VOLUME - IA
TECHNICAL CONDITIONS OF CONTRACT (TCC)

BHARAT HEAVY ELECTRICALS LIMITED

TECHNICAL CONDITIONS OF CONTRACT (TCC)
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1.0 Project Information (TNPL UNIT-II, 1x30MW STG)

1	Purchaser	:	M/s TAMILNADU NEWSPRINT& PAPERS LTD.
2	Project Title	:	TNPL Unit-II, 1x30MW STG
3	Location	:	Monadipati Village, Near Mannparai
4	Address Detail	:	Monadipati Village, Near Mannaparai Tirchy Dist: Tamilnadu
5	Nearest Railway Station	:	Karur
6	Road Approach	:	NH-67
7	Nearest Air Port	:	Tiruchirappalli
8	Nearest Port	:	Cochin
9	Data of Seismic Design	:	As per IS 1893
10	Average Annual Rainfall	:	775 mm
11	Ambient Air Temperature (Average)	:	a) Maximum : 34 C b) Minimum : 23 C
12	Average Relative Humidity	:	53 - 57 %
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 Unit-II 1x30MW STGs at Mondipati Village, Near Mannaparai Tamilnadu to be carried out by contractor, but not limited to following for safe, speedy erection and commissioning of this package.

- Supply of one Portable cabin of size 20ft. x 10ft. x 8ft. with furniture & other fittings will be used as site office. Supply of one Porta Cabin of size 20ft. x 10ft. x 8ft. with proper lighting for sotage of material. Bidder shall take back these porta cabins after contract period. Details of porta cabins are given in Part-II, chapter III of TCC.

- Installation of Porta cabins, barbed wire fencing (around 100 m) with gate for office cum storage area, for the site office area allotted to BHEL. Electrical distribution of construction work of Mechanical, Electrical & C&I work of the complete package. Dismantling, removal & disposal(within a radius of 10.0 Km. inside/outside the customer complex at a designated place informed by customer/BHEL) of all temporary facilitation works, viz. fencing, gate, site office(BHEL/Bidder's), etc. will be in bidder's scope.

- Receipt of materials from Manufacturing Units of BHEL, BHEL Sub Vendor, Customer stores, Storage yard etc. Handling at stores/storage yard, site of work, transportation to site of work. Preservation of all materials / equipment's under custody of the contractor during storage, pre-assembly and erection, commissioning etc. shall be carried out by Contractor.

- Rotating Equipments (Steam turbine, Turbo generator, auxiliary pumps) Inspection, preparation of foundation for erection, erection, leveling, centering, alignment, grouting & final alignment. Pre commissioning & commissioning.

- Piping between various equipment & customer battery limit (Steam, Utility, Oil, CW) : All piping items will be supplied as loose and Pipes in commercial lengths.

    i. Fabrication, Preassembly, erection, alignment, welding, Insulation, NDT, Fabrication of supports, fixing hangers & supports, installation of valves, instruments installation, chemical cleaning / pickling, card board blasting, oil flushing, water flushing, hydro testing, & supply of target plates for steam blowing. Pre commissioning & commissioning.
    ii. Fabrication & erection of Temporary Piping along with supports & insulation, Installation of fixtures (blinds etc.) Hydro testing, steam blowing, chemical cleaning etc.
    iii. Lifting, laying, erection, bolt tensioning, bolt torque tightening, supporting and installation, pre and post weld heat treatment, inspection, nondestructive testing including radiography and hydrostatic test, water / steam flushing, air drying, nitrogen purging and other testing of piping installations above ground.
    iv. Supply of Consumables like Welding Rods, Filler rods for welding and target plates for steam blowing.

- Vessels (Flash Tanks, Overhead Oil tank, Drain Oil Tank): Pre assembly, preparation of foundation for erection, erection, welding. Pre commissioning & commissioning

- Heat Exchangers (Generator Air Coolers, GSC, Lube Oil Coolers): Pre assembly, preparation of foundation for erection, erection, welding, insulation. Pre commissioning & commissioning.

- Static Equipment (Lube Oil Console, Jacking Oil Skid, Governing Oil Skid, Oil Centrifuge) : Inspection, preparation of foundation for erection, erection, leveling, centering, alignment, grouting & final alignment. Pre commissioning & commissioning.

- Panels (Generator Control Panel, Generator Relay Panel, DAVR, LASC, NGR, CT, Turbine Control Panel, Local Gauge Rack, Governing Console): Inspection, preparation of foundation for erection, erection, leveling. Pre commissioning & commissioning.

- Cabling works (Interconnecting power cables and instrumentation cables) : Laying from equipment to equipment, termination & Testing etc.

- Instrumentation (Field instruments, Machine mounted instrument, Control Valves, PSV, Stop Valves, Flow meters, etc) : Installation, calibration, testing, pre-commissioning and Commissioning.

- Bus Duct: 11 kV bus duct connecting Generator with main breaker panel through CT and with tapping to LASC panels. 11 kV bus duct from TG neutral terminals to NGR panel. Open Bus bar inside the Cooling duct.

- Earthing: Above ground Earthing of BHEL supplied equipment upto the Customer's main grid

- Painting: Supply and application of painting (Primer and Final Painting) for Piping, Structural and equipment touch up.

- During the erection, testing, pre-commissioning and commissioning works, some repairs, rectification and modifications etc. are likely to occur. Bidder shall note that they are part of scope of job. The bidder while quoting the rates shall take the above in consideration and no extra payment will be entertained on this account.

Examples for repairs, rectification, modifications etc.

1. Mismatching of flanges,
2. Machine base plate hole enlarging for adjustments,
3. Supports welding to equipment and rectification as per site condition,
4. Matching of filter section,
5. Additional chipping of foundation,

6. Changing of parts when they fail during the tests etc.,
7. Re-reaming of Coupling bolts holes etc.
8. Any parting plane blue matching etc.,
9. Providing of small opening on oil tanks & mounting of oil pumps. These points are only few examples, similar types of other works are also likely to come which are incidental to the nature of erection work.

- For any extra equipment & structural the approved unit rates of erection only will be applicable, and this will not be treated as extra works for payment on man hour rates basis.

- Execute all mechanical, electrical, C&I jobs identified during check list, Technical audits, pre-commissioning and commissioning, including additional supports required to restrain pipe movement avoiding interference with nearby structural / piping.

- Obtain clearances and approvals from all applicable statutory / Government agencies e.g. IBR, Electrical Inspectorate etc.

- Dewatering inside building for equipment erection facilitating is contractor scope.

- Provision of crane for erection activities as and when required.

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 owner
b	Open space for storage (as per availability)	Yes		Location will be finalized after joint survey with owner
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**			Not applicable
a	Open space for labour colony (as per availability)			
b	Labour Colony with internal roads, sanitation, complying with statutory requirements			
3.2.0	**ELECTRICITY**			
3.2.1	**Electricity For construction purposes** of Voltage 415/440 V			FREE
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	

S. No.	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.2	**Electricity for the office, stores, canteen etc of the bidder**			FREE
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	
3.2.3	**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**			FREE
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	
3.3.2	**Water supply for bidder's office, stores, canteen etc**			FREE
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**	
3.3.3	**<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	
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 ERECTION FACILITIES	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.9.1	**Engineering works for construction:**			
a	Providing the erection drawings for all the equipments 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 site erection schedules and other input requirements		Yes	In consultation with BHEL
f	Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments	Yes	Yes	In consultation with BHEL
g	Weekly erection schedules based on S. No. e. hard copy to Construction manager, by email to HO.		Yes	In consultation with BHEL
h	Daily erection / 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	Preparation of preassembly bay		Yes	

Sl. No	Description PART II 3.9.0 ERECTION FACILITIES	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
k	Laying of racks for gantry crane if provided by BHEL or brought by the contractor/bidder himself		Yes	
l	Arranging the materials required for preassembly		Yes	
M	Coordination for inspection (IMIR etc) and getting clearance from Client / PMC		Yes	
N	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	Dia. of the drill =15 mm	2 Nos.

	Machine dia: 15 mm	Power=350 watts 250V, 50 c/s	
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		1 No.

	manipulator rod. Iridium\ 192 isotope		
	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. LIST OF TOOLS AND PLANT - C&I, ELECTRICALS :

The following tools and equipment but not limited to, are required for the installation and commissioning instrumentation & electrical works. The contractor shall make them available for erection, testing and commissioning purposes, including all consumables likely to be used at his own cost at the time of mobilization and get them certified by Engineer in charge.

S.No.	Description
1.	2.
1.	Pipe bending machine (5mm to 25 mm)
2.	Pipe wrenches (6", 8", 12")
3.	Screw spanners (7", 8")
4.	Set of screw drivers
5.	Set of Allen keys (mm & inch)
6.	Set of spanners
7.	Set of needle files (Round, triangular, square, half round and knife edge)
8.	Copper tube cutters
9.	Stainless steel tube cutter and flaming tool
10.	SS Tube bender
11.	Small size hacksaw & fraksaw
12.	Cutting pliers
13.	Nose pliers
14.	Insulation stripers
15.	Dry cable jointer
16.	Crimping tool for control and power cables
17.	Die set ¼", ½", ¾", 1 ½", 2", ET, NPT, M20X1, M20X1.5
18.	Tap set of above sizes
19.	Drill bits
20.	Number punches

21. Alphabet punch
22. Embossing machine with cassettes (Numbers and alphabets)
23. Portable drilling machine up to 1-1/2”
24. Soldering gun
25. Soldering Iron
26. Multimeter (a) Digital 3-1/2 digit (b) Analog with Comet AC/DC 0-10A & Voltage-1000V.
27. Avometer
28. Megger 500V, 1000V, 2500V/ 5kv Motorized
29. Calibration kit for thermocouples RTDS
30. Continuity tester
31. Calibration kit for vibration equipment
32. 0-30 MA ammeter
33. Standard gauge for pneumatic instrument calibration.
34. Manometer 0-2 M of H20
35. Vacuum pump
36. Standard pressure gauges 0-2.5 Kg/cm2, 0-100 Kg/cm2, 0-160 Kg/cm2, 0-250 Kg/cm2.
37. Pneumatic calibrating kit
38. Telephone headphones with accessories for cable testing etc.
39. Hydraulic pump capable of generating 400 kg/cm2 pressure.
40. Dead weight tester for pressure gauges calibration up to 400 kg/cm2 range
41. Universal watch makers screw driver set
42. Day welding and cutting set
43. Welding DC Generator set with regulator etc.
44. Spring balance 0-2 Kg/cm
45. Torque wrench 0-60 Kgm
46. Dual channel Oscilloscope

47. Micro ohmmeter digital 0-200m ohm/0-10 amps DC
48. Phase sequence meter
49. Tong tester (a) 0-300 amps AC (b) 0-100 amps DC
50. Three phase variac 0-10 A, 415/450 V
51. Single phase variac 0-250 V, 10A
52. HV Test kit 0-30 KV DC
53. Relay test kit with phase shifter

G. 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.

SN	DESCRIPTION & CAPACITY OF T&P	QUANTITY	PURPOSE
01	EOT CRANE IN TG HALL	1 No. of 40 T	FOR HANDLING AND ERECTION WITHIN TG HALL ON SHARING BASIS AS AVAILABLE AND SUBJECT TO THEIR ACCESSIBILITY AND APPROACHABILITY.

NOTE:

1. Customer will provide one number of EOT crane of 40 T capacity, however contractor will have to provide the EOT crane operator for his operations and will carry out the day today operational maintenance, general cleanliness, attending of gear box leakages etc., applying caladium Compound on slings and holding/supporting the supply cables etc. as part of scope of work.

2. EOT cranes will be used on sharing basis by other agencies working within the TG hall under the instruction of BHEL. Contractor has to plan his activities well in advance and inform BHEL engineer in charge/ Construction Manager the date of actual use.

6.1 **TIME SCHEDULE**

6.1.1
The entire work of erection testing and commissioning of the Steam Turbine, Generator & their auxiliaries as detailed elsewhere in the Tender Specification shall be completed within **9 (Nine) months(06 months for Erection & Commissioning+3 month for PG Test, Handing Over and Site 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, testing 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 erection & commission are achieved on specified schedules:

TENTATIVE SCHEDULE

Activity	Tentative schedule
Mobilization for Site Establishment activities	**Dec'15**
Commencement of Erection	**Jan'15**
Mechanical Erection Completion	**Apr'15**
TG oil flushing completion	**Apr'15**
Turbine on barring gear	**May'15**
Rolling & synchronization	**May'15**
Trial Operation Completion	**May'15**
PG Test, Handing Over and Site Demobilization	**Aug'15**

6.3.3
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.

6.4 CONTRACT PERIOD

For the purpose of contract, the period shall be taken as **9 (Nine) months(06 months for Erection & Commissioning+3 month for PG Test, Handing Over and Site 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.

6.5 GUARANTEE PERIOD
The guarantee period of twelve months shall commence from the date of handing over of the Unit to Customer or six months from the date of first synchronization of the set, whichever is earlier (Provided all erection, testing, and commissioning works are completed in all respects)

The progressive payment for erection, testing and commissioning on accepted price of contract value per unit of STG Package rates will be released as per the break up given hereinafter:

7.1. Hiring of Porta cabin & Container

The following are the weightages assigned for various activities against prices for Part A of the Price bid specification.

Sl. No.		Item	Weightage
7.1.1	**Porta cabins**		
	1.	HIRING CHARGES OF ONE NO. PORTA CABIN & ONE CONTAINER TILL CONTRACT PERIOD PAYABLE ON SUPPLY & FIXING OF PORTA CABIN & CONTAINER ALONGWITH ALL FURNITURES, FIXTURES, ETC. FENCING WORK AND SITE DEVELOPMENT	90%
	2.	HIRING CHARGES OF ONE NO. PORTA CABIN & ONE NO. CONTAINER, PAYABLE AFTER COMPLETION OF NINE MONTHS FROM THE DATE FIXING OF CABINS AS DEFINED IN S. NO. 1 ABOVE	10%
	Total		**100.00%**

The following terms of payment will be operated

a. **80 % payment against running bills.**
b. **5% on acceptance of submitted protocols by Client.**
c. **10 % upon final commissioning and material reconciliation.**
d. **Balance 5% (retention amount) as per GCC clause no. 2.22.**
e. **Security deposit will be as per clause no. 1.10 & 1.11 of GCC.**

7.2 Mechanical Items :

The bidder shall quote “FIRM” Prices only.

7.2.1. 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.

7.2.2 ERECTION,TESTING COMMISSIONING AND PAINTING APPLICATION				
S.NO	Description	QUANTITY		TOTAL WT
		NO OF ITEMS	WT	
7.2.2.1	Upper Part of Outer Casing + Upper Part of Exhaust Hood	1	18750	18750
7.2.2.2	Lower Part of Outer Casing + Exhaust Hood	1	19750	19750
7.2.2.3	Guide Blade Carrier - I	1	1000	1000
7.2.2.4	Guide Blade Carrier - II	1	1000	1000
7.2.2.5	Guide Blade Carrier - III	1	1000	1000
7.2.2.6	Guide Blade Carrier - IV	1	1000	1000
7.2.2.7	LP Guide Blade Carrier	1	3500	3500
7.2.2.8	Steam Chamber	1	1500	1500
7.2.2.9	Intermidiate Glands	1	1000	1000
7.2.2.10	Front Bearing Support System	1	7000	7000
7.2.2.11	Rear Bearing Support System	1	2000	2000
7.2.2.12	Bed Plate under Exhaust Hood	1	2000	2000
7.2.2.13	Rotor	1	7000	7000
7.2.2.14	ESV Assembly	1	975	975
7.2.2.15	HP Servo motor Assembly	1	466	466
7.2.2.16	LP Servomotor Assembly	2	130	260
7.2.2.17	Gear Box Assembly	1	15200	15200
7.2.2.18	Generator Assembly	1	63300	63300
7.2.2.19	Generator Foundation + Duct items	1 set	7000	6000
7.2.2.20	Generator Air cooler	8	960	7680
7.2.2.21	Lub oil tank	1	5810	5810
7.2.2.22	Overhead Lube Oil tank	1	2340	2340
7.2.2.23	Duplex filters	1	350	350
7.2.2.24	Main / Aux. Lube Oil Pump Assembly	2	1200	2400
7.2.2.25	Emergency Oil Pump Asembly	1	650	650

7.2.2.26	Jacking Oil Pump Assembly	1	600	600
7.2.2.27	Lube Oil Accumulators	1 set	500	500
7.2.2.28	Oil Vapour Extn Fan	2	100	200
7.2.2.29	Lube Oil Centrifuge	1	1000	1000
7.2.2.30	Transfer Oil Pump	1	100	100
7.2.2.31	Drain Oil Tank	1	1150	1150
7.2.2.32	Gov. Oil Console	1	1200	1200
7.2.2.33	Lube Oil Cooler	2	4000	8000
7.2.2.34	Valves	1 Set	11000	11000
7.2.2.35	Gland Steam Condenser	1	1000	1000
7.2.2.36	Structurals	1 Set	5000	5000
7.2.2.37	Flash Tank	1	1150	2300
7.2.2.38	Warm Up vent Silencer	1	500	500
7.2.2.39	LP Steam Vent Silencer	1	1300	1300
7.2.2.40	MP Steam Vent Silencer	1	950	950
Total Weight				208530

7.2.3 Pipe fit up and welding

S.No	PIPE SIZE	MATL.	TYPE OF WELD	No. of Joints
IBR PIPING-Alloy Steel				
7.2.3.01	0.5" Sch 80	P11	TIG+SMAW	10
7.2.3.02	1" Sch 80	P11	TIG+SMAW	85
7.2.3.03	1.5" Sch 80	P11	TIG+SMAW	20
7.2.3.04	2" Sch 40	P11	TIG+SMAW	45
7.2.3.05	3" Sch 40	P11	TIG+SMAW	15
7.2.3.06	4" Sch 40	P11	TIG+SMAW	40
7.2.3.07	6" Sch 40	P11	TIG+SMAW	45
7.2.3.08	0.5 " Thk. 7.47	P22	TIG+SMAW	55
7.2.3.09	1 " Thk. 4.55	P22	TIG+SMAW	14
7.2.3.10	1 " Thk. 5.08	P22	TIG+SMAW	8
7.2.3.11	1 " Thk. 6.35	P22	TIG+SMAW	68
7.2.3.12	1 " Thk. XXS	P22	TIG+SMAW	78
7.2.3.13	1.5 " Thk. 5.08	P22	TIG+SMAW	2

7.2.3.14	1.5 " Thk. 5.54	P22	TIG+SMAW	10
7.2.3.15	1.5 " Thk. 7.14	P22	TIG+SMAW	74
7.2.3.16	2 " Thk. 12.75	P22	TIG+SMAW	3
7.2.3.17	2 " Thk. STD	P22	TIG+SMAW	12
7.2.3.18	3 " Thk. 5.49	P22	TIG+SMAW	27
7.2.3.19	3 " Thk. 15.24	P22	TIG+SMAW	11
7.2.3.20	4 " Thk. 7.14	P22	TIG+SMAW	2
7.2.3.21	4 " Thk. 17.12	P22	TIG+SMAW	4
7.2.3.22	4 " Thk. STD	P22	TIG+SMAW	4
7.2.3.23	8 " Thk. 25.4	P22	TIG+SMAW	16
7.2.3.24	12 " Thk. 7.14	P22	TIG+SMAW	6
7.2.3.25	12 " Thk. 12.75	P22	TIG+SMAW	2
7.2.3.26	12 " Thk. 15.24	P22	TIG+SMAW	2
7.2.3.27	12 " Thk. 35	P22	TIG+SMAW	54
7.2.3.28	12 " Thk. XXS	P22	TIG+SMAW	32
IBR PIPING-Carbon Steel				
7.2.3.29	0.5" Sch 80	A106GRB	TIG+SMAW	124
7.2.3.30	1" Sch 80	A106GRB	TIG+SMAW	371
7.2.3.31	1.5" Sch 80	A106GRB	TIG+SMAW	68
7.2.3.32	3" Sch 160	A106GRB	TIG+SMAW	36
7.2.3.33	4" Sch 40	A106GRB	TIG+SMAW	7
7.2.3.34	6" Sch 40	A106GRB	TIG+SMAW	34
7.2.3.35	8" Sch 20	A106GRB	TIG+SMAW	50
7.2.3.36	8" Sch STD	A106GRB	TIG+SMAW	11
7.2.3.37	8" Sch 80	A106GRB	TIG+SMAW	20
7.2.3.38	10" Sch 40	A106GRB	TIG+SMAW	37
7.2.3.39	12" Sch 20	A106GRB	TIG+SMAW	32
7.2.3.40	24" Sch 20	A106GRB	TIG+SMAW	24
NON-IBR PIPING				
7.2.3.41	0.25" Sch 80	A106GRB	TIG+SMAW	15
7.2.3.42	0.5" Sch 80	A106GRB	TIG+SMAW	149
7.2.3.43	0.75" Sch 80	A106GRB	TIG+SMAW	35
7.2.3.44	1" Sch 80	A106GRB	TIG+SMAW	255
7.2.3.45	1.5" Sch 80	A106GRB	TIG+SMAW	63
7.2.3.46	2" Sch 40	A106GRB	TIG+SMAW	142
7.2.3.47	3" Sch 40	A106GRB	TIG+SMAW	114
7.2.3.48	4" Sch 40	A106GRB	TIG+SMAW	110
7.2.3.49	6" Sch 40	A106GRB	TIG+SMAW	311
7.2.3.50	6" Sch 80	A106GRB	TIG+SMAW	3
7.2.3.51	8" Sch 20	A106GRB	TIG+SMAW	30
7.2.3.52	8" Sch 80	A106GRB	TIG+SMAW	4

7.2.3.53	10" Sch 20	A106GRB	TIG+SMAW	50
7.2.3.54	10" Sch 30	A106GRB	TIG+SMAW	6
7.2.3.55	10" Sch 40	A106GRB	TIG+SMAW	8
7.2.3.56	12" Sch 20	A106GRB	TIG+SMAW	20
7.2.3.57	20" Sch 30	A106GRB	TIG+SMAW	1
7.2.3.58	4" Sch 10S	SS321	TIG	115
7.2.3.59	3" Sch 10S	SS321	TIG	60
7.2.3.60	2" Sch 20S	SS321	TIG	90
7.2.3.61	1.5" Sch 40S	SS321	TIG	35
7.2.3.62	1" Sch 40S	SS321	TIG	315
7.2.3.63	0.75" Sch 40S	SS321	TIG	50
7.2.3.64	1/2" Sch 40S	SS321	TIG	103
7.2.3.65	0.25" Sch 40S	SS321	TIG	25

7.2.4 Radiography of piping

S.No	PIPE SIZE	MATL.	TYPE OF WELD	No. of Joints
IBR PIPING-Alloy Steel				
7.2.4.01	0.5" Sch 80	P11	TIG+SMAW	10
7.2.4.02	1" Sch 80	P11	TIG+SMAW	85
7.2.4.03	1.5" Sch 80	P11	TIG+SMAW	20
7.2.4.04	2" Sch 40	P11	TIG+SMAW	45
7.2.4.05	3" Sch 40	P11	TIG+SMAW	15
7.2.4.06	4" Sch 40	P11	TIG+SMAW	40
7.2.4.07	6" Sch 40	P11	TIG+SMAW	45
7.2.4.08	0.5 " Thk. 7.47	P22	TIG+SMAW	55
7.2.4.09	1 " Thk. 4.55	P22	TIG+SMAW	14
7.2.4.10	1 " Thk. 5.08	P22	TIG+SMAW	8
7.2.4.11	1 " Thk. 6.35	P22	TIG+SMAW	68
7.2.4.12	1 " Thk. XXS	P22	TIG+SMAW	74
7.2.4.13	1.5 " Thk. 5.08	P22	TIG+SMAW	2
7.2.4.14	1.5 " Thk. 5.54	P22	TIG+SMAW	2
7.2.4.15	1.5 " Thk. 7.14	P22	TIG+SMAW	74
7.2.4.16	2 " Thk. 12.75	P22	TIG+SMAW	3
7.2.4.17	2 " Thk. STD	P22	TIG+SMAW	4
7.2.4.18	3 " Thk. 5.49	P22	TIG+SMAW	27
7.2.4.19	3 " Thk. 15.24	P22	TIG+SMAW	11
7.2.4.20	4 " Thk. 7.14	P22	TIG+SMAW	2
7.2.4.21	4 " Thk. 17.12	P22	TIG+SMAW	4

7.2.4.22	4 " Thk. STD	P22	TIG+SMAW	4
7.2.4.23	8 " Thk. 25.4	P22	TIG+SMAW	16
7.2.4.24	12 " Thk. 7.14	P22	TIG+SMAW	4
7.2.4.25	12 " Thk. 12.75	P22	TIG+SMAW	2
7.2.4.26	12 " Thk. 15.24	P22	TIG+SMAW	2
7.2.4.27	12 " Thk. 35	P22	TIG+SMAW	54
7.2.4.28	12 " Thk. XXS	P22	TIG+SMAW	32
IBR PIPING-Carbon Steel				
7.2.4.29	0.5" Sch 80	A106GRB	TIG+SMAW	13
7.2.4.30	1" Sch 80	A106GRB	TIG+SMAW	38
7.2.4.31	1.5" Sch 80	A106GRB	TIG+SMAW	7
7.2.4.32	3" Sch 160	A106GRB	TIG+SMAW	4
7.2.4.33	4" Sch 40	A106GRB	TIG+SMAW	2
7.2.4.34	6" Sch 40	A106GRB	TIG+SMAW	4
7.2.4.35	8" Sch 20	A106GRB	TIG+SMAW	5
7.2.4.36	8" Sch STD	A106GRB	TIG+SMAW	2
7.2.4.37	8" Sch 80	A106GRB	TIG+SMAW	2
7.2.4.38	10" Sch 40	A106GRB	TIG+SMAW	4
7.2.4.39	12" Sch 20	A106GRB	TIG+SMAW	3
7.2.4.40	24" Sch 20	A106GRB	TIG+SMAW	3
NON-IBR PIPING				
7.2.4.41	0.25" Sch 80	A106GRB	TIG+SMAW	2
7.2.4.42	0.5" Sch 80	A106GRB	TIG+SMAW	15
7.2.4.43	0.75" Sch 80	A106GRB	TIG+SMAW	4
7.2.4.44	1" Sch 80	A106GRB	TIG+SMAW	26
7.2.4.45	1.5" Sch 80	A106GRB	TIG+SMAW	7
7.2.4.46	2" Sch 40	A106GRB	TIG+SMAW	15
7.2.4.47	3" Sch 40	A106GRB	TIG+SMAW	12
7.2.4.48	4" Sch 40	A106GRB	TIG+SMAW	11
7.2.4.49	6" Sch 40	A106GRB	TIG+SMAW	32
7.2.4.50	6" Sch 80	A106GRB	TIG+SMAW	2
7.2.4.51	8" Sch 20	A106GRB	TIG+SMAW	3
7.2.4.52	8" Sch 80	A106GRB	TIG+SMAW	2
7.2.4.53	10" Sch 20	A106GRB	TIG+SMAW	5
7.2.4.54	10" Sch 30	A106GRB	TIG+SMAW	2
7.2.4.55	10" Sch 40	A106GRB	TIG+SMAW	2
7.2.4.56	12" Sch 20	A106GRB	TIG+SMAW	2
7.2.4.57	20" Sch 30	A106GRB	TIG+SMAW	1
7.2.4.58	4" Sch 10S	SS321	TIG	12
7.2.4.59	3" Sch 10S	SS321	TIG	6
7.2.4.60	2" Sch 20S	SS321	TIG	9

7.2.4.61	1.5" Sch 40S	SS321	TIG	4
7.2.4.62	1" Sch 40S	SS321	TIG	32
7.2.4.63	0.75" Sch 40S	SS321	TIG	5
7.2.4.64	1/2" Sch 40S	SS321	TIG	10
7.2.4.65	0.25" Sch 40S	SS321	TIG	3

7.2.5 PIPING ERECTION INCLUDING SPRING HANGERS, SUPPORTS, HYDRAULIC TESTING AND PAINTING

S.No	PIPE SIZE	MATL.	Length
IBR PIPING-Alloy Steel			
7.2.5.01	0.5" Sch 80	P11	6
7.2.5.02	1" Sch 80	P11	66
7.2.5.03	1.5" Sch 80	P11	12
7.2.5.04	2" Sch 40	P11	36
7.2.5.05	3" Sch 40	P11	12
7.2.5.06	4" Sch 40	P11	33
7.2.5.07	6" Sch 40	P11	30
7.2.5.08	0.5 " Thk. 7.47	P22	18
7.2.5.09	1 " Thk. 4.55	P22	6
7.2.5.10	1 " Thk. 6.35	P22	97
7.2.5.11	1.5 " Thk. 5.08	P22	12
7.2.5.12	1.5 " Thk. 5.54	P22	12
7.2.5.13	1.5 " Thk. 7.14	P22	72
7.2.5.14	2 " Thk. 12.75	P22	18
7.2.5.15	3 " Thk. 5.49	P22	36
7.2.5.16	3 " Thk. 15.24	P22	6
7.2.5.17	4 " Thk. 17.12	P22	0.6
7.2.5.18	8 " Thk. 25.4	P22	12
7.2.5.19	12 " Thk. 7.14	P22	96
IBR PIPING-Carbon Steel			
7.2.5.20	0.5" Sch 80	A106GRB	42
7.2.5.21	1" Sch 80	A106GRB	306
7.2.5.22	1.5" Sch 80	A106GRB	48
7.2.5.23	3" Sch 160	A106GRB	54
7.2.5.24	4" Sch 40	A106GRB	7
7.2.5.25	6" Sch 40	A106GRB	24
7.2.5.26	8" Sch 20	A106GRB	54
7.2.5.27	8" Sch STD	A106GRB	18
7.2.5.28	10" Sch 40	A106GRB	42
7.2.5.29	12" Sch 20	A106GRB	42

7.2.5.30	24" Sch 20	A106GRB	36
NON-IBR PIPING			
7.2.5.31	0.5" Sch 80	A106GRB	63
7.2.5.32	0.75" Sch 80	A106GRB	30
7.2.5.33	1" Sch 80	A106GRB	120
7.2.5.34	1.5" Sch 80	A106GRB	44
7.2.5.35	2" Sch 40	A106GRB	87
7.2.5.36	3" Sch 40	A106GRB	72
7.2.5.37	4" Sch 40	A106GRB	72
7.2.5.38	6" Sch 40	A106GRB	270
7.2.5.39	6" Sch 80	A106GRB	6
7.2.5.40	8" Sch 20	A106GRB	18
7.2.5.41	8" Sch 80	A106GRB	12
7.2.5.42	10" Sch 20	A106GRB	60
7.2.5.43	10" Sch 30	A106GRB	18
7.2.5.44	12" Sch 20	A106GRB	18
7.2.5.45	20" Sch 30	A106GRB	6
7.2.5.46	4" Sch 10S	SS321	69
7.2.5.47	3" Sch 10S	SS321	36
7.2.5.48	2" Sch 20S	SS321	51
7.2.5.49	1.5" Sch 40S	SS321	27
7.2.5.50	1" Sch 40S	SS321	198
7.2.5.51	0.75" Sch 40S	SS321	30
7.2.5.52	1/2" Sch 40S	SS321	54
7.2.5.53	0.25" Sch 40S	SS321	66

7.2.6 THERMAL INSULATION (APPLICATION) INCLUDING CLADDING, FIXING ARRANGEMENTS ETC.

Sl. No.	Pipe OD in mm	Sq.m
7.2.6.01	30mm thick Mattress. (Piping)	11.14
7.2.6.02	40mm thick Mattress. (Piping)	72.614
7.2.6.03	45mm thick Mattress. (Piping)	464.08
7.2.6.04	50mm thick Mattress.(Piping)	246.45
7.2.6.05	60mm thick Mattress.(Piping)	11.966
7.2.6.06	65mm thick Mattress.(Piping)	13.867
7.2.6.07	70mm thick Mattress.(Piping)	147.21
7.2.6.08	75mm thick Mattress.(Piping)	347.44
7.2.6.09	90mm thick Mattress.(Piping)	23.93
7.2.6.10	100mm thick Mattress.(Piping)	14.96
7.2.6.11	115mm thick Mattress.(Piping)	14.188

7.2.6.12	125mm thick Mattress.(Piping)	16.33
7.2.6.13	150mm thick Mattress.(Piping)	18.76
7.2.6.14	HE Equipment (75 MM THIKNESS)	17

7.2.7 Electrical, Control & Instrumentation Items : ERECTION, CALIBRATION,TESTING, LOOP - CHECKING & COMMISSIONING

Sl.no	Description of items	UOM	Quantity
ELECTRICAL ITEMS			
SECTION-E1A: CABLE TRAYS AND ACCESSORIES			
E1A.1	PERFORATED TYPE 50 MM (W)x 50 (H) mm	MTRS	1,450
E1A.2	PERFORATED TYPE 150 MM (W)x 75 (H) mm	MTRS	750
SECTION-E2A: LT POWER/CONTROL CABLES			
E2A.1	5Cx2.5 SQ MM	MTRS	2,000
E2A.2	10CX2.5 SQMM	MTRS	1,000
E2A.3	12C X 2.5 SQ MM	MTRS	1,000
E2A.4	3CX4 SQMM	MTRS	500
E2A.5	3CX6 SQMM	MTRS	300
SECTION-E3A: EARTHING MATERIALS			
E3A.1	75x10 MM GI STRIP	MTRS	300
E3A.2	35x6 MM GI STRIP	MTRS	900
E3A.3	25x6 MM GI STRIP	MTRS	600
E3A.4	8 SWG GI WIRE	MTRS	1,500
E3A.5	16SWG GI WIRE	MTRS	1,000
E3A.6	1Cx70SQMM EARTHING CABLE	MTRS	500
SECTION-E4A: JUNCTION BOXES			
E4A.1	INSTRUMENT JUNCTION BOX (300X150X350)MM,WEIGHT 15KGS EACH	NOS.	21
E4A.2	PROXIMETER HOUSING (150X100X50)MM, WEIGHT 5KGS EACH	NOS.	11
E4A.3	LOCAL CONTROL STATION (300 x 150 x 400)MM,WEIGHT 10KGS EACH	NOS.	20
SECTION-E5A: STRUCTURAL STEEL			
E5A.1	STRUCTURAL STEEL FABRICATION & ERECTION(MS ANGLE ,CHANNEL,PLATE ETC.)	KG	3,100
E5A.2	2" CS PIPE FOR TRANSMITTER &JB MOUNTING	MTRS	150
SECTION-E6A:GENERATOR CONTROL & PROTECTION PANELS			
E6A.1	GENERATOR CONTROL AND RELAY PANELS (1000 X1000 X2200) APPX WEIGHT 600KGS	NOS.	3
E6A.2	LAVT CUBICLE(2250 X 2100 X 2400)APPX WEIGHT 2400KGS	NOS.	1
E6A.3	NGR CUBICLE(1200X1200X1800) APPX WEIGHT 2000 KGS	NOS.	1
E6A.4	DAVR PANEL (1200x1150x2295) APPX WEIGHT 1200 KGS	NOS.	1
E6A.5	11kV, 3000 AMPS, SP BUS DUCT, LOOSE ITEMS LIKE SILICAGEL BREATHER, GI CHANNELS SUPPORT AND ASSOCIATED ACCESSORIES.TYPICAL SECTION	SET	1

	20000X1350X450 MM APPX WEIGHT 3500 KGS.		
SECTION-E7A : STARTER PANEL/BOXES/POWER DISTRIBUTION BOX/MARSHALLING BOXES			
E7A.1	DC MOTOR STARTER PANEL INCLUDING RESISTANCE BOXES. APPX. WEIGHT 350 KGS AND DIMESION 1500x1500x1800 MM	NOS.	1
	C&I Items		
SECTION-C1A:CONDUITS/PIPES/TUBES			
C1A.1	AIR DISTRIBUTION POT	NOS.	12
C1A.2	IMPULSE PIPE AS 21.3X3.73	MTRS	300
C1A.3	IMPULSE PIPE CS 21.3x3.73mm SCH80	MTRS	132
C1A.4	IMPULSE PIPE CS 21.3x4.78mm SCH160	MTRS	78
C1A.5	IMPULSE PIPE SS 21.3X2.8	MTRS	30
C1A.6	IMPULSE PIPE SS 12.7X2.1MM THK	MTRS	930
C1A.7	IMPULSE PIPE SS 6X1.5MM THK	MTRS	84
C1A.8	METAL WITH PVC SHEATHED CONDUITS	MTRS	200
SECTION-C2A:SIGNAL & INSTRUMENT CABLES			
C2A.1	1P x 1.5 SQ MM	MTRS	2300
C2A.2	1T x 1.5 SQ MM	MTRS	100
C2A.3	2TX1.5 SQMM	MTRS	2200
C2A.4	10TX1.5 SQMM	MTRS	500
C2A.5	2P x 0.5 SQMM CR-AL EXTENTION CABLE	MTRS	150
C2A.6	3Cx1.5 SQMM CABLE	MTRS	1200
SECTION-C3A: FIELD INSTRUMENTS			
C3A.1	DIFFERENTIAL PRESSURE TRANSMITTER	NOS.	8
C3A.2	PRESSURE TRANSMITTER	NOS.	26
C3A.3	TEMPERATURE TRANSMITTER	NOS.	46
C3A.4	LEVEL TRANSMITTERS	NOS.	1
C3A.5	LEVEL GAUGES	NOS.	4
C3A.6	LEVEL SWITCHES	NOS.	6
C3A.7	PRESURE GAUGES	NOS.	58
C3A.8	DIFFERENTIAL PRESSURE GAUGES	NOS.	1
C3A.9	TEMPERATURE GAUGES	NOS.	34
C3A.10	PRESSURE SWITCH	NOS.	29
C3A.11	TEMPERATURE ELEMENT (THERME COUPLE)	NOS.	6
C3A.12	TEMPERATURE ELEMENT (RTD)	NOS.	22
C3A.13	POSITION TRANSMITTER	NOS.	3
C3A.14	SPEED PROBE	NOS.	2
C3A.15	VIBRATION , AXIAL AND SPEED PROBE	NOS.	19
C3A.16	LIMIT SWITCHES	NOS.	6
C3A.17	SOLENOID VALVES	NOS.	6
C3A.18	PROXIMETERS	NOS.	19
C3A.19	VIBRATION MONITOR	NOS.	1
C3A.20	WOODWARD GOVERNOR	NOS.	1
SECTION-C4A: CONTROL PANELS			
C4A.1	TURBINE CONTROL PANEL(1000x800x2100)Appx. Weight 500kgs each	NOS.	1
C4A.2	TURBINE LOCAL GAUGE BOARD(1700x1200x500) Appx weight 400kgs	NOS.	2

TOTAL PRICE	

7.3.1. MATERIAL UNLOADING AND STACKING

Sl no	Description	Weight (Tons)
7.3.1.1	Material Handling and Stacking	439.63
7.3.1 Total		

BILLING SUMMARY

Clause	Description
7.1	PORTA CABIN HIRING CHARGES
7.2.2	EQUIPMENT ERECTION INCLUDING COST OF GROUTING
7.2.3	PIPE FIT UP AND WELDING
7.2.4	RADIOGRAPHY OF PIPING JOINTS
7.2.5	PIPING ERECTION INCLUDING SPRING HANGERS SUPPORTS & PAINTING
7.2.6	THERMAL INSULATION (APPL) INCLUDING CLADDING, FIXING ARRANGEMENTS ETC
7.2.7	ELECTRICAL AND CONTROL & INSTRUMENTATION
7.3.1	MATERTIAL HANDLING AND STAKING Total

Notes (MECHANICAL):

1. Bidders to note that turbine, Gear Box, Generator erection include the placement of turbine, Gear Box and generator at site in position, with proper foundation preparation and grouting with Conbextra GP-2 Cement.

2. Contractor shall arrange required crane services with suitable capacities for placing the heavy items like Turbine, Generator on their foundations. No extra payment is allowed for this.

3. In case of any discrepancy in above component weights, the item weights in packing list shall be taken as final.

4. Erection rates of pipes sizes dia 48.3 and below includes fit up, welding, radiography wherever applicable and welding of instrument isolation valves, flanges for thermo wells, stubs etc. on all pipes and equipment. Alloy steel pipe weld joints rate to be quoted including Stress relieving.

5. Piping payments for each line will be considered for payment only upon completion of activities, like Fitup, Welding, Radiography, Supports, Painting, Insulation, Testing etc (as applicable). Decision of Construction manager is binding.

Notes (ELECTRICAL, CONTROL & INSTRUMENTATION):

1. Testing equipment for all control and relay panels should be provided by contractor.
2. Miscellaneous items like cable tags, 2mm thick Al strip, Nylon Cord, Ferrules etc. required for, erection, testing, commissioning by contractor.
3. Contractor shall arrange required crane services with suitable capacities for placing the heavy items like panels, bus duct etc. on their foundations. No extra payment is allowed for this.
4. Cables shall be checked for insulation resistance before and after termination.
5. The work shall include all clamping, fitting, fixing,, soldering, tapping, compound filling, crimping, shorting and grounding as required for the complete job. All equipment shall be of contractor's procurement under this specification.
6. The contractor shall put ferrules on all control cable cores in all junction boxes and at all terminations. The ferruling shall be cross ferruling and ferrules shall carry terminal numbers as per drawing. All ferrules shall be colored, plastic & interlocked type.

7. Spare cores shall also be similarly ferruled, crimpled with lug and taped on ends. Spare cores shall be ferruled with individual cable number.
8. All the pre-fabricated ladder, cable trays, accessories are made out of GI sheets.
9. The supply and application of Red Oxide Zinc Chromate Primer and finish paint for painting of all Structural Steels (required for cable tray supports) shall be considered in contractor's scope.
10. Fixtures will be supplied to site in loose parts. Assy. And erection of the same shall be considered in contractor scope.
11. Accessories of Panel/JB like cable glands, gland plate may be supplied in loose. Contractor shall consider assembling of the same at site

7.4 Mode of Payment and measurement of work completed

Refer General Conditions of Contract

Note:

1. BHEL at discretion may further split up the above items and effect payment to suit the site conditions, cash flow requirements, according to the progress of work.
2. Payments against the above Billing break up will be subject to the other statutory deductions, viz. retention amount, TDS towards income tax, security deposits, etc. as per the provisions contained in GCC,SCC, NIT & other contract documents.

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.

8.1.2 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,

1. **The name, address and the registration number of the contractor,**
2. **The name and address of the party receiving taxable service,**
3. **Description, classification and value of taxable service provided and,**
4. **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.

8.1.3 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:-

i. 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.
ii. 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.

iii. 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.

iv. 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 fabrication, 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 major power plant 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 erect all the equipment as per sequence prescribed by BHEL at site. The sequence of erection, methodology will be decided by the BHEL engineers depending upon the availability of material, 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 erection adopted in erection of similar TG sets 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, handling, transporting, unloading at erection site, pre-assembly, erection, alignment, hot alignment, bolting, fastening, welding, radiography, leveling, cold pulling, adjusting, Non-destructive testing, Post weld heat treatment, hydraulic test, chemical cleaning, passivation, steam blowing, oil flushing, water flushing, air flushing, pre-commissioning tests, trial running of auxiliaries covered under these specifications, commissioning and all other activities till handing over of the unit. 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 etc. will be necessary on account of feedback from various thermal power stations on units already commissioned and/or units under erection and commissioning 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, equipments, 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/equipments issued to him for the work. Special care will have to be taken to guard against pilferage / theft of copper tubing, brass fittings, brass valves and other costly materials.

1.13
All equipments shall be handled very carefully to prevent any damage or loss. No bare wire ropes, slings etc, shall be used for handling of the equipments without the specific permission of the engineer.

1.14
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.

1.15
Access to site for inspection by BHEL and customer engineers shall be made available by the contractor at all times.

1.16
Contractor shall mobilize sufficient quantity of sleepers for stacking of materials in his custody.

1.17.1
Utility Points : Number of utility points (Service / plant air, service / plant water, service / washing steam, inert gas (N_2) etc., shall be indicated in the P & I diagram. Contractor to locate the utility points as advised by site engineer and shall route the piping to these points as per site conditions, and shall submit as built layout with Bill of Material (BOM) to BHEL for approval.

1.17.2
The utility points shall be located at convenient point to handle and to be terminated with brass / bronze valve with suitable connection for hose pipe.

1.18
As Built Drawings : Contractor shall be supplied with two extra copies of the layout & isometrics 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.

1.18
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.

1.19
Field Quality Assurance Formats: It is the responsibility of the contractor to collect and fill up the relevant FQA Log sheets / Welding logs & Heat treatment charts 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.

1.20
For other agencies, such as cabling, instrumentation etc., to commence their work from / on the equipments coming under this scope, Contractor has to clear the front, expeditiously and promptly as instructed by BHEL Engineer. Some time it may be required to re-schedule the activities to enable other agencies to commence / continue the work so as to keep the overall project schedule.

1.21

For the purpose of planning, contractor shall furnish the estimated requirement of power (month wise) for execution of work in terms of maximum KW demand.

1.22
Contractor should obtain the formal statutory clearance from Chief Inspector of Boilers to carry out erection & Welding of piping / tanks under IBR purview. All IBR piping layout drawings received from BHEL for pipeline erection to be submitted to Boiler Inspector for approval. Arrangement for the visit of Boiler inspector for field inspection, hydraulic test etc., is in the scope of contractor, and necessary drawing / details only will be given by BHEL. Inspection fee, if any shall be paid by BHEL. After approval of the drawings, Erection of pipe lines / tanks to be started.

Not Applicable

3.0 PORTABLE CABIN & STORAGE CONTAINER

3.1 Supply of 1 No. of Portable Cabin (Size: 20 ft X 10 ft X 8.0 ft) with furniture & furnishings, electricals as detailed below and another 1 no. Container with other accessories(electricals, etc.) as defined below on hiring basis for 9 months for BHEL's site office use. If Project schedule is extended, BHEL reserves the right to extend the hiring period for another 6 months at the same rates, terms and conditions.
Amenities to be included in Cabin are given below
Furniture and Fixtures suitable for 6 members (For Porta cabin)

- Executive Table with Side Table - 01 no.
- Executive Revolving Chair - 01 no.
- Visitor Revolving chair - 03 nos.
- Office Table - 05 nos.
- Office Revolving Chair - 05 nos.
- Wall mounted cabinet - 05 nos.
- Window Air Conditioner 1.5 ton - 02 no.
- White board of size 750x1000mm - 01 no.
- Perforated Board of size 750x1000mm - 01 no.

Interior cum Insulation (For Porta Cabin)

- Insulated walls with Pre-Laminated Sheet
- Ceiling : Glass Wool Covered with Pre-Laminated Sheet
- Flooring : Cement fiber sheet with PVC vinyl carpet

Other accessories:

- Tube Lights-4, Wall mounted Fans-5,LAN Points-6, TELE Point-1, External Light-1 Aluminum sliding windows, 15 Amp Switch-2, 5 Amp Switch-4,Electrical switch board-1(LAN point only in Porta cabin)
- Insulated paneling Doors, Safety Grills for all windows, Vertical Blinds For all Windows(For Porta cabin)
- Weather sheds for all door and windows, Partition(laminated sheet both sides) with internal Door facility, Corrosion free and fire proof paints
- Steel racks-8 nos. for material storage & retrieval(to be provided in container only)

Maintenance:

- During hiring period, maintenance of the Porta cabin & container and accessories shall be in the scope of bidder.

Note:

- Supply, transportation & installation of Porta cabin & Container to the worksite shall be in the scope of bidder.
- Removal of Porta cabin & container from the work site & transportation after completion of all the activities of E&C related to this project shall be in the scope of bidder. Porta Cabins shall remain the property of the supplier after the completion of the hiring period.
- Power Cable (approx. 50m of length) shall be in the scope of bidder.

4.0 COLLECTION AND RETURN OF EQUIPMENTS, MATERIALS & CONSUMABLES

4.1
Contractor shall take delivery of the components, equipments, lubricants, chemicals, special consumables, steel etc from the storage yard/stores/sheds of BHEL/ client. The Contractor should note that the transport of equipments 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 equipments such as laboratory equipments, measuring and controls equipments, 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.

4.2
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.

4.3
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.

TEST TAPPING POINTS

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 equipments 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.

4.4
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.

4.5
All Measuring and Monitoring Devices (MMD) used for the work in scope of these tender specifications shall be calibrated by the accredited agencies that are approved by BHEL or calibration tractability is established up to National Physical Laboratory.

4.6
Contractor shall furnish the consumption details of chemicals, lubricants, TIG welding filler wire, welding electrodes and other consumables on monthly basis.

1.01 SCOPE OF CONTRACT:

The intent of specifications is to provide erection services 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 erection of the plant shall not relieve the Contractor of the responsibility of providing such facilities to complete the erection.

1.02 Should any error or ambiguity be discovered in the specification or information furnished to him the Contractor shall forthwith bring the same to the notice of Engineer of BHEL before commencement of work. The Engineer's interpretation in such cases shall be final and binding on the Contractor.

1.03 Any part of work for which there is no specification laid down in the contract shall be carried out as per the instructions and requirements of the site Engineer.

2.00 FOUNDATION AND CIVIL WORKS:

2.01 Buildings and other necessary civil works for equipment etc. will be provided by the client of BHEL. However, all adjustment of the foundation level, dressing and chipping of foundation surfaces, foundation bolt pockets and grouting of equipment, auxiliaries after alignments etc. as may be required for the erection of equipment/plants will have to be carried out by the Contractor at his own cost. Supports for pipes, valves, flanges etc. are to be grouted wherever necessary, by the contractor with cement concrete at his own cost, as per instructions of the BHEL Engineer. All materials like cement, steel, sand, gravel etc. for the purpose of grouting shall be arranged by the contractor at his own cost including special grout mixes.

2.02 Any civil work damaged by the Contractor in the execution of the work shall have to be made good by contractor at his own cost to the satisfaction of BHEL/its client

3.00 PRE-ASSEMBLY:

The Contractor shall transport the equipment and materials requiring pre-assembly from the storage yard to the pre-assembly areas. The contractor shall take delivery of the components and equipment from the storage yard after getting the approval of the Engineer on standard indent forms to be specified by the BHEL Engineer. After completion of erection work, complete

and detailed account of the equipment so erected shall be submitted to BHEL duly certified by BHEL Engineer, by the Contractor.

3.01 Any fabrication including supply of Engineering materials required for pre-assembly or erection of pre-assembled blocks/pieces other than those made available by BHEL or their clients at site shall be Contractor's responsibility at his cost.

4.00 METHOD OF ERECTION: -

The components of equipment are sent in partly assembled and partly disassembled condition for convenience of transport. They are to be dismantled, cleaned, assembled stage by stage, erected, matched (including minor modification), aligned and adjustments carried out.
Valves, fittings and pumps are to be thoroughly cleaned where necessary by dismantling the same before erecting and aligning. Valves requiring hydraulic testing, checking of operation and setting are to be done by the contractor. Any test rig required for these operations will be fabricated by Contractor with his material. All the above activities are to be carried out by the Contractor within his stipulated rates. Careful handling of equipment while lifting and transporting is required. Highest care should be taken, especially while lifting heavy equipment like compressor barrels and casings, turbine casing, rotors, condensers and other heat exchangers etc.

5.00 ERECTION:

5.01 The scope of erection shall include transporting to work spot the materials from storage yard/pre-assembly area, erection work, alignment pre-heating, welding, post heating, heat treatment, stress relieving and X-raying, leveling adjusting, cabling, calibration, instrumentation, tubing etc. till the turbo-set and other equipment are finally tested and approved for acceptance and are taken over by BHEL/their clients for putting into commercial operation.

5.02 The Contractor shall provide at his own cost in sufficient quantity all consumables

a) Sealing material, shellac compound, hemp fiber- klingerite, permanite, temporary CAF gaskets, general purpose gland packing, adhesive and other tapes etc.

c) Cleaning material like washing soda, soap, dungy cloth, cotton waste, carbon tetrachloride etc.

d) Adhesive papers, tapes, grinding and lapping stones, emery cloth, emery paper etc.

e) Soldering and welding material including thermo chalks, fluxes, all electrodes, oxygen, acetylene, argon (for carbon, steel, alloy steel & stainless steel) etc.

f) Hardware items including nuts, bolts, etc.

g) Electrical items such as cables, bulbs, switch etc. for construction works.

h) Packing plates and shims for minor adjustments.

i) Scaffolding etc.

j) Miscellaneous items of consumables nature not specifically mentioned but required for erection purposes incidental to such works. The materials so supplied and used shall be of the best quality and subject to prior approval of BHEL.

k) All grout mixes.

l) Necessary tools and accessories like crimping material, identification tag ferrules, clamps, bolts & nuts etc. required for laying pneumatic tubing, impulse tubing & piping, are not in BHEL scope of supply. The same has to be supplied by the contractor

m) Erection of instruments shall include fabrication of instrument stands and hardware like nut & bolt for mounting instruments on to stands. For instrument stands fabrication consumable like gas, welding rods, nuts, bolts and anchor fasteners etc. are also in contractor's scope.

6.00 PROTECTION:

The Contractor shall take all reasonable care to protect the work under erection till such time the erected equipment are taken over by BHEL/their client. Wherever necessary, suitable fencing and lighting shall have to be provided by the Contractor as a safety

measure against accidents and damage of property of BHEL/their clients. Caution notices shall be displayed by the Contractor to give warning to the persons working at site of access to any part which may be deemed to be unsafe and hazardous.

7.0 PAINTING:

All the items erected-main equipment, auxiliaries, piping, etc. will have to be painted by band or spray as directed by the Engineer with paint procured by

Contractor. For items received painted, two coats of finish paint over one/two coats of primer are essential. For items received and erected without any paint, two coats of finish paints over two coats of primer are essential. The quality, specification, colors and brand of paint are subject to approval by the Engineer. The scope of work includes scraping off old paint where required, color bands, lettering, arrows, etc., as directed. Provision of scaffolding, consumables etc. incidental to the work are to be arranged by the contractor at his own cost. The work is subject to inspection/approval by BHEL's clients. Paint weight is not considered for tonnage purposes. Painting of all equipment and piping is to be carried out by the contractor. All shop painted equipment is to be painted with two coats of finish paint using ""APCODUR" of Asian Paints or equivalent. All the piping to be painted with primer and two coats of finish paint of approved color and brand with Synthetic enamel paint. The contractor shall arrange for the painting deploying his own tools, tackles, manpower, etc.

7.01 In case of damage or loss to any equipment or components or any property thereof of BHEL or their clients caused by the Contractor's men while handling and erecting the same due to negligence and carelessness on the part of the Contractor's workmen, the responsibility of repairing or replacing shall rest with the contractor. In case the Contractor fails to make good loss or damage within a reasonable time, the actual cost of damage or loss together with overheads will be recovered from Contractor's bill. Decision of BHEL regarding the cause as well as extent of the cost of damage shall be final and binding on the Contractor. Delay in progress or works due to this will be attributable to contractor.

7.02 Until the plants or equipment are deemed to have been taken over, the Contractor shall be liable for and shall be deemed to have agreed to indemnify BHEL or their clients occasioned by negligence or fault of the Contractor or his personnel.

7.03 The erection devices, alignment fixtures, including supply of materials for same, tools and tackles, lifting device and all other materials necessary to carry out the entire work shall be arranged by the Contractor. Before putting into use all such fixtures, devices, etc. shall have to be approved by BHEL.

7.04 The contractor shall execute the work in the most substantial and workman like manner. Accuracy of work in stipulated time is an essential part of this contract. The Contractor shall be responsible to ensure the assembly and workmanship to confirm to the dimensions and tolerances given in the drawing, specifications, quality or suitability or measurements, or as per the instructions of Engineer. If any portion of work is found to be defective, in

specification or measurements, the Contractor shall dismantle and redo the work at his cost to the satisfaction of BHEL. Time lost on this account will be attributable to the Contractor.

7.05 Fabrication of pipes 2" & below for which isometric drawings are not given, like governing oil lines, and seal oil lines, has to be done at site as per the site conditions, for which pipes are supplied in commercial lengths. Fabrication of bends, tees elbows, reducers etc. for pipes of dia. up to 2" and below will also be done at site by the contractor at no extra cost from the above pipes supplied in commercial lengths. However, bends, tees, elbows, reducers etc. above 2" will be supplied readymade.

7.06 Permanent supports for an II the pipes of all diameters wherever required are to be fabricated at site by the Contractor within his quoted rates. However special supports like spring suspensions, clamps, and hanger rods will be supplied by BHEL. Material for fabrication such as plates, angles, channels, rods, I - sections, pipes etc. will be supplied in running lengths. Fabrication as above will include adjustments by cutting and welding as required. Temporary supports will have to be provided wherever required at contractor's cost.

7.07 The pressure parts shall be erected in conformity with the provision of Indian Boiler Regulations and will be subject to inspection by the chief inspector of Boilers, or anyone appointed by him in his sole jurisdiction.

7.08 Non-destructive tests like hydrostatic pressure test, air tightness test etc. as instructed by the engineer from time to time, shall be carried out by the contractor to the satisfaction of BHEL/it's client.

7.09 Scope of erection also includes any installation work on pressure parts, connected with instruments and controls.

7.10 For alignment and level adjustments of the equipment like Pumps, motors etc. necessary shim plates and pickings suitably fabricated, wherever required, shall be arranged by the Contractor at his own cost.

8.00 WELDING:

8.01 All necessary preheating, of welds and stress relieving operation of welds are part of the erection work and shall be performed by the Contractor in accordance with the relevant regulations and standards of BHEL practice and to the satisfaction of BHEL Engineer and in accordance with the drawings and specifications.

8.02 Erection of equipment involves good quality welding dye penetration test heat treatment radiography work. Wherever required 100% dye penetration test, have to be carried out as per instructions of BHEL Engineers. Contractor's personnel Technicians along with laborers engaged should have adequate knowledge on the above works.

8.03 The pressure parts shall be erected in conformity with the provision of Indian Boiler Regulations and may be directed as per any other standard/specification in practice in BHEL. The method of welding (Viz.) Arc, Gas, TIG or other method may be indicated in the detailed drawings. BHEL Engineer will have the option of changing the method of welding as per site requirements.

8.04 Welding of high pressure parts shall be done by certified High pressure Welders who possess valid certificate or CIB of the state in which the equipment is erected as per provision of IBR. The high pressure Welders who possess necessary certificate shall appear well in advance before the expiry of the validity of this certificate for requalification test as per relevant provision of IBR and keep the certificate valid till the completion of work. The services of such welders, the validity of whose certificates have expired shall have to be terminated forthwith.

8.05 All Welders deployed on this work shall be tested and approved by BHEL Engineer before they are actually engaged on work though they may possess the IBR Certificate BHEL reserves the right to reject any welder without assigning any reason

8.06 BHEL Engineer is entitled to stop any welder from the work if his work is unsatisfactory for any technical reasons or there is a high percentage of rejection of joints welded by him, which, in the opinion of the BHEL Engineer, will adversely affect the quality or the welding though the welder has earlier passed the tests prescribed by BHEL Engineer. The welders having passed qualification tests does not relieve the Contractor of a Contractual obligation to check on the Welder's performance.

8.07 All charges towards testing of Welders for approval of Welders for engaging in the erection work shall be borne by the Contractor.

8.08 Sufficient quantity of test plates and pipe pieces as considered adequate for testing contractor's welders will have to be arranged by Contractor at his cost. All the other expenses in conducting the test including radiography and heat treatment shall also be borne by the Contractor.

8.09 All welded joints shall be subjected to acceptance by BHEL Engineer.

9.00 WELDING AND THEIR PRESERVATION:

9.01 The electrodes/wires and related supplies as required for site welding are to be procured by the Contractor at his cost.

9.02 All the welding electrodes/wires shall be stored by the Contractor carefully to prevent deterioration of their properties. Proper care should be taken to preserve low hydrogen electrodes, alloy steel & stainless steel electrodes which have to be stored in an air- conditioned room at constant relative humidity by the contractor.

9.03 All these electrodes shall be dried in the electric drying oven to temperature and period specified by the Engineer, before they are used for erection work.

10.00 HEAT TREATMENT:

10.01 Preheating, post weld heating and stress relieving after welding, is part of erector's work and shall be performed by the Contractor in accordance with IBR regulations and BHEL Engineer's requirement. Contractor shall arrange to supply heating equipment with automatic recording devices. Also the contractor shall have to arrange for labor, all heating elements, thermocouples, etc., insulating material like mineral wool, asbestos, cloth, ceramic beads, asbestos ropes, etc., required for heat treatment and stress relieving works. During preheat and stress relief operations, the temperature shall be measured at least at two different points for pipes above 200 mm dia. by thermocouple, and recorded on a continuous printing type recorder. All the recorded graphs for heat treatment works shall be the property of BHEL. The contractor has to provide thermo chalks temperature recorders, thermocouple attachment units, graph sheets, etc. for checking.

10.02 The contractor shall maintain a record in the form as prescribed by BHEL of all operations carried out on each weld and maintain a record indicating the number of welds, the names of Welders who welded the same, date and time of start and completion, preheat temperature radiographic results, rejection, if any percentage of rejections, etc., and submit copies of the same to the BHEL Engineer as required. Interpretation of the BHEL Engineer regarding acceptability or otherwise of the welds shall be final. All site welding joints shall be subject to acceptance by BHEL Engineers.

10.03 The Contractor shall carry out the edge preparation of weld joints at site in accordance with details acceptable to BHEL Engineer. Wherever possible, machining or automatic flame cutting will be allowed only for edge preparation. Some extra lengths in various fabricated pipes given as erection allowance shall have to be cut and edges prepared to suit the site conditions at no extra cost.

10.04 Heat treatment may be required to be carried out at anytime (day and night) to ensure the continuity of the progress. The contractor shall make all arrangements including labor required for the work as per directions of B H EL.

10.05 All the data such as heating temperature, heating rate, soaking time, maximum temperature reached during heat treatment shall be properly recorded and documented which will be the property of BHEL.

10.06 Oxy.-acetylene flame heating or exothermic chemical heating for stress relieving is not permitted. Heating shall be by means of Electric Induction Coil or Electric Resistance coil. Potentiometric type recorders shall only be used for temperature recording purposes.

11.00 <u>RADIOGRAPHY:</u>

11.01 Radiography work of welds connected with this contract shall be arranged by the Contractor including provision of services of Technicians and necessary equipment and consumables like Isotope camera, X-ray films, and chemicals. Also contractor has to provide necessary labor required such as Riggers, Helpers, etc. to assist the technician for carrying out the above radiography work and making other arrangements such IS providing scaffolding approaches, plat-form, lighting arrangements at his cost as per the

instructions of BHEL. It may be noted that invariably the radiography will be carried out after the normal working hours only.

11.02 Radiography inspection of welds shall be performed in accordance with requirements and recommendations of BHEL Engineer and also as per the directions of BHEL's customer. The minimum extent of radiographic inspection shall be as per provision of IBR Reg. (151) h. They may, however be increased depending upon the performance of the individual Welder at the discretion of BHEL Engineer/Boiler Inspection Authority.

11.03 Quantum of radiography shall be enforced as per the specifications and as per the drawings. BHEL Engineer reserves the right to alter the quantum of

radiography of joints. The decision of the BHEL Engineer in this regard is fixed and final and binding on the contractor. Any rectifications required shall have to be done by the Contractor at his cost. All X-ray films of joints radio graphed at site in connection with work shall be properly preserved in air-conditioned rooms and shall become the property of BHEL.

11.04 All field welded joints shall be subjected to dye-Penetrant examination as specified in the respective drawings and shall have to be accepted by BHEL Engineer. Any rectifications required shall have to be done by the contractor at his cost.

11.05 For carrying out ultrasonic testing of welded joints large size tubes and pipes, it will be necessary to prepare the surface by grinding to a smooth finish and contour as desired by BHEL Engineer. The Contractor's scope of work includes such preparation and no extra charges are payable for this.

11.06 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 and quote the price inclusive of all such work and radiography.

11.07 The welded surface irrespective of place of welding shall be cleaned of slag and painted at the center with primer paint to prevent corrosion at no extra cost towards this.

11.08 All the welded joints of steam admission pipelines to HPT, IPT and LPT shall have to be subject to non-destructive tests, viz. magnetic particle test, dye-penetration test and hardness test in addition to radiography. All the weld seams shall be properly ground and subjected to 100% radiographic examination.

11.09 The contractor shall have to do root run or gas welding for pipe joints by TIG process wherever required as per the instructions of BHEL Engineer.

11.10 Welding of hangers' supports, stubs, and impulse piping is to be carried out by the contractor according to drawing, specifications and as per BHEL Engineer's instructions. Preheating, post-heating, stress relieving, etc., have to be carried out by the contractor according to drawing and specifications and as per BHEL Engineer's instructions.

12.00 CLEANING OF EQUIPMENTS

12.01 The Contractor shall take necessary measures to ensure that will all the machined surfaces are greased and covered, for proper protection.

12.02 The contractor shall clean the internal surfaces of all piping before erection mechanically and by air blowing as per the instructions of the site Engineer. The inside of all the equipment shall be thoroughly cleaned before they are installed.

12.03 All pressure parts and such other lines as may be directed by the Engineer shall be acid pickled, flushed with alkali water, oil, steam, or air as directed. Cleaning sequence and arrangements of temporary piping will be directed by the Engineer and contractor shall execute the work under the direction of the Engineer. Temporary pipe material and other connecting material including and/ alkali will be supplied by BHEL.

12.04 After flushing with water, steam blowing or after chemical cleaning as indicated by the Engineer all parts of equipment (viz. valves etc.) shall be dismantled, checked for accumulation of dust wear or damage, cleaned Rectified/replaced if necessary and reassembled by the Contractor without any claim for extra cost., However, the parts to be replaced in such cases will be supplied by BHEL.

12.05 All the bearings, gear boxes etc. of the equipment and electrical motors to be erected are provided with protective grease only. Contractor shall arrange as and when required by the Engineer, for cleaning these bearings gear boxes etc. with kerosene or some other agent, if necessary by dismantling some of the parts of the equipment already installed and shall arrange for re-greasing/lubricating them with recommended lubricants and for assembling back the dismantled parts. Lubricants will however be supplied free of cost.

12.06 The Contractor shall provide all labor for execution of work including installation and dismantling of temporary piping, strainers, valves and instruments required for conducting the cleaning work.

12.07 The Contractor shall effectively protect the finished work from action of weather and from damage or defacement and shall cover the finished parts when and where required for their protection

13.00 **HYDROSTATIC TESTING:** -

13.01 All pressure parts and some of the low pressure parts shall be subjected to the hydrostatic pressure test as required by the Indian Boiler Regulations &

API. ASME, STDS, TEMA, ASAB, 31.3 IBR, ASME APC (ASAB 31.3) Contractor shall supply all necessary labor and equipment required for conducting the test.

13.02 The test shall be performed by the Contractor to the complete satisfaction of the Boiler Inspector and the Engineer. All leaky joints shall be cut out repaired or re-welded as directed and test repeated until satisfactory results are obtained.

14.00 INSULATION:

The Contractor should carryout thermal insulation (Supply end application) for equipment and piping. He should also carry out cold insulation and insulation for personal protection where required.

The quality of insulation material is subject to approval by BHEL and the work should be got executed by the contractor through agencies reputed in the field like M/s. Lloyds Insulation etc. to standard specifications. The cost of the supply and application of insulation should be included within the overall cost of the contract. The weight of insulation done will not de reckoned for purposes of tonnage erected. For detailed technical specifications etc. please refer to the following documents enclosed to this tender schedule (a) TC 51751 (b) 3-30826-00001.

15.00 OIL FILLING:

Oil for flushing purposes should be drawn from the stores of BHEL or its client as directed and filled into the lube oil tank. Thorough cleaning of the L.O. tanks and S.O. tanks including painting of the inside surface where required with Apcodur or equivalent paint to be supplied by BHEL is necessary. On completion of flushing, oil is to be drained and fresh charge for trial run and commissioning filled. Oil for second filling also has to be drawn from stores as mentioned above. The work being incidental to the main erection work under contract, no extra payment is envisaged and weight of oil filled will not be considered for tonnage purposes.

16.00 INSPECTION AND TEST RUN:

The Contractor shall provide personnel for the test run of all equipment erected by him to work under the direction of the Engineer, in case any defect is detected during test run such as loose components, undue noises or vibration, strain on connected equipment etc., the Contractor shall immediately attend to these defects and take necessary corrective measures.

16.01 Contractor shall provide personnel for the testing of all equipment erected by him to work under the direction of the engineer, after the solo run of the turbine, the contractor shall provide personnel for the bearings inspection.

17.00 <u>COMMISSIONING:</u>

17.01 The Contractor shall carry out all tests such as hydrostatic pressure test, function test OT pumps & motors, sole run of Turbine, leak test of compressors etc. as per standards followed by BHEL. Necessary skilled and unskilled personnel and supervisory staff as may be required shall be supplied by the Contractor during start up, testing and commissioning of the equipment.

17.02 Contractor shall install temporary piping if required in connection with testing and commissioning of these units at various points, as required by the Engineer and shall remove them in a neat and workman like manner after tests are over all at no extra cost.

17.03 The erection, testing and commissioning of the (Turbo-Generator/Turbo compressor) units should be carried out in accordance with drawings and specifications which shall be supplied to the Contractor by the Engineer from time to time under the supervision/ guidance of and to the entire satisfaction of the Engineer of BHEL. This shall, however in no way relieve the Contractor of his responsibility of providing adequate and competent supervisory staff. Drawings and specifications will be supplied only after ensuring that the contractor has employed qualified, trained Engineers/Supervisors for supervising the job. Drawings and specifications will not be handed over to the unqualified men of Contractor.

18.00 <u>FACILITIES PROVIDED BY BHEL/THEIR CLIENTS AT SITE</u>:

18.01 **LAND:-**

BHEL/client will allot sufficiently leveled area, storage sheds for storage of Turbo- compressors & components and pre-assembly area at a suitable location. For contractor's Office shed sufficient area will be allotted on rent as charged by BHEL's client. The remittance of rent shall be as directed by BHEL/their clients. Upon completion of the work, the contractor shall dismantle and clear all debris as directed by BHEL.

18.02 **ELECTRICITY:**

a) Electricity for construction purpose will be made available at 3 Ph. 415 V 4 wire systems “At a single point in the project site. The bidders are advised to visit site and ascertain full details of the same before submitting their offers.". Further distribution of power to various erection equipment and power tools shall be arranged by Contractor by providing his own cable, main switch board, distribution switch board, service connections etc. and shall meet all the local statutory requirements.

b) The Contractor shall not be entitled to any compensation on account of interruptions /shut downs or temporary power failures.

18.03 **WATER SUPPLY**

Water (including drinking water) required for construction purposes will be supplied at one point for each purpose. The Contractor shall make necessary arrangements at his cost for further distribution and storage of water.

18.04 BHEL reserves the right to draw water and electricity without charges, from the distribution line laid by the Contractor.

18.05 Customer's workshop facilities and cranes end other heavy equipment required for construction may be made available to the Contractor at the rates as may be fixed by Customers, subject to their availability and provided they do not affect the Customer’s work.

18.06 All electrodes are to be arranged by the contractor.

18.07 Oil for first filling for the Turbo-generators will be supplied by BHEL's Client. Wastage of oil during erection, Oil flushing etc. shall be made up by the Contractor at his own cost.

18.08 Instruments used by Contractor for work purposes shall be made available to BHEL Engineers whenever required without any extra charge.

18.09 BHEL shall provide instruments required by their Engineers for commissioning of turbo- compressors. However, the Contractor shall arrange for instruments as included in the list of tools and plants at his own cost.

18.10 BHEL will arrange for Engineers required for commissioning. However, the Contractor shall arrange workers and supervisory staff round the clock where necessary during commissioning and till handing over of the set.

18.11 BHEL shall supply material required for temporary piping and other connected materials for flushing or blowing of the pipelines.

19.00 <u>PROJECT SITE RULES</u>:

In addition to what has been mentioned in the general and special conditions, the site rules mentioned hereinafter shall be strictly observed by the Contractor and his employees. Contractor's work shall be also subject to inspection by Customer's Engineers and the Contractor shall provide all necessary assistance for such inspections.

19.01 **PRE-COMMISSIONING TEST AND TRIAL OPERATIONS:**

On completion of mechanical erection by the Contractor each item of the equipment and plant shall be thoroughly inspected by BHEL for correctness and for completion of thermal insulation etc. The Contractor shall also carryout within his quoted rates the installation of metering and connected wiring and piping works, laying out connected cables, cable jointing and generally carry out all works connected with their testing and commissioning and thereafter the Contractor shall put forth the equipment and plants for pre-commissioning tests at site. The procedure for pre- commissioning tests to be performed at site shall be as per agreement between BHEL and Customer.

19.02 **TESTING AND INITIAL OPERATION:**

The Contractor shall at his own cost perform the following work to be completed before trial operation as defined. The works to be carried out for this purpose shall include the following but details of the same shall be strictly in accordance with the drawings, specifications and technical information furnished by the BHEL and duly approved by Customer.

1. Alignment of generator/compressor and turbine tandem unit

2. Adjustment of eccentricity for cylindrical part and/or rotary part under cold condition and hot condition.

3. Tightness test and/or pneumatic test of intercoolers, after collars, surface condenser and other heat exchangers.

4. Pressure test and/or pneumatic test of all pipeline system

5. Cleaning of generator/compressor and turbine inner parts by oil and other cleaning agents where needed
6. Flushing of process gas line system by air/mechanical cleaning and/or pickling.

7. Flushing of steam line system by steam.

8. Flushing of condensate line system by water.
9. Acid and chemical cleaning of oil line system.
10. Flushing of miscellaneous small line system by Air.
11. Alignment of all pipe line connection to the unit.
12. Adjustment of pipe hanger supports including spring supports
13. Initial and preliminary checking of all wiring, tubing and cabling before energizing.
14. Function test of control valves and other valves.
15. Function test of all electrical items and pumps.
16. Trial operation of oil console unit.
17. Oil circulation of oil system for flushing purpose
18. Painting of all equipment, pipes where needed
19. Trial operation of Hot well pumps.
20. Function test of steam ejector.
21. Vacuum test of surface condenser unit.
22. Trial operation of all auxiliary units
23. Initial charge of lubricant, seal and control oils
24. Supply and application of thermal insulation work for turbine and other equipment and piping.
25. Turbine spin test.
26. Adjustment of turbine trip device.
27. Adjustment of steam inlet governor and extraction governor.

28. Piping test of safety valve on steam extraction line

29. Generator/Compressor and turbine tandem trial run

30. Adjustment of servo motor and steam inlet control valves

31. All electrical switches connected to the trip / inter lock circuit shall be checked / tested for their functioning by simulating the service condition.
32. On advice of BHEL Commissioning Engineer, contractor shall put all instruments in line with the process. The Contractor shall modify the settings or ranges in case suggested by the BHEL Commissioning Engineer. During Commissioning of main equipment and other related equipment / auxiliaries, the contractor shall fine tune instruments in auto control mode to suit system requirements.

33. Before charging pneumatic supply air header, the lines shall be blown for a period specified by BHEL Engineer at full parameter and all signal tubes shall be blown at least once.

The above tests shall be carried out under the supervision of BHEL's supervisory personnel on satisfactory completion of all pre-commissioning tests; the trial operation of the units shall start. The trial operation shall be considered successful if it is proved that the unit can operate continuously during the period of trial operation. Tests at site including the trial operation will be carried out in compliance with Customers' instructions. During trial operation, no repair or adjustment other than running adjustment will be permitted.

19.03 **GUARANTEE TESTS AT SITE:**

The guarantee tests of the plant shall be carried out after achieving 100% output of the equipment which may take around six months from the date of commissioning immediately after the conclusion of the operation. Detailed tests for conducting the guarantee tests shall be given later. Guarantee tests shall be carried out jointly by the representatives of BHEL and the Customer. The worker and supervisory personnel required during guarantee tests shall be provided by the Contractor without any extra charge.

OIL PIPING

1) All dimensions /elevations refer to C.L. of pipe lines unless otherwise specified.
2) a) Pipe routing shall be done strictly as per drawing. Wherever dimensions are not specified same may be routed as per site convenience.
   b) Pipe nominal size 2" and below shall be routed as per site convenience unless otherwise specified in the drawing.

3) a) Fusion faces shall be as per plant standard No. HY0620599.
   b) Weld edges shall be debarred before welding.
4) Follow the following WPS Nos. for weld joints:
   Carbon steel (SA 106-B or Eq): WE 003/A2 Stainless steel (A312TP 321 or Eq):WE-313/A2 or A1.

5) 100% of fillet welds shall be tested with liquid penetrant for IBR Piping (Group A), 10% all fillet weld at random for remaining piping shall be tested with Liquid penetrant.

6) Drain lines / return headers shall be erected with a slope of 1 Deg in the direction of flow.
7) All hangers are of rigid type unless otherwise specified. Small bore pipes shall be Fixed clips to the nearest structure suitably.

8) Orifice shall be erected after oil flushing.

9) Pipes shall be thoroughly cleaned during erection and should be acid pickled as per drawing No.4-170552 after the lines are completely erected and hydraulically tested.

10) Hydraulic test shall be conducted on complete pipe lines (except drain lines) at 1.5 times max. working pressure before acid pickling.

11) After cleaning, all pipes shall be painted as per plant standard No.HY 0674162, unless otherwise specified.

CLEANING AND PAINTING OF LUBE OIL
(CARBON STEEL AND STAINLESS STEEL)

Scope: This standard covers the pickling and painting requirement of Carbon Steel Piping and pickling requirement s of Stainless Steel Piping.

1.0 Mechanical cleaning for Carbon Steel and Stainless Steel Piping.

2.1 Mechanical cleaning consists of removing scales, welding spatters, rust, earth residues, previous painting or any other deposits adhering to the metal surface by means of wire brushes, wheels or pneumatic chisel or other similar methods while taking care not to damages the piping metal surface.

2.0 **Flushing:** Initially flush the C.S. and S.S pipe lines with water at 70o C for about one hour.

3.0 Degreasing of C.S. and S.S. Pipe lines.

3.1 **Purpose:** For removal of any oil, grease etc., which may be adhering to the metal surfaces of line.

3.2 **For degreasing:** A solution containing 15% caustic soda and 15% sodium Phosphate in water at 80oC shall be used. The solution shall be kept agitated during degreasing.

4.0 **Flushing:** The C.S. and S.S. Pipe lines shall be flushed with hot water at 80o C for 1 hour.

5.0 Pickling of Carbon Steel Pipe Lines.

6.1 Use a mixture of sulphuric Acid and Hydrochloric Acid. The strength of the pickling solution depending on the surface condition of the part to be treated. The concentration may be up to 20% and temperature can be 20 to 65o C. Duration of pickling shall be 24 hours or use 5% sulphuric acid or use 20% Hydrochloric Acid.

6.2 Washing: The pipelines shall be flushed with water.

6.3 Neutralization : In alkaline solution consisting of caustic soda 5% Benzoate 2 to 3% and sodium Nitrate 10% . The PH values of the solution shall be PH 8-10. T. No-time lapse should be allowed between articles 6.2 and 6.3 above. Or 2% phosphoric acid can also be used for Neutralization.

6.4 Drying: Immediately after neutralization pipe lines shall be dried with compressed air which is free from oils and humidity.

6.5 Protection : If the pipe lines are not put into service within few days of above treatment, they shall be protected by Anti-oxidizers and fill with Nitrogen.

7.0 Pickling of stainless steel pipe lines.

7.1 A solution of 7% by vol. of Industrial Nitric Acid and 3% by vol. of industrial sulphuric acid in water at 50o C shall be used for pickling for half an hour.

or

A solution containing citric acid 8% by Wt. and Rodine 92 A or 130 (Powder) 1-5% by wt. in water at 65oC to 70o C shall also be used for Pickling for 12 hours. However citric acid is preferable.

7.2 Same as Art. 6.2 above (Washing)

7.3 Same as Art.6.3 above. (Neutralization)

7.4 Same as Art 6.4 above(Drying)

7.5 Same as Art.6.5 (Protection).

8.0 Painting of CS. Pipe lines.

8.1 Pipe lines shall be cleaned by wire brushing also see Art.2.1 for details.

8.2 Anti-corrosive painting.

Apply 4 coats of anticorrosive paint DURALIT SR 1.423. 2201 of MAX MAYER or its equivalent APCODUR CP 684 yellow with its suitable thinner No.121. The total thickness of dry film shall be around 0.2mm.

8.3 Finish paint.
Apply one coat of DURALIT ISC series 431 (1.431-8176) of MAX MAYER) or its equivalent
APCODOUR CF 692 ADUIRALTY GREY by adding suitable thinner No.181, The thickness of dry film shall be around 0.04mm.

9.0 Stainless steel surfaces do not re quire painting.

GENERAL INSTRUCTIONS FOR ACID CLEANING (PICKLING) OF PIPE LINES OF OIL SYSTEM
(TURBO COMPRESSOR AND TURBO GENERATOR SETS)

1.0 GENERAL:

The purpose of acid cleaning (pickling) is to remove the rust resulted due to long Exposure to the atmospheric conditions and for dislodging g the burs, welding slag and the mil scales adhering to the internal surface of the pipe lines. The oil pipe lines include lubricating oil pipe lines, governing oil pipe lines, seal oil system pipe lines and all the drains.

After completing the fabrication of piping for the oil circuit, the pipes shall invariably be pickled. (Note: sand blasting method shall not be resorted to). It is always desirable that this operation is carried out by a reputed agency which is specialized in pickling pipe work. If this is not possible due to any reasons, the following procedures are recommended. The activities involved for this process are given below with detailed procedures in sequential manner.

2.0 Methods of pickling pipe lines material wise.

2.1 Carbon steel and alloy steels.

2.2 Stainless steel; and steels with high chromium content.

3.0 Preparation at site.

3.1 Mechanical cleaning of oil pipe lines.

3.2 Hydraulic testing of oil pipe lines.

3.3 Steam blowing of oil pipe lines.

3.4 Assembly of oil pipe lines for acid cleaning.

3.5 Pressure testing of contours (loops).

4.0 Flushing of the contour with hot water.

5.0 Quantity of acid solution and acid cleaning process.

5.1 Circulation process.

5.2 Soaking /filling process.

6.0 Flushing with hot water after pickling g and neutralization.

7.0 Die-assembly of contours and dray compressed air blowing.

8.0 Oil spraying of the pipe sections.

9.0 Safety precautions.

10.0 Approximate material requirement.

2.0 METHODS OF PICKLING PIPE LINES MATERIAL WISE.

2.1 Material: carbon steels & alloy steels.

a)Hot water flushing	D.M.water	Item under hot water flushing
b)Degreasing with an Alkaline solution	Alkaline solution consisting of 50 gms. Of tri-sodium phosphate, 50 gms.of sodium carbonate,20 gms of caustic soda per 1 ltr of water at 80 deg. C circulation /filling for 2hrs. at 70 to 80 deg.C	Item under circulation process
c)Hot water flushing after degreasing.	Hot water circulation for one hour at 70 to 80 deg.C	Item under hot water flushing.
d) Acid cleaning with	Acid solution consisting of HCL at 10% concentration inhibitor of 1% by volumeOther inhibitors like 1% Forma-line or 3% pyridine can also be used. (say roudine 213) and the rest with water at temp 70	Refer item under circulation method

Note: Other acid solutions which are less frequently used are:
i) Sulphuric acid 10 to 15% concentration; soaking period 1 hour.

ii) Phosphoric acid of 30 to 40% concentration; soaking period 10 hours

It is not advising to use NITRIC ACID SOLUTIONS for this Process.
e) Hot water flushing After acid cleaning. Hot water flushing at 70 to 80 C for one hour.
f) Neutralisation: After acid cleaning to neutralize the acid a solution of 5 to 10% of caustic soda of 50 gms of Trisodium Phosphate mixed in one liter of water maintained at 40 to 50 Deg. C can be used. Circulation may be for one hour. Soaking period may be 10 to 20 minutes.
However, it is to be continued till the PH value of the solution reaches to the required value of
about 8 to 10.
g) Hot water flushing: Hot water circulation at 80 Deg C for one hour.

h) Dry with	Air blowing with compressed Air free from oil, moisture etc	Ref. item under air blowing
i) Protecting the interior with	1) Filling the loops with oil and spraying the oil inside the pipes which are not included in the loops 2) Cleaning the pipe ends with cloth	

2.2 Material : Stainless steel and steels with high chromium content.

ACTIVITY	**ACTIVITY COMPOSITION AND OTHER DETAILS**	**FOR DETAILED PROCEDURES REFER ITEMS**
a) Hot water washing	D.M.water circulation at about 80Deg C for one hour	
b) Degreasing with	i) Solution consisting of 15% caustic soda Alkaline solution. plus 15% sodium phosphate per litre of circulation item. Water at 80 Deg C.or ii) Solution consisting of 50 gms trisodium	Refer pickling

	phosphate 50 gms. Of sodium carbonate and 20 gms. Caustic soda per one litre of water at 70 Deg. To 80 Deg.C. CIRCULATION :2 hrs.	
c) Hot water flushing after degreasing	Circulation at 80Deg. C for one hour	Refer circulation
d) PICKLING	i) Cleaning with a solution of 7% (by volume) industrial Nitric acid and 3% (by volume) filling industrial sulphuric acid and 90% (by volume water at 50 Deg.C for 30 minutes). ii) Preferably pickling of stainless steel piping may be done with solution containing Citric Acid 6% (by weight),Redine 92 A or 130 (Power) 1.5% (by weight) at a temperature of 65 Deg to 70 Deg.C 12 hours circulation method.	
e) Hot water flushing	Circulation at 80 Deg.C for one hour	
f) Neutralisation	Solution of 10% Caustic soda and 90% Circulation for one hour	
g) Hot water flushing	Circulation at 80 Deg.C for one hour	
h) Dry with	Air blowing with compressed air free from oil, moisture etc.	
i) Protecting the interior with	i) Filling the loops with oil and spraying the oil inside the pipes which are not included in the loops. ii)Closing the pipe ends with cloth	

3.0 PREPARATION AT SITE:

3.1 MECHANICAL CLEANING OF OIL PIPE LINES;

All the pipe sections are thoroughly cleaned with the help of round wire brushed of proper sizes and chains. The tee branches, reducers, bends are cleaned with greater care. Wherever possible, the excess of welding metal protruding over the internal surface of the pipe sections are to be removed by grinding or with the help of hand files. After cleaning is done the pipe sections are blown with compressed air to remove the dirt of dust.

The cleaning is continued till all the rust, loose materials, welding burrs, slogs are dislodged and removed. All the joining flanges of the pipe lines are to be scraped and colour matches with the surface plate.

3.2 HYDRAULIC TESTING OF OIL PIPE LINES:

After the successful mechanical cleaning, the pipe lines are to be hydraulic tested at the recommended pressure and the test results are to be recorded. Maximum possible pipe line sections which form the complete con tour are assembled temporarily on a levelled ground for the purpose of hydraulic testing. The selection of sections has to be done from the point of convenience. Pipe sections which cannot be included in the contours have to be tested individually. This test is inevitably required for all the high pressure pipe line sections included in the seal oil system.

3.3 STEAM BLOWING OF OIL PIPE LINES:

All the pipe sections which cannot be mechanically cleaned are to be steam blown in two stages. The steam required for blowing is obtained from the existing units of a package boiler where no Unit exists. The parameters of the steam used for blowing are 7 to 8 Kg./cm2, temperature of 180 To 200 deg. cent. Minimum flow to be maintained during process is 4 to 5 t/hr. Duration of each Blow shall be 15 to 20 minutes. The second blowing is given after cooling the pipe sections to the ambient temperature. The blowing further ensures the removal of all the loose, materials, welding slag adhering to the internal surface of the internal surface of the pipe sections.

3.4 ASSEMBLY OF OIL PIPE LINES FOR ACID CLEANING;

Note : Pipe sections of diameter 80mm below are not to be included in the contour. They are acid cleaned by soaking process. Soaking filling method can be done

wherever the circulation process is not possible due to air locks and also depending on the loops prepared.

The pipe sections are assembled in different contours on a levelled ground and supported over wooden sleepers at number of places near the joints. The selection of sections has to be done from the point of convenience. Where parallel flow paths as unavoidable, orifices shall be provided restrict to flow in the path offering the least resistance for the flow. The contours shall have to be provided with drain points for draining the solution and air vent for removal of air.

while charging with the solution. The cleaning of the front pedestal inner oil pipe lines is not done by acid. They are only mechanically cleaned and steam blown. The contours are to be provided with sampling points both a suction and return lines for facilitating the collection samples for analysis.

The contours are also to be provided with valves in suction and return ends for the regulating flow. A drain line to the neutralizing pit with a valve is to be provided before the valve on the return line. A by pass line is also provided for the contour with a valve for facilitating the starting of the acid pumps. All the pipe sections joints are to be provided with acid resistance rubber gaskets only, wherever temporary pipe lines or blanks are required; they are to be provided by the contractor.

3.5 PRESSURE TESTIN G OF CONTOURS:

Contours assembled are hydraulic tested with one discharge to the dissolving tank to check for the tightness of all the joints.

4.0 FLUSHING OF THE COUNTOUR WITH HOT WATER.

Hot water flushing of the contours are carried out with filter water prior to acid circulation process in order to remove the dust, dirt or moll scales.. This also helps to check the tightness of all the flanged joints under hot conditions. The filter water is first taken into the dissolving tank and head to a temperature of 60 deg. C by passing steam. The parameter of the steam admitted shall be 8kg.cm2 and temperature of 180 to 200 deg.C. The acid circulation pump is then started on re-circulation and further the temp. of the water in the dissolved tank is raised to 70 deg.C by passing more quantity of steam. The air valve provided in the contour is opened and the suction valve of the contour is opened slowly for charging the contour. When all the air is expelled out of the contour, the water starts coming out in the form of a jet from the air vent. After ensuring the complete removal of the air, the air valve is closed and the discharge valve of the contour to the neutralizing pit is opened slowly and the storage tank maintained at a constant level i.e.3/4th gauge throughout the process. The rate of discharge of water to be maintained at 50 t/hr.

This quantity may vary from set to set. The approximate time required for the completion of the process is three hours.

5.0 QUANTITY OF ACID SOLUTION AND ACID CLEANING PROCESS:

5.1 SAMPLE CALCULATIONS:

The quantity of acid to be used for cleaning a contour depends upon the volume of contour /piping loop. A sample calculation to arrive at the required quantity of acid for a contour of 6 m3 volume is given below. However, the total quantity of acid required will depend upon the total volume of pipe lines to be cleaned which varies from set to set. .
Volume of contour = 6 m3 The dissolving tank volume is of say =2 m3.

The working volume of the tank is taken as 10 m3 as the level is to be maintained at ½ of the level gauge glass.

Total volume =6+10 = 16m3

If acid concentration is chosen as 15% of phosphoric acid (H3 P04).

For 80% concentration of H3 P 04:

Commercially available quantity of acid required is =2.4/0.8=3 m3. Specific gravity of acid required is 1.75. Weight of H3 P04 required for 6 m3 contour cleaning is = 1.75x3= 5.25 MT.

5.2 PREPARATION OF SOLUTION AND PROCESS OF CIRCULATION METHOD:

Demineralised water is filled in to the dissolving tank up to the lower gauge glass full. One of the acid circulation pumps is started on recirculation through the contour/pipe loop. The temperature of the tank water is raised to 50 deg. Cent. by passing of steam in to the dissolving tank. Just after the temperature of 50 deg.cent. is attained, the addition of the calculated quantity of acid, a sample from suction of the contour is sent to laboratory for checking required concentration . The temperature of 60 to 80 deg.cent. is maintained throughout the process by controlling required steam quantity. The parameter of the steam is 7 to 8 Kg/cm2 and temperature 180 to 200 deg.cent.(care is to be taken to see that the tank level does not increase more than 1 ¾ level gauge glass. The closed circulation of the acid solution is continued for 6 hours after the complete addition of the acid.

During the circulation hourly samples are taken from the suction and return lines and analised for the following:

1) PH 2) acidity 3) Iron content.

NOTE: The concentration of the acid and type of acid chosen may vary depending upon the material and cleanliness of the pipe lines. Refer item for method of pickling noted.

After the successful completion of the 6 hours circulation the pumps are stopped. The contour is allowed to soak with the solution for one hour. This is called the "Locking of the process". The circulation is resumed once again for about 15 to 20 minutes and the process is locked for 5 minutes. This operation is repeated for 3 to 4 times to dislodge the extraneous matter that might have been stuck up at the sharp bends of the contour. Even during this locking process, Samples are taken from the suction return lines and analysed as earlier.

Then the complete solution is discharged in to the neutralizing pit first through the pump and then by gravity after stopping the pump. The contour is also drained. While discharging the acid solution, it is neutralized by adding NaOH in to the neutralizing pit.

5.3 SOAKING PROCESS/FILLING PROCESS;

The pipe sections of diameter 80mm and below which are included in the contour are acid cleaned (pickled) by "soaking process". This method comprises of blanking one end of the pipe sections completely and filling up of the acid solution prepared with the required concentration .
After the pipe section is filled with the acid solution, the other end is also blanked loose to allow the gases to escape.

In some cases, all the small bore pipe sections and other small branches are completely immersed in the tank for digressing, pickling and neutralization and it is ensured that all the pipes are filled inside fully with the solution. In both the methods, it is to be left for 24 hours and after which the solution is drained out from the pipe sections. These were finally blown by steam and air.

6.0 FLUSHING OF THE CONTOUR WITH D.M.WATER:

After the system is completely drained the dissolving tank is filled with the D.M.. Water and the water in the tank is put on recirculation through the acid pump. The contour is slowly charged end the water is put on recirculation through the contour and the bypass valve of the contour is closed. The temperature of the D.M. water of the dissolving tank is raised to 70 to 80 deg. Cent. by passing steam of 7to 8 Kg/cm2

and temperature of 180 to 200 deg. Cent. The discharging valve of the contour to the neutralizing pit is slowly opened and the hot flushing of the contour is started. The recirculation valve to the tank is closed. The rate of discharge to the neutralizing pit is maintained at 50t/hr. This quantity may vary from set to set. The dissolving tank is mad up continuously with D.M. water and the constant level of 1 ¾ gauge glass is maintained. The hourly samples from the discharge line is collected and analysed for the following:

1) PH 2) CONDUCTIVITY 3) ACIDITY 4) IRON CONTENT.

The temperature of the water at the dissolving tank is maintained at 70 to 80 deg. Cent. throughout the process. The rinsing of the contour is deemed to be over when the acidity and iron content becomes nearly equal over a set of consecutive readings of zero. The pipe sections which are soaked are also booked in to contours and rinsed with D.M.water as above or the pipe sections are steam washed till such results as above are obtained. The approximate time required for the above process is 8 hours.

7.0 DESSEMBLY OF CONTOUR AND DRY COMPRESSED AIR BLOWING:

Soon after completing the D.M.water rinsing the pipe sections of the contour are dissembled and taken over a platform where the arrangement for dry compressed air is made compressed air is made available for blowing. The temperature of the compressed air used shall be 50 deg. Cent. and the pressure 3 50 4Kg/cm2. The clean dried surface has a dark steel gray colour, which indicates that the acid cleaning is of required standard.

8.0 OIL SPRAYING OF THE PIPE SECTIONS:-

The dry pipe sections are then sprayed with DTE medium oil for protecting them from further rusting till they are erected back. For this purpose oil is thrown in to the pipe section using a small container and blown with compressed air. The end of the pipe sections are covered with wooden blanks to prevent the entry of the dust. The method of preservation is adopted when the cleaned pipe lines are required to be stored for 1 to 2 months. This is called the “passivation”.

9.0 SAFETY PRECAUTIONS TO BE TAKEN DURING AND AFTER ACID CLEANING:

1) The acid cleaning area shall be maintained free from foreign materials which may obstruct the movement of the personnel.

2) Ensure that the persons working in the acid cleaning process use the following:

a) Rubber gloves

b) Goggles

c) Aprons

d) Gum boots

e) Masks

3) Ensure the availability of first aid box, eye drops neutralizing bottle and cotton rolls.

4) The pipe sections after acid cleaning are to be stored properly so that no moisture or dust enters in to them till erected.

5) Smoking is strictly prohibited in the area where acid cleaning is done, no fire should be lit around the area.

6) Drilling, cutting, Welding of the pipe sections are strictly prohibited after the acid cleaning. All the stubs for instrument tapings are hence to be provided before acid cleaning and properly Plugged during and after acid cleaning till erected.

7) The damaged bolts and nuts during acid cleaning shall be replaced by new ones.

8) Due precautions to be taken while tightening the joints of the loop so that they do not leak.

10.0 MATERIAL REQUIREMENT (VARIES FROM-SET TO SET):

	1) Quantity of filter water	:	1250 MT
	2) Quantity of D.M.Water	:	1900 MT
3)	Quantity of acid	:	16.5 MT
4)	Quantity of steam for heating the solution etc:.	:	150 MT
5)	Quantity of Na OH	:	3 MT

6)	Capacity of dissolving tank	:	20 m3
7)	Acid pumps	:	100m3/hr
			10Kg/cm2
			4Nos.
8)	Hot air blower	:	1No.
9)	Thermometer (dial type)	:	0 to 100 Deg.C.
			1No.

OIL FLUSHING FOR TG SETS

1. GENERAL

After completion of fabrication, acid pickling and installation the entire oil system should be thoroughly flushed, in order to eliminate all the contaminants, which might have been introduced into the oil system during the erection operations.

Acid pickling (write up Ref.No.4-17-0552) would have already removed all the Residual impurities from the oil system. However, oil flushing is to be carried out to make sure that no foreign material will be carried by the oil to the bearings and governing elements, which is dangerous to the turbo set.

During oil flushing, high velocity of flow in the oil lines can be achieved by temporarily removing the throttling points in governing line and opening the bearing inlet orifices such that drain oil pipe is 2/3 full. These high velocities will help in detaching loose particles adhering to the pipe walls, so that they will be carried away by the oil flow.

2. FLUSHING OIL:

Oil system can be flushed with the same type of oil that is employed for normal turbine operation.

Oil quantity required for flushing is approximately 60% to 70% of the quantity of oil required for normal operation of the turbine. However it has to be ensured that the oil pump does not starve for oil at its suction, during flushing.

After completion of flushing, the oil has to be centrifuged by centrifuging equipment and then tested. From the test results it can be decided whether the oil, after being used for flushing, is still usable as turbine lubricant.

NOTE: Other types of cleaning agents, especially chemical detergents, must never be used for flushing operations.

3. PREPARATION FOR START UP:

OIL TANK: Before filling with oil, the oil tank and strainer are to be thoroughly cleaned. Only cloth but never cotton waste should be used for cleaning.

The cleaning materials used, should not leave any residue, and then the tank is to be loaded up with oil.

LUBRICATING OIL CIRCUIT:

a) All the adjustable orifices are to be opened such that drain oil pipes are 2/3 full.

b) All filter cartridges in lube oil filter are to be removed.

c) Upper halves of the radial bearings are to be taken out. Journal portion is to be covered with cloth leaving the hole space for oil inlet. The cloth is to be pressed in between the bearing covers such that it will not become loose and pass on along with oil.

d) Thrust bearing is to be removed.

e) Proper tightening of all the flanges is to be ensured.

f) Flushing of delivery pipe lines of the other oil pumps which are not used for flushing operations can be done by connecting their delivery pipe lines to the oil tank before the strainers.

g) The delivery lines of jacking oil pump need not be flushed. These are to be cleaned after flushing.

h) Gear boxes are not to be flushed; temporary pipe of 11/2" may be connected from inlet to drain through inspection window.

GOVERNING OIL CIRCUITS;

a) All the orifices in trip oil, secondary oil and primary oil circuits are to be removed.

b) Damaging devices in secondary oil circuits and primary oil circuits are to be removed.

c) Control slide is to be taken out from the governing valve servomotors.

d) Solenoid valve is to be kept in operating position.

e) Tripping device is to be turned in to operating position locked.

f) Starting device is to be turned into operating position and locked.

g) About 20 to 30 mm dia temporary orifice is to be provided in the power oil inlet line to servomotors.

h) Low lube oil protection is to be ensured for operating position by assembling 13mm thick stopper below the position.

i) Vacuum protection is to be kept in operating position with the help of lever.

j) Position is to be removed from emergency stop valve or the

4. FLUSHING OPERATION:

Oil pump is to be switched ON. In case of centrifugal pump delivery line is to be closed before switching on the pump and to be gradually opened later. Pump input amperage is to be watched and if it rises too high, pump delivery is to be throttled for reducing it. In case of positive displacement Pumps, all the valves in the delivery are to be kept fully open before switching on the pump. Any leakages found in the oil system are to be curbed.

Flushing is to be started with lube oil header to drain by blocking oil entry to bearings and providing a temporary line between the two headers.

Subsequently the flushing can be extended to individual bearing oil lines, governing system, to all oil pumps, standby coolers, standby filters and over head oil tanks etc.

The best cleaning effect can be obtained by using alternatively hot and cold oil for flushing. Oil should therefore be heater up to 70C to 80 C. Oil temperature should not go up beyond 85 C because higher temperatures may be harmful for the oil.

After flushing for a period of about four hours, at a temperature of 70 deg. to 80deg. Cent., oil is to be allowed to cool down to about 30 to 35 deg. cent. When the pipes are also cooled to that temperature, oil is to be again heated to 70 to 80 deg. Cent. All the pipes must be hot during oil flushing. If any pipes are found to be cold, the reason why oil is not flowing through those lines is to be investigated and the fault to be rectified. Tapping on the pipes at intervals, further improves the removal of foreign materials from the pipe walls.

5. FLUSHING PERIOD:

Coarse impurities will be retained by the strainer in the oil tank. For filtering out the smaller foreign particles, filter cartridges should be kept in position during the last third of the flushing time. Differential pressure across the filter should be watched

and paper filter cartridges are to be replaced whenever the differential pressure rises above 1.5 Kg/mm.

Oil centrifuging equipment (if available) is to be kept in service during oil flushing as an additional means of purification. Other oil filtering facilities can be provided by inserting fine filter meshes (approximately 25 microns) at the flange connections of bearing housings. These meshes will enable to check the impurities still present after flushing.

Flushing operation has to be continued until no substantial amounts of contaminants are found in the filters any more or no substantial rise in differential pressure across filters with in a period of 12 hours.

POST FLUSHING OPERATIONS:

a) Oil tank and strainers are to be cleaned. The oil tank is to be filled up with operating oil to the required level.

b) Oil filter is to be cleaned. In case of paper cartridges, used cartridges are to be replaced by new cartridges.

c) If stop valve is included in the flushing, oil portion is to be cleaned and piston is to be assembled back.

d) Lower half cells of bearing halves are to be cleaned. Thrust bearing pads and top halves of radial bearings are to be assembled in operating position.

e) Removed orifices and damping devices are to be assembled back in trip, secondary and primary oil lines.

f) Primary and secondary oil pipes are to be separately cleaned.

g) Orifice at the power oil inlet to servomotor is to be removed.

h) Stopper piece in low lube oil protection is to be removed and cleaned.

i) Overhauling and assembly of control slide in servomotor is to be carried out.

j) Temporary lines provided for flushing operation are to be removed.

ERECTION OF INSTRUMENTATION

- The Contractor shall, execute the entire instrumentation work within the battery limits as indicated in BHEL drawings and the work includes erection, testing, calibration, and commissioning of instrumentation and control panels and gauges, boards for all equipment and associated auxiliaries.

- BHEL will furnish the contractor with necessary P&I diagrams in which all the instruments required for the control & protection of the system are shown.

- The Contractor shall erect all local instruments and junction boxes in the field with suitable and permanent supports as per BHEL standards. Vibration free locations at which instruments shall be installed will be indicated by BHEL site engineer.

- The contractor will provide necessary tap off points on the equipment, vessels, auxiliaries and pipe lines up to the first isolation valve and shall carryout further process connection from these tap off points to various instruments like pressure gauges, pressure transmitter, differential pressure transmitters, pressure switches etc. All temperature gauges with capillary type should be mounted on separate stand and capillary to be routed in separate perforated tray.

- The process line connections between the tap off points and respective instruments shall be carried out in accordance with the BHEL standards furnished to the contractor, or as instructed by BHEL Engineer at site.

- The contractor shall route process impulse lines from the respective tap off points up to the primary instruments via the shortest possible route employing minimum number of bends. They shall be carried out with the concurrence of the BHEL site engineer.

- The instrument air (2" header) for each services will be provided at the battery limit of the respective services. The contractor shall route the instrument air header to the local control panels and the various local pneumatic instruments, which shall be carried out under the supervision of BHEL site Engineer.

- The contractor shall install an isolation valve and air filter regulator near the local instrument on a permanent support and carryout connections from air header to various pneumatic instruments.

- The Contractor shall connect the primary pneumatic instruments to the secondary instruments as per the P & I diagrams by means of 6 X 1 mm PVC covered copper tubes / S. S. tubes joined by S.S. socket weld straight coupling by Argon welding, or compression fittings as required at site.
- The Contractor shall plan the routing of pneumatic impulse lines and cables with the concurrence of BHEL Engineer. He shall carryout pre-modifications suggested by BHEL site Engineer in line with layout of pneumatic tubes and electrical cables, wherever found necessary.

- After finalizing routing plan for cables and tubes, the contractor shall erect slotted sheet metal trays/angle trays as the case may be from the local instruments and junction boxes up to panels & gauge boards and from the junction boxes to the local control panels. The Contractor shall use natural bends wherever slotted sheet metal/ angle tray junctions are encountered. These cable trays shall be erected securely and shall be fixed to the walls or steel beams with proper support or with hangers. The routing shall be carried out in such a way that they should be kept away from hot environment and allow enough room to lay additional cables easily at a later date.

- The contractor shall lay pneumatic tubes and electrical cables on independent trays. All cables shall be protected at both ends and also strands shall be ferruled for easy testing and termination. All tubes, cables shall be laid properly and fixed securely to the trays by means of clamps. All junction boxes shall be numbered using paint as per the directions of BHEL site engineer.

- Metallic tags inscribing the junction box number shall be tied securely to the cable or tube at the primary elements like pressure transmitters, pressure switches, etc. and a metallic tag at the junction boxes inscribing the tag number of the instrument.

- The contractor shall connect multi-tube/ multi-core cables to the control panel bulk head/terminal box from the respective junction boxes. Multi-cable/multi-tube shall be laid in the same way as mentioned before, and shall be secured by cable glands/ bulk heads.

CONTROL PANELS & LOCAL GAUGE BOARDS:

- Panel erection shall include chipping, levelling, grouting, fabrication of base frame if required and modifications in panel wiring if any, removal of

instruments/ relays for calibration, testing and re-fixing of the same after calibration / testing.

- Gauge boards, as and when received at site, shall be unloaded, cleaned and shall be immediately installed at location as shown in layout / as suggested by BHEL engineer.

- The Contractor shall drill required No. of holes on gland plates of panels and local gauge boards for entry of electrical cables, pneumatic tubes and process impulse lines. All cables shall be provided with suitable glands. Any extra hole shall be plugged to avoid dust/moist air entry into panel.

- All cables & pneumatic tubes shall be identified and tagged with the instrument tag numbers connected to terminal strip/bulk heads as per the panel drawing supplied to the contractor.

- On completion of work, all carbon steel components viz, impulse line, instrument supports, angles, cable racks shall be properly cleaned and painted firstly with a coat of suitable/applicable primer and double coat of suitable / applicable anti corrosive paint.

CALIBRATION AND TESTING:

- All local pneumatic/ electrical instruments shall be calibrated, aligned, and set as per the data furnished and priority set by BHEL Engineer. Calibration shall be carried out by the contractor in the presence of BHEL Engineer or staff deputed by BHEL Engineer. The contractor shall fill in the pro-forma for each instrument indicating data, tag. No, service, instrument make, and calibration values etc. Each pro forma shall be signed by BHEL Engineer and customer's representative.

- All panel instruments, service wise, shall be calibrated, aligned and set as per the data furnished by BHEL Engineer in the order of priority. The Contractor shall fill in the pro forma as said above and shall be signed by BHEL Engineer & Customer representative.

- Calibration of all local instruments and instruments mounted on local gauge boards and control panels shall be carried out in position as far as possible and any deviation shall be duly certified by BHEL Engineer.

- All control valves shall be checked/ calibrated for full range operation with required pneumatic/electric signal. Report shall be prepared and countersigned by BHEL Engineer/Customer Engineer.

- All safety valves shall be removed and shall carry it to the instrument room, to be checked with the set value as advised by the BHEL engineer and if necessary contractor shall adjust and set value. Contractor shall fill in pro-forma indicating the service, tag No. set value etc. and BHEL engineer and customer's representative shall sign.

- After setting the safety valve shall be installed in its original position.

- The contractor shall carry hydraulic test for all process impulse lines with 1.5 times the normal operating pressure of the line, isolating the instrument. The test pressure shall be maintained for thirty minutes. If any leak is found in the process impulse line the contractor shall rectify the same. After rectification, hydraulic test shall be carried out once again & BHEL Engineer shall certify each line after successful hydraulic test.

- Contractor shall arrange for necessary standard test equipment/kits required for calibration of instruments. Test equipment / instruments shall be accredited by an authorized agency or the OE M & a copy of the certificate, indicating accuracy, validity period of the instrument usability etc., shall be furnished to BHEL engineer for approval.

- All pneumatic impulse lines shall be tested by the contractor for leakages at connections with air/nitrogen at a pressure of 10kg/sq. cm. or at the value advised by BHEL Engineer, isolating instruments and with soap solution for loop checking. If any leakage is found contractor shall rectify the same and repeat the test. The Contractor shall obtain signature of BHEL Engineer for each line after successful testing.

- All pneumatic air headers shall also be tested by the contractor in the same way as mentioned above

- All electrical cables shall be tested for continuity and insulation. Contractor shall earth the equipment and cables where ever required as per BHEL Engineer's advice.

PNEUMATIC LOOP CHECKING:

- All pneumatic loops shown in P & I schemes shall be checked / tested for their functioning. The loop shall include primary elements and final elements etc. The loop shall be checked / tested by simulating the process condition by means of variable inputs to the primary elements/transducers. If any of the instrument's calibration is found drifted, the contractor shall re calibrate the instrument and check the loop again.

- The Contractor shall check/test all panel internal Electrical / Pneumatic circuitry with ref to the panel drawings / schemes, and if any deviations noticed, he shall intimate the BHEL Engineer and shall act as per his advice.

ABOVE GROUND EARTHING

- Above ground earthing with GI material for BHEL supply scope of equipment within the STG hall battery limits. Grounding cables for electronic equipment in BHELs scope & Owner's DCS cabinets in turbine building.

- Earthing scope also covers, earthing of all cable trays, metallic frames of all current carrying equipment, supporting structures adjacent to current carrying conductors, Panels, motors, JB, push button boxes etc., as required .

- Drawings of main earth grid to be provided by others would be made available to the contractor to enable them to carry out rest of the earthing system work.

- Different type of earthing materials shall be supplied by BHEL and the contractor shall lay and connect the earthing materials as per site requirement. Unit rate for earthing material shall be paid on meter basis if appearing in the BOQ.

- The connection between earthing pads/ terminal to the earth grid shall be made short and direct and shall be free from kinks and splices.

- Generator neutral from the NGT/NGR cubicle shall be earthed using two dedicated rod electrodes, which shall in turn be connected to the main plant grid.

INTEGRATED TESTING OF CONTROLS AND PROTECTIONS & RELAY TESTING

- 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.
- Relay testing in static condition for generator, and associated system by secondary current injection at different current and recording the time duration.
- Testing and checking of control and protection interlock scheme in static condition and simulation of protection device contact from internal and external devices.
- 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.
- Relay setting and checking the stability of protection relays in static and dynamic condition during the OCC (open circuit characteristic) & SCC (short circuit characteristic)
- Functional checks / testing of synchronizing schemes during the static and dynamic by simulation / back charging of generator transformer conditions.
- 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.
- 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.
- 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).
- Measurement of Insulation resistance of individual equipment and connected together.

- Calibration of energy meters, tri-vector meters, voltmeters, ammeters, current & power transducers etc.
- Providing temporary shorting link on bus duct or any other location while testing & normalization after the test.
- High voltage test on inter connecting bus-duct between generator and line/ neutral side cubicle.
- 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.
- Checking & testing of neutral grounding transformer & resistor.
- Compilation of test records.
- 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.
- 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.

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A. SYMBOLS FOR MECHANICAL ITEMS:

1. VALVES:

a) TYPE WISE:

- GATE VALVE– NORMALLY OPEN
- GLOBE VALVE–NORMALLY OPEN
- GATE VALVE–NORMALLY CLOSED
- GLOBE VALVE–NORMALLY CLOSED
- GATE VALVE LOCK OPEN TYPE (LO)
- GATE VALVE LOCK CLOSE TYPE (LC)
- REGULATING GLOBE VALVE
- NON RETURN VALVE (PISTON LIFT)
- NON RETURN VALVE (SWING CHECK)
- NON RETURN VALVE, SPRING LOADED
- BUTTERFLY VALVE
- BALL VALVE
- ANGLE VALVE
- THREE–WAY VALVE
- FOUR WAY VALVE
- TURBINE GOVERNING VALVE
- TURBINE CONTROL VALVES (IN GOV. SCHEME)

b) EXECUTION WISE

- VALVE WITH GLAND SEALING (FOR VACUUM SERVICES)
- A.C. MOTOR OPERATED VALVE
- MOTOR OPERATED VALVE WITH INCHING FACILITY
- D.C. MOTOR OPERATED VALVE
- HYDRAULIC OPERATED VALVE
- VALVE WITH FLANGED ENDS
- VALVE, SPRING LOADED
- VALVE WITH INTEGRAL BYPASS

2. EQUIPMENTS:

- STEAM TURBINE, GENERAL
- STEAM TURBINE, DOUBLE FLOW (–4)
- HEAT EXCHANGER
- HYDRAULIC/PNEUMATIC OPERATED QCNRV
- ATMOSPHERIC TANK
- PRESSURE VESSEL
- PUMP, CENTRIFUGAL TYPE/FAN
- PUMP, POSITIVE DISPLACEMENT TYPE
- CENTRIFUGAL PUMP WITH MOTOR
- GEAR PUMP
- A.C. MOTOR
- D.C. MOTOR
- FILTER

3. OTHERS.

- GEAR COUPLING
- FLEXIBLE MEMBRANE COUPLING
- RIGID COUPLING
- Y–TYPE STRAINER
- BASKET TYPE STRAINER
- METALLIC EXPANSION BELLOW
- RUBBER EXPANSION BELLOW
- STEAM TRAP (STEAM / WATER)
- ORIFICE (FIXED DIA.)
- NOZZLE
- SYPHON
- SIGHT GLASS
- ADJUSTABLE ORIFICE
- REDUCER
- FIXED ORIFICE
- FLANGED JOINT
- BLIND FLANGE
- DISHED END / PIPE CAP
- SPECTACLE FLANGE
- DRIP LEG WITH WELD CAP
- RUPTURE DISC
- SILENCER/ENERGY ABSORBER/ MIST SEPERATOR
- VENT TO ATMOSPHERE – LOCAL
- OIL VAPOUR EXTRACTION FAN
- STEAM JET EJECTOR
- STEAM VENT SILENCEER
- VENT TO ATMOSPHERE ABOVE ROOF
- DRAIN TO WASTE
- ITEM SUPPLIED ALONG WITH EQUIPMENT
- DIRECTION OF FLOW
- BHEL (HY) CUSTOMER — SCOPE OF SUPPLY LIMIT BETWEEN CUSTOMER & BHEL
- IC PIPING PACKAGES — INTERNAL SCOPE OF SUPPLY
- T&C ENGG PE&SD — INTERNAL SCOPE OF SUPPLY LIMIT(WITHIN BHEL)
- TERMINAL POINT No.

3. PIPING MATERIAL SPECIFICATION DESIGNATION

DESIGNATION SHALL BE AS FOLLOWS:

X X X — LINE VARIANTS A,B,C etc.,

CODE FOR RATING	
CODE	RATING
1	#150
2	#300
3	#600
4	#900
5	#1500
6	#2500

CODE FOR MATERIAL	
CODE	MATERIAL
1	CARBON STEEL
2	A312 TP 304
3	A 335 P11
4	A 335 P22
5	A 335 P91

B. INSTRUMENTATION.

1. IDENTIFICATION LETTERS.

LETTER	FIRST LETTER	SUCCEDING LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	FUNCTION	MODIFIER
A			ALARM	
C			CONTROL,CLOSE	
D		DIFFERENTIAL		
E	VOLTAGE		SENSOR (PRIMARY) ELEMENT	
F	FLOW RATE,FAIL			
G			GLASS, VIEWING DEVICE	
H	HAND			HIGH
I	CURRENT		INDICATE	
J	POWER	SCAN		
K				
L	LEVEL		LIGHT, LAMP	LOW
M				
N				
O			ORIFICE, RESTRICTION, OPEN	
P	PRESSURE, VACCUM		POINT (TEST CONNECTION)	
Q	QUANTITY	INTEGRATE TOTALIZE		
R			RECORD	
S	SPEED, FREQUENCY	SAFETY	SWITCH	
T	TEMPERATURE		TRANSMIT	
t	TIME			
U	MULTI VARIABLE		MULTI FUNCTION	
V	VIBRATION, MECHANICAL ANALYSIS		VALVE, DAMPER, LOUVER	
W	WEIGHT, FORCE		WELL	
X		X–AXIS		
Y		Y–AXIS	RELAY, COMPUTE, CONVERT	
Z	POSITION DIMENSION	Z–AXIS		

2. PANEL ABREVATIONS

LGB	LOCAL GAUGE BOARD	DAS	DATA ACQUISITION SYSTEM
TSD	TURBINE START UP DESK	DCS	DISTRIBUTION CONTROL SYSTEM
LP	LOCAL PANEL	ATRS	AUTOMATIC TURBINE RUN UP SYSTEM
LCP	LOCAL CONTROL PANEL	IPP	INTERLOCK & PROTECTION PANEL
MCP	MAIN CONTROL PANEL (IN CONTROL ROOM)	PLC	PROGRAMMABLE LOGIC CONTROLLER
UCP	UNIT CONTROL PANEL (IN CONTROL ROOM)		
UCB	UNIT CONTROL DESK(BOARD		

3. LINE SYMBOLS FOR INSTRUMENTS.

1. INSTRUMENT SUPPLY OR CONNECTION TO PROCESS
2. PNEUMATIC SIGNAL
3. ELECTRIC SIGNAL
4. HYDRAULIC SIGNAL
5. CAPILLARY
6. SOFTWARE OR DATA LINK
7. AIR VAPOR MIXTURE LINE

4. INSTRUMENT LOCATION SYMBOL

1. FIELD MOUNTED
2. (**) INSTRUMENT MOUNTED ON LOCAL GAUGE RACK
3. LOCAL GAUGE BOARD MOUNTED
4. TURBINE START UP DESK/LOCAL CONTROL PANEL MOUNTED
5. CONTROL PANEL MOUNTED (IN CENTRAL CONTROL ROOM)
6. (#) INSTRUMENT IN TURBINE CONTROL SYSTEM
7. DCS DISPLAY/ CONTROL/ ALARM
8. (#) REAR OF CENTRAL CONTROL ROOM MOUNTED
9. INSTRUMENTS WITH TWO FUNCTIONS
10. INTERLOCK
11. ($) PUSH BUTTONS, INDICATING LAMPS PROVIDED ON TURBINE CONTROL PANEL
12. (*) INSTRUMENT MOUNTED ON PANEL FOR BALANCE OF PLANT
13. (#) INDICATION/ALARM ON CUSTOMER'S CRT & BHEL PLC CRT

5. SYMBOLS

1. CONTROL VALVE (DIAPHRAM ACTUATED)
2. MANUALLY OPERATED CONTROL VALVE
3. CONTROL VALVE –ANGULAR TYPE
4. MODULATING CONTROL VALVE WITH PNEUMATIC ACTUATOR AND ELECTROPNEUMATIC POSITIONER
5. FL/FO FAIL LOCK/FAIL OPEN
6. FL/FC FAIL LOCK/FAIL CLOSE
7. CONTROL VALVE, SOLENOID OPERATED
8. PSV SAFETY VALVE (SPRING LOADED)
9. DESUPERHEATER (COMBINED WITH SPRAY CONTROL VALVE)
10. I/P I/P CONVERTER
11. FLOW NOZZLE / VENTURI
12. FLOW ORIFICE
13. A ANALOG INPUT TO DCS
14. D BINARY INPUT TO DCS
15. A ANALOG INPUT TO ATRS
16. B BINARY INPUT TO ATRS
17. PX PRESSURE INSTRUMENT (WITH INSTRUMENT ISOLATION VALVE)
18. PDX DIFFERENTIAL PRESSURE INSTRUMENT (WITH 5 VALVE MANIFOLD)
19. LX TOP MOUNTED LEVEL INSTRUMENT
20. TANK, LX SIDE MOUNTED LEVEL INSTRUMENT

NOTES :
SAME TAG NUMBER SHALL BE GIVEN FOR ALL INSTRUMENTS IN A LOOP. SUFFIXES A, B, C MAY BE USED TO AVOID DUPLICATION.

PE&SD INTERNAL REVIEW

REV.00	NAME	SIGN
C&I	SONALIKA	

REV.	DATE	ALTERED	CHD/APPD
ZONE			

CUSTOMER: TNPL — TAMILNADU NEWSPRINT AND PAPERS LTD., UNIT–2,MONDIPPATTI,MANAPPARAI,TRICHY,TAMILNADU

PROJECT CONSULTANT: SPB-PC — SPB PROJECTS AND CONSULTANCY LIMITED, CHENNAI INDIA

TYPE OF PRODUCT/ PROJECT: TNPL UNIT–II, 1X30 MW STG

PROJECT No. : 277 | AREA CODE/ AREA : 27150/ STG

BHARAT HEAVY ELECTRICALS LTD. HYDERABAD

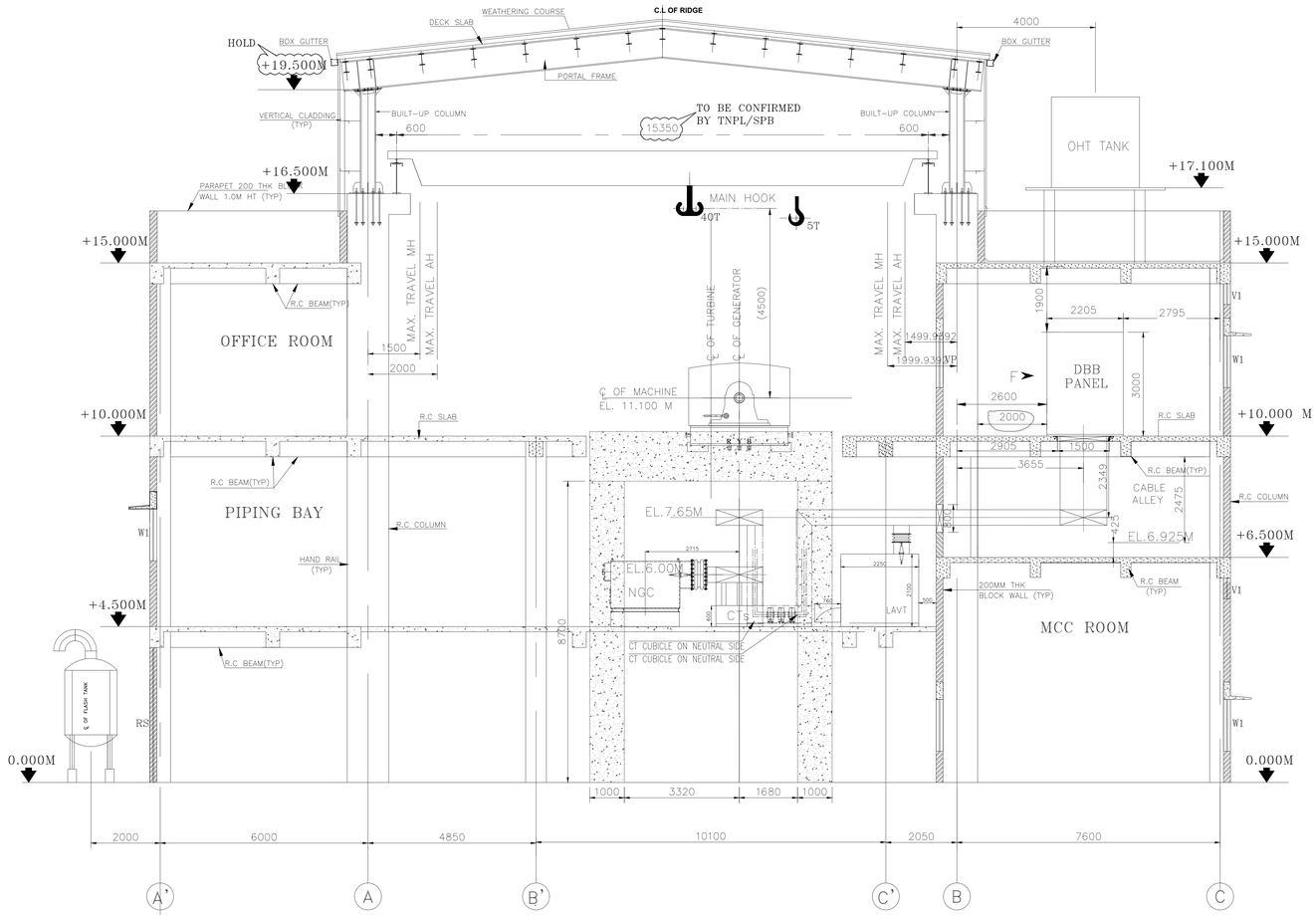
	NAME	SIGN	DATE	NO.OF VAR.
DRN.	S.B.N.		06.02.14	–N.A.–
CHD.	M.S.S.N		06.02.14	
APPD.	P.S.B		06.02.14	

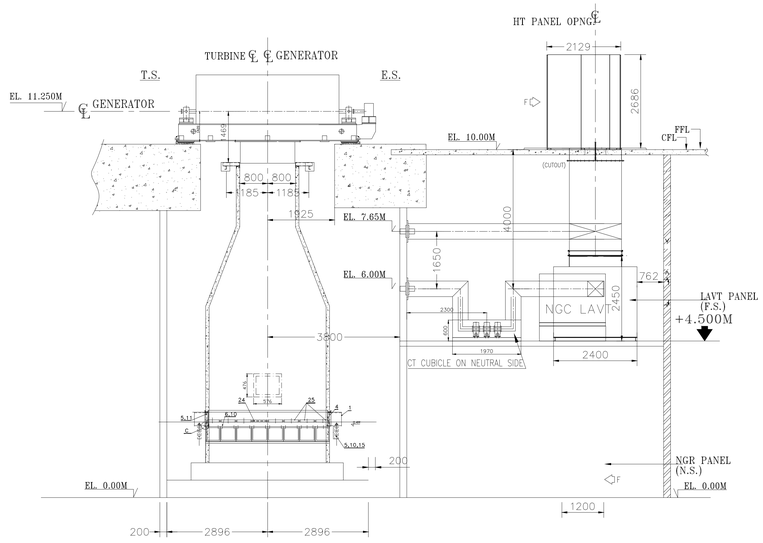
RELEASED

DEPT.	UNTOL. DIMS. GR.		SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM NO.	NO.OF ITEMS
PE&SD CODE 450	E/M/F		NTS	–N.A.–	–N.A.–	–N.A.–	–N.A.–

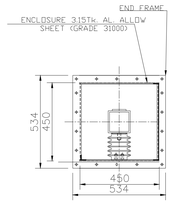
TITLE: LEGEND FOR P&I DIAGRAMS

CARD CODE | BHEL DRAWING NO. 1–381–01–05844 | REV. 00 | SHT. No 1 | NO. OF SHT. 1

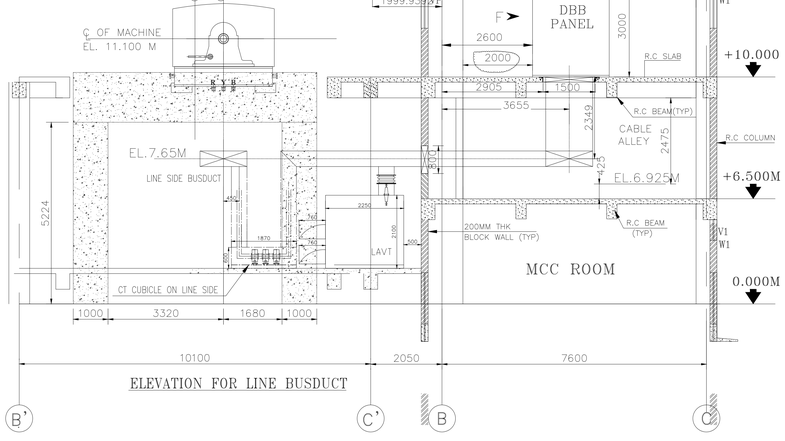




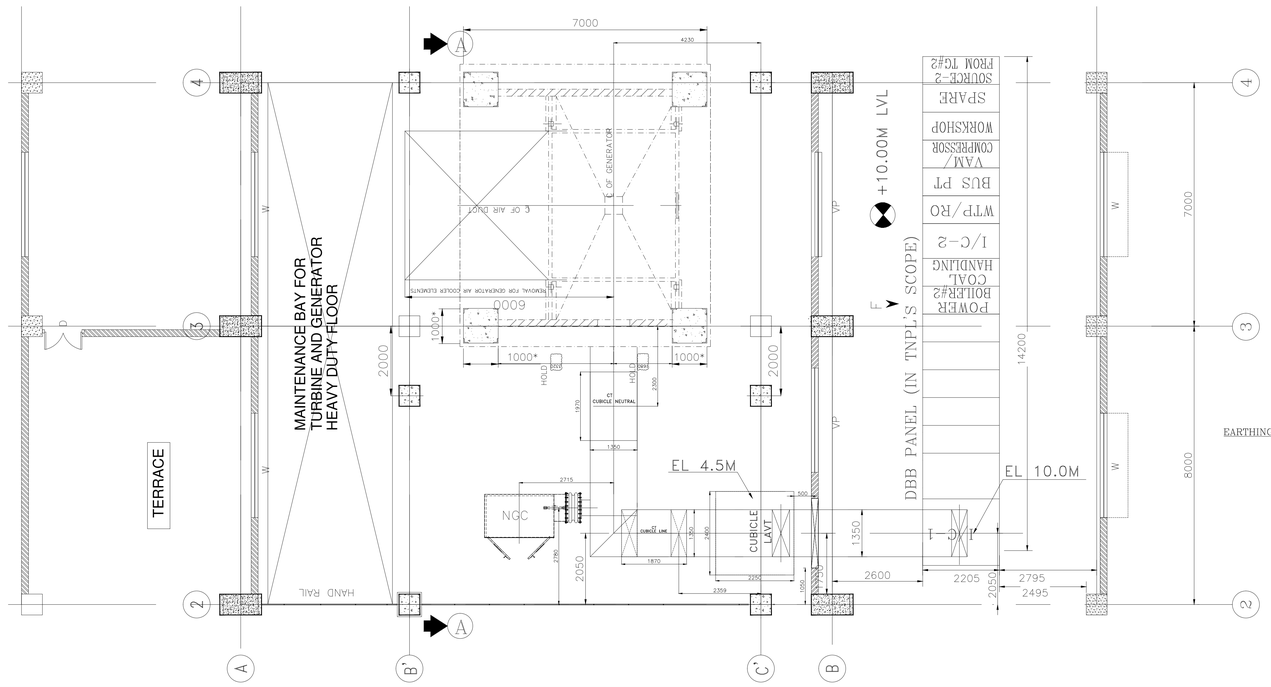
VIEW'A-A'

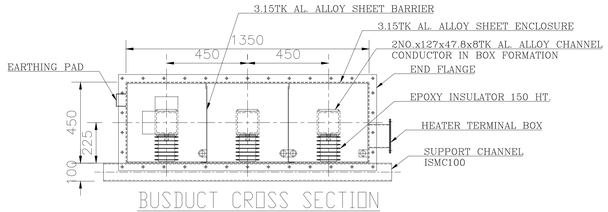


SECTION FOR NGC BUSDUCT



ELEVATION FOR LINE BUSDUCT





BUSDUCT CROSS SECTION

FOR APPROVAL

REFERENCE DRAWING			
S.NO.	DRAWING NO.	REV.	DISCRIPTION
1.	13810105847	00	TG HALL EQUIPMENT LAYOUT
2.	HY-DG-1-5611-84339	00	KEY DIAGRAM FOR MEASUREMENT AND PROTECTION
3.	HY-DG-0-13991-84325	01	CLOSED CIRCUIT AIR COOLING SYSTEM

PROJECT	TNPL 1X30 MW STG
CUSTOMER	TNPL, KAGITHAPURAM
CONSULTANT	SPBPC LTD. CHENNAI

BHARAT HEAVY ELECTRICALS LIMITED
RUDRAPUR

	NAME	SIGN.	DATE	NO. OF VAR.
DRN.	S.P.S	-Sd-	23.4.14	
CKD.	RKB	-Sd-	23.4.14	
APPD.	RKB	-Sd-	23.4.14	

REV.	DATE	ALTERD	CHEKED
01	19.06.14	S P S	R K L

DRG REVISED AS PER COMMENTS 30.05.14.

DEPTT.	UNITDL.DIM.GR.	SCALE	WEIGHT-KG	IT.NO.	NO.OF ITEM
ECC	C/M/F	N.T.S.	-	-	

TITLE
GENERAL LAYOUT DRAWING OF 11KV, 3000A LINE & NEUTRAL SIDE BUSDUCTS & ACCESSORIES

NTPC DRG. NO. ----------

DRAWING NO. 01981310001 REV. 01

SHEET NO.- 01 NO.OF SHEETS- 01 SIZE- A0

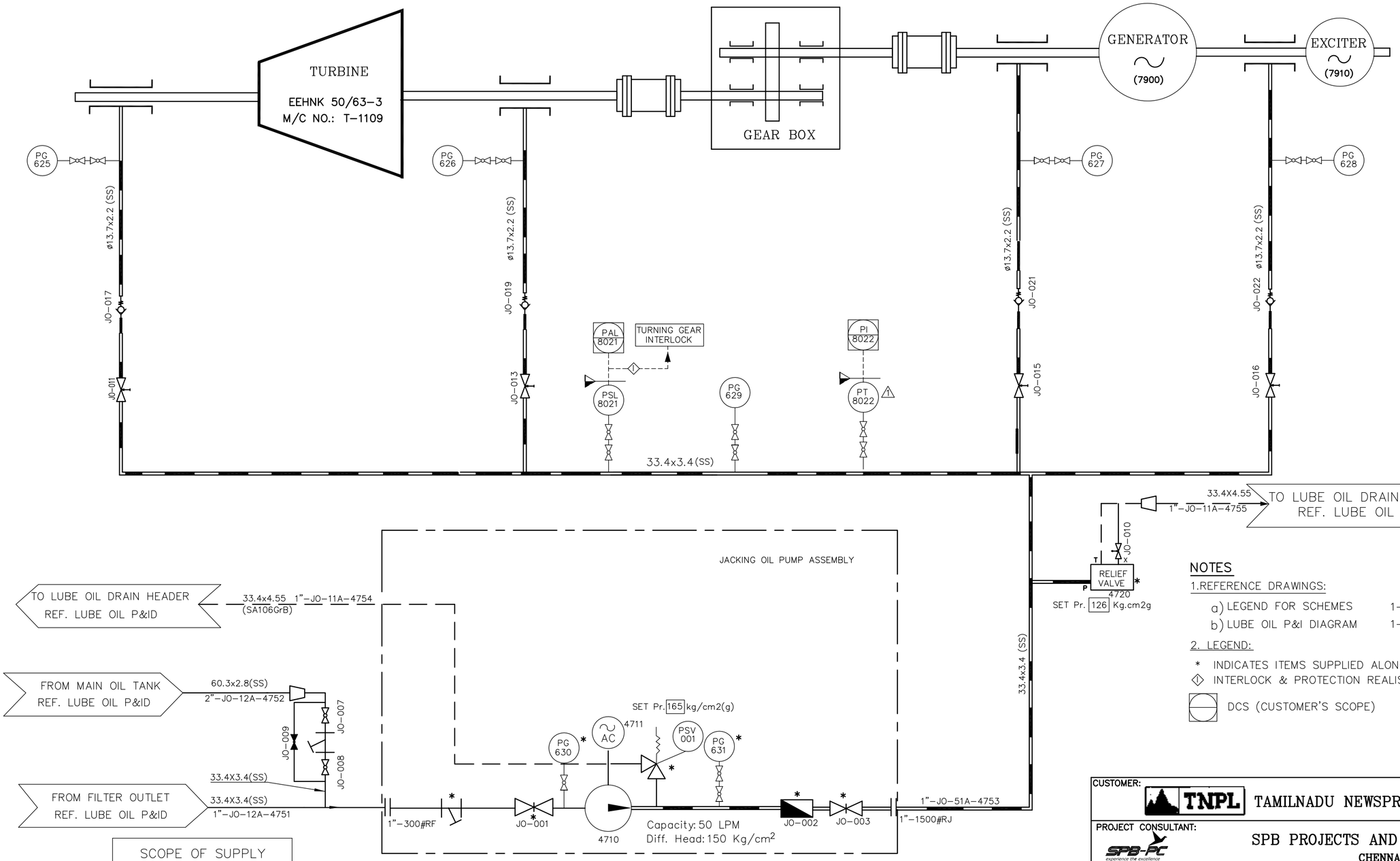
FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 1-317-01-10963

SH. 1 OF 1

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



NOTES

1.REFERENCE DRAWINGS:

a) LEGEND FOR SCHEMES 1-381-01-05844

b) LUBE OIL P&I DIAGRAM 1-317-01-10962

2. LEGEND:

* INDICATES ITEMS SUPPLIED ALONG WITH RESPECTIVE EQUIPMENT

◇ INTERLOCK & PROTECTION REALISED IN DCS.

DCS (CUSTOMER'S SCOPE)

SCOPE OF SUPPLY

BHEL | CUSTOMER

STATUS OF DRAWING: For Approval

CUSTOMER: TNPL TAMILNADU NEWSPRINT & PAPERS LIMITED

PROJECT CONSULTANT: SPB PROJECTS AND CONSULTANCY LIMITED, CHENNAI INDIA

PROJECT: 1X30MW STG UNIT-2

MONDIPPATTI, MANAPPARAI, TRICHY, TAMILNADU

BHARAT HEAVY ELECTRICALS LTD. HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN.	A K JHA	-SD-	11.02.14	N.A.
CHD.	B SINGH		11.02.14	
APPD.	S.R.V.K		11.02.14	

REV.	DATE	ALTERED	CHD/APPD
01	01.03.14	A K JHA	B SINGH/SRVK

REVISED AS PER CUSTOMER COMMENTS

DEPT.	UNTOL. DIMS.	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM NO.	NO.OF ITEMS
TCEP	GR. C/M/F	N.T.S	N.A.	N.A.	N.A.	N.A.
CODE 415						

TITLE: JACKING OIL P&I DIAGRAM

CARD CODE: N.A.

DRAWING NO. 3-317-01-10963 REV. 01

SHT. No 1 NO. OF SHT. 1

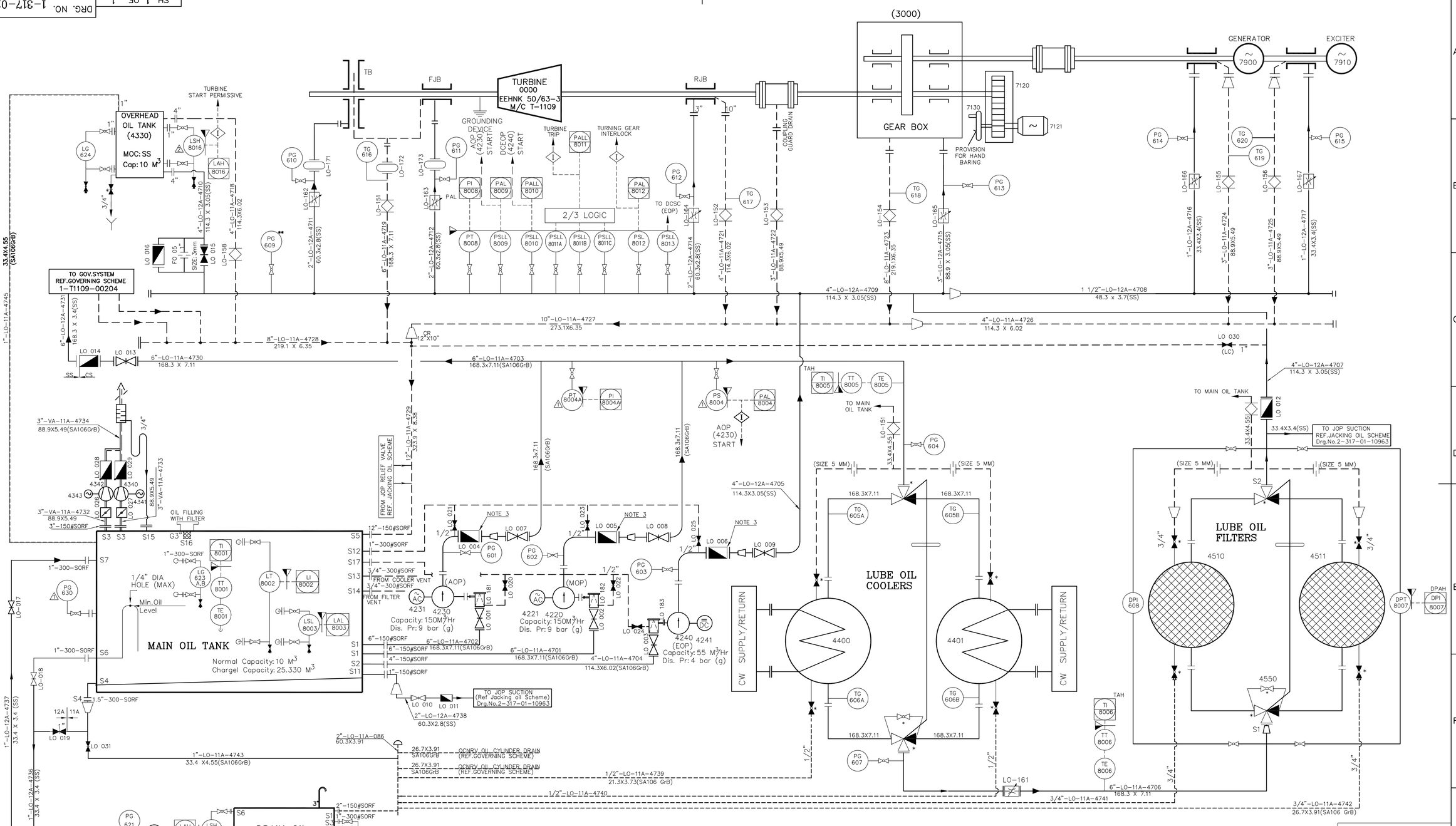
RETRIEVED

BHEL-HYD EDAS INFORMATICS CENTRE

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 1-317-01-10962 SH. 1 OF 1



NOTES:

1) REFERENCE DRAWINGS
   - a) LEGEND FOR SCHEMES 1-381-01-05844
   - b) GOVERNING SCHEME 1-T1109-00204
   - c) JACKING OIL P&ID 2-317-01-10963
2) ALL PIPE LINES DOWN STREAM OF THE FILTER UPTO BEARINGS/O.H.T ARE OF S.S. OTHERS ARE OF C.S
3) IT SHALL BE ENSURED THAT THE CHECK VALVE ELEVATION SHALL BE LOWER THAN THAT OF MIN.OIL LEVEL IN THE TANK TO PREVENT AIR LOCKING IN DISCHARGE PIPING.
4) ALL INSTRUMENTS AND MOTOR TAG NUMBERS SHALL HAVE PREFIX AS "27150"

5.LEGEND:
- '*' ITEM SUPPLIED ALONG WITH RESPECTIVE EQUIPMENT.
- INTERLOCK & PROTECTION REALISED IN DCS
- DCS (CUSTOMER SCOPE)
- ** INSTRUMENTS MOUNTED ON LOCAL GAUGE RACK

STATUS OF DRAWING: FOR APPROVAL

CUSTOMER: TNPL TAMILNADU NEWSPRINT & PAPERS LIMITED

PROJECT CONSULTANT: SPB PROJECTS AND CONSULTANCY LIMITED, CHENNAI INDIA

PROJECT: 1X30MW STG UNIT-2
MONDIPPATTI,MANAPPARAI,TRICHY,TAMILNADU

BHEL HYDERABAD

	NAME	SIGN	DATE	NO.OF VAR.
DRN.	A K JHA		11.02.14	–N.A.–
CHD.	B SINGH		11.02.14	
APPD.	S.R.V.K		11.02.14	

REJECTED USE

DEPT.	UNTOL. DIMS.		SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM NO.	NO.OF ITEMS
TCEP CODE 415	GR. C/M/F		NTS	–N.A.–	–N.A.–	–N.A.–	–N.A.–

TITLE: LUBE OIL P&I DIAGRAM

CARD CODE: N.A.

DRAWING NO. 1-317-01-10962 REV. 02

SHT. No 1 NO. OF SHT. 1

REV.	DATE	ALTERED	CHD/APPD
02	19.03.14	ALTERED A K JHA	CHD/APPD B SINGH/SRVK
		REVISED AS PER CUSTOMER COMMENT & MARKED AS ⚠	
01	01.03.14	ALTERED A K JHA	CHD/APPD B SINGH/SRVK
		REVISED AS PER CUSTOMER COMMENT	

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

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 3-38101-03395 SHT. 1 OF 1

COMPUTER FILE NAME 1-3801-03372-500.R00.dwg | REF. DRG. NO. | SIGN. AND DATE | INVENTORY NO

AUX COOLING WATER INLET

TP-81

10"-CWS-5203-11D

CONC. RED 10"X6"

6"-CWS-5201-11D

6"-CWS-5209-11D

	PRES.(g) (Kg/cm2)	TEMP. (°C)	FLOW (m3/hr)
NORMAL	4	33	290
MAX.	5	–	–
DESIGN	5	–	–

TI 8301 | TT 8301 | TE 8301

02

GTV-5201

PG 681

TG 682

6" ANSI 150# SORF

HE ENGG

GENERATOR AIR COOLER

140 M3/HR

6" ANSI 150# SORF

02

TI 8302 | TT 8302 | TE 8302

GTV-5202

PG 683

TG 684

6"-CWR-5202-11D

	PRES.(g) (Kg/cm2)	TEMP. (°C)	FLOW (m3/hr)
NORMAL	2.5	37.6	290
MAX.	5	–	–
DESIGN	5	–	–

02

TP-82

AUX COOLING WATER OUTLET

10"-CWR-5208-11D

CONC. RED 10"X6"

02

TI 8303 | TT 8303 | TE 8303

6"-CWS-5204-11D

6"-CWS-5205-11D

PG 685

GTV-5203

TG 687

PG 686

GTV-5204

TG 688

6" ANSI 150# SORF

6" ANSI 150# SORF

HE ENGG

L.O. COOLERS

150 M3/HR

150 M3/HR

6" ANSI 150# SORF

6" ANSI 150# SORF

PG 689

GTV-5205

TG 691

PG 690

GTV-5206

TG 692

6"-CWR-5206-11D

6"-CWR-5207-11D

02

TI 8304 | TT 8304 | TE 8304

6"-CWR-5210-11D

BHEL-HYD EDAS INFORMATICS CENTRE

NOTES

1) REFERENCE DRAWINGS/DOCS:-.

A) LEGEND FOR SCHEMES 1-381-01-05844

B) NUMBERING PHILOSOPHY 2-381-01-04250

2) ALL VALVES AND INSTRUMENTS SHALL BE PREFIXED WITH 27150.

* SUPPLIED WITH MAIN EQUIPMENT.

TAG NO. INDEX

	TAGS USED	RANGE	UNUSED TAGS
LINE NUMBERS	5201-5210	5201-5299	--
VALVE TAG.	5201-5206	5201-5299	--
INSTRUMENTATION TAG	681-692	681-699	--
	8301-8304	8301-8399	--

02

SCOPE OF SUPPLY

CUSTOMER | BHEL

REV.	DATE	ALTERED	CHD/APPD
ZONE			
02	20.3.14	REVISED INLINE WITH THE TNPL COMMENTS RECEIVED VIDE EMAIL DATED 18.03.14	AJIT SINGH. PRADEEPA
01	07.03.14	REVISED INLINE WITH THE TNPL COMMENTS RECEIVED VIDE EMAIL DATED 22.02.14	AJIT SINGH. PRADEEPA

CUSTOMER: TAMILNADU NEWSPRINT AND PAPERS LTD., KAGITHAPURAM

UNIT-2,MONDIPPATTI,MANAPPARAI,TRICHY,TAMILNADU

CONSULTANT: SPB PROJECTS AND CONSULTANCY LIMITED

CHENNAI INDIA

PROJECT: TNPL UNIT-II, 1 X 30 MW STG

PROJECT NO: 277 | AREA CODE / AREA :27150 / CWS

BHARAT HEAVY ELECTRICALS LTD. HYDERABAD

		SIGN.	DATE	NO.OF VAR.
DRN.	AJIT		17.02.14	
CHD.	PRADEEPA		17.02.14	
APPD.	RADHIKA SISTA		17.02.14	

DEPT. PED | CODE 450 | UNTOL. DIMS. GR. g/M/f | SCALE | WEIGHT (KG) | REF. TO ASSY. DRG. | ITEM NO. | NO.OF ITEMS

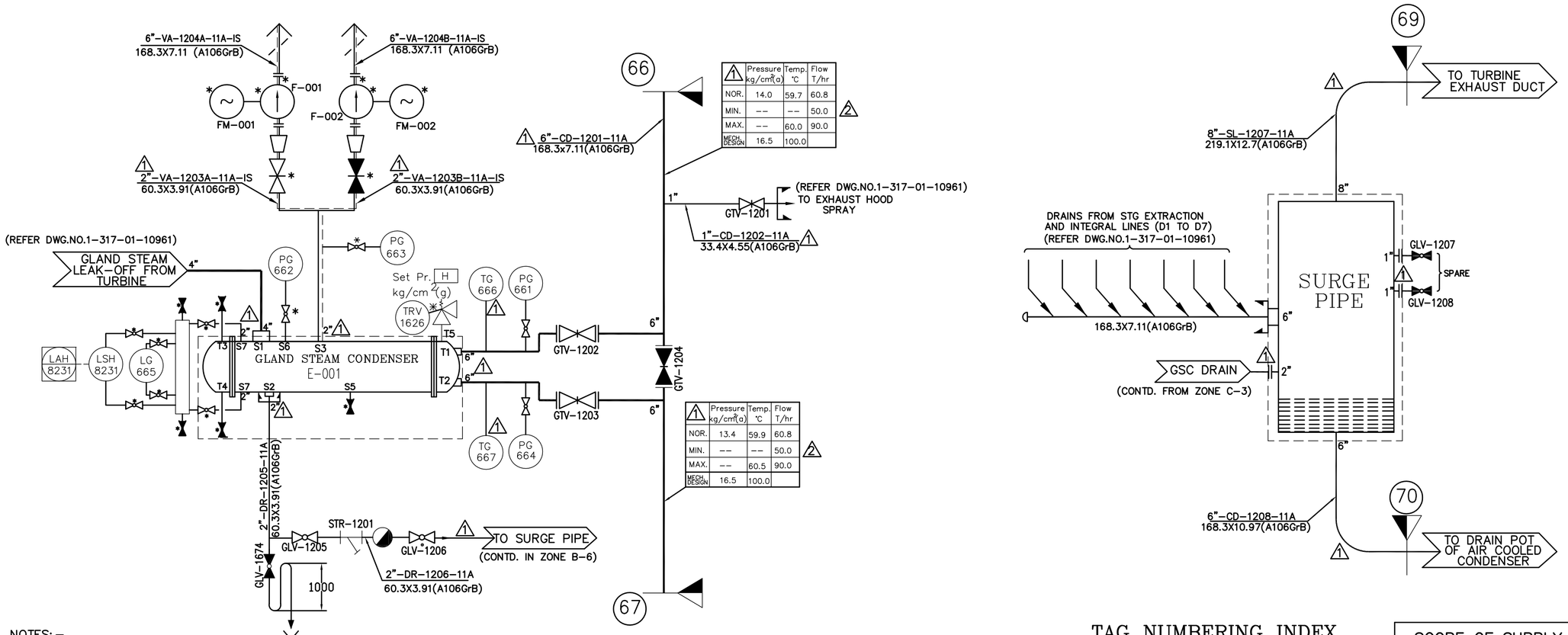
TITLE: P&I DIAGRAM AUXILLIARY COOLING WATER SYSTEM

CARD CODE

BHEL DRG. NO. 3-38101-03395 REV. 02

CUSTOMER DRG. NO. 03395-27150-1352

SHT. No 1 NO. OF SHT. 1



1	Pressure kg/cm²(a)	Temp. °C	Flow T/hr
NOR.	14.0	59.7	60.8
MIN.	--	--	50.0
MAX.	--	60.0	90.0
MECH. DESIGN	16.5	100.0	

2

1	Pressure kg/cm²(a)	Temp. °C	Flow T/hr
NOR.	13.4	59.9	60.8
MIN.	--	--	50.0
MAX.	--	60.5	90.0
MECH. DESIGN	16.5	100.0	

2

NOTES: –

1) REFERENCE DRAWINGS: –

A) LEGEND FOR SCHEMES	1-381-01-05844
B) NUMBERING PHILOSOPHY	2-381-01-04250
C) TURBINE INTEGRAL STEAM & DRAIN SCHEME	1-317-01-10961

2) ALL DRAINS & VENTS SIZES SHALL BE OF 1" UNLESS OTHERWISE SPECIFIED.
3) DRAINS SHALL BE PROVIDED AT ALL LOWEST POINTS BASED ON LAYOUT.
4) END CONNECTIONS FOR TAP OFFS TO BE PROVIDED ON PIPING FOR INSTRUMENTS SHALL BE AS FOLLOWS
   –ROOT VALVE ENDING WITH 1/2" SW FOR PRESSURE
   –STUB ENDING WITH M33x2 FOR TEMPERATURE
5) ALL TEMPERATURE ELEMENTS SHALL BE OF DUPLEX TYPE.
6) THE TAG NUMBERS INDICATED IN THIS P&ID FOR VALVES, INSTRUMENTS & EQUIPMENTS SHALL BE PREFIXED BY AREA CODE ie., 27150. (REFER NUMBERING PHILOSOPHY DOCUMENT)
7) LEGEND
   '*' ITEM SUPPLIED ALONG WITH RESPECTIVE EQUIPMENT.
   '**' PARAMETERS TO BE CONFIRMED BY CUSTOMER.

DCS

TAG NUMBERING INDEX

TAG NO. INDEX	TAG NOs RANGE	SPARE TAGS
EQUIPMENT TAG	--	
LINE NUMBERS	1201-1206	-
VALVE TAG.	1201-1208	
1 INSTRUMENTATION TAG	LOCAL : 661-667 OTHERS : 8231	LOCAL:668-670 OTHERS:8232-8240
INTERLOCK TAG.	--	
1 TERMINAL POINT	66-70	68, 71-75

SCOPE OF SUPPLY

BHEL CUSTOMER

BHEL INTERNAL SCOPE

BHEL (T&C ENGG) BHEL (PE&SD)

CUSTOMER: TNPL

TAMILNADU NEWSPRINT AND PAPERS LTD.,
UNIT-2,MONDIPPATTI,MANAPPARAI,TRICHY,TAMILNADU

PROJECT CONSULTANT: SPB-PC experience the excellence

SPB PROJECTS AND CONSULTANCY LIMITED,
CHENNAI INDIA

TYPE OF PRODUCT/ PROJECT: TNPL UNIT-II, 1X30 MW STG

PROJECT No. : 277

AREA CODE/ AREA : 27150/ STG

BHARAT HEAVY ELECTRICALS LTD.
HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN.	S.B.N.		15.02.14	-N.A-
CHD.	M.S.S.N		15.02.14	
APPD.	P.SUDHIR BABU		15.02.14	

RETRACED

DEPT.	UNTOL. DIMS.		SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM NO.	NO.OF ITEMS
PE&SD	GR.		-N.A-	-N.A-	-N.A-	-N.A-	-N.A-
CODE 450	ℓ/M/F						

TITLE: P&ID FOR CONDENSATE PIPING AND SURGE PIPE

CARD CODE

DRG. NO. 2-381-01-04251 REV. 02

CUST. DRG. NO. 4251-27150-1212

SHT. No 1 NO. OF SHT. 1

PE&SD INTERNAL REVIEW

REV.02	NAME	SIGN.
C&I	SONALIKA	-sd-

REV.	DATE	ALTERED	CHD/APPD	MSSN/PSB.
02	04.04.14	–REVISED AS PER MOM DATED 03-04 APR 2014. –REVISIONS MARKED AS 2		
01	17.03.14	–GENERALLY REVISED –REVISED AS PER MOM DATED 18-19 FEB 2014. –GSC DATA UPDATED AS PER GA DWG. –REVISIONS MARKED AS 1		

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 1-381-01-05846 SHT.1 OF 1

COMPUTER FILE NAME 1381010S846-S00-R03.DWG | REF. DRG. NO. | SIGN. AND DATE | INVENTORY NO.

MAIN STEAM SUPPLY TO TURBINE (51)

	Pressure kg/cm²(a)	Temp. °C	Flow T/hr
NOR.	103.0	525	147.8
MIN.	103.0	525	5.85
MAX.	103.0	525	158.4
MECH. DESIGN	115.5	530	

12"-MS-1101-64C-IH 323.8X35.00 (A335P22) [3]

Note13

FI 8203, FY 8203, TI 8204, PI 8209, FT 8203, TT 8204, PT 8209, TE 8204, FE 8203

GLV-1102A, GLV-1102B, GLV-1103A, GLV-1103B, D101

MOV-GTV-1101A, MOV-RGLV-1101B (Inching type), Note4

3" GTV-1146, GLV-1147, WET STEAM WASHING CONNECTION

8" 33.4X6.35, GLV-1104, GLV-1105, GLV-1106A, GLV-1106B, 1 1/2", D102

TI 8101, PI 8102, 2/3 LOGIC, 1/2 LOGIC, TO ELECTRONIC GOVERNOR

TE 8101A/B/C, TT 8101A/B/C, PT 8102A/B, PT 8103, PG 635**, TG 636**

SILENCER, CR 6"X2", 6"-VT-1120-11A-IS 168.3X7.11 (A106GrB)

MOV-GTV-1108, GLV-1107, GLV-1109A, GLV-1109B, D103

2"-MS-1102-64C-IH 60.3X12.75(A335P22) [3]

	Pressure kg/cm²(a)	Temp. °C	Flow T/hr
NOR.	102.4	525	147.25
MIN.	102.4	525	5.2
MAX.	102.4	525	154.45
MECH. DESIGN	115.5	530	

Note6 WARM UP CONNECTION, N1, 10"-#2500 (SA182 F22) (WELD RING GASKET #2500, Sch.160)

6"-#300 WNRF SCH.40 (SA182F11), 6"-#300 WNRF SCH.40 (SA182F11), SCH.40

STEAM TURBINE M/C NO.T-1109 EHNK 50/63-3

N3, N4, N5, N6, N7, N8, N9A, N9B, 01

4"-300# WNRF SCH.40 (SA182F11), 6"-300# WNRF SCH.40 (SA182F11), 8"-#600 WNRF SCH40 (SA182F11), 6"-#300 WNRF SCH.20 SA105, 12"-#150, WNRF SCH.20,SA106, 6"-#300,WNRF SA182F11,SCH.40, 24"X12"

SCOPE OF SUPPLY

BHEL CUSTOMER

BHEL INTERNAL SCOPE

BHEL (T&C ENGG) BHEL (PE&SD)

BHEL/VENDOR SCOPE

VENDOR'S PE&SD SCOPE

11/2"-AUX-1107-64C-IH 48.3X7.14 (A335P22)

	Pressure kg/cm²(a)	Temp. °C	Flow T/hr
NOR.	103.0	525	0.465
MIN.	103.0	525	0.465
MAX.	103.0	525	3.77
MECH. DESIGN	115.5	530	

CR 4"X11/2", CR 4"X11/2", 1"-AUX-1124-64C-IH 33.4X6.35(A335P22)

TG 651, PG 651, ZI 8201, ZT 8201, PY 8201, I/P, PCV 8201, PIC 8201, PAH, PT 8201, PG 652

GLV-1124A, GLV-1124B, GLV-1125B, GLV-1125A, GTV-1123, RGLV-1123, FIP/FC, H"-2500# WNRJ, 24C 64C P22 P22, 23C 64C P11 P22, CR 11/2"X1"

4"-VT-1119-11A-IH 114.3X6.02(A335P22), SET Pr: 16.6 Kg/Cm²g, PSV 1146, CR 21/2"X3", 11/2"-#300RF, 33.4X4.55, 500, D113

11/2"-AUX-1121-24C-IH 48.3x5.08 (A335P22) [3]

	Pressure kg/cm²(a)	Temp. °C	Flow T/hr
NOR.	16.0	484.3	0.465
MIN.	--	--	0.465
MAX.	16.0	484.3	3.77
MECH. DESIGN	17.6	495.0	

3"-AUX-1108-24C-IH 88.9X5.49(A335P22), 1"-BD-1124-24C 33.4X4.55(A335P22), STR-1101, NRV-1135, 24C 21C CS (P22), 1"-#300 WNRF, TG 654, TE 8202, 3" CR 4"X3", GLV-1136, GLV-1139, GTV-1157, ST-1119, D111, D112, DS 8206

TG 653, PG 653, CR 4"X1", CR 4"X1", 54, SPRAY WATER SUPPLY, 1"-BD-1111-21C 33.4X4.55(A106GrB)

	Pressure kg/cm²(a)	Temp. °C	Flow T/hr
NOR.	31.0	55.0	0.047
MIN.	31.0	55.0	0.047
MAX.	28.0	80.0	0.377
MECH. DESIGN	41.0	100.0	

ZI 8202, ZT 8202, TY 8202, I/P, TCV 8202, TAH, TIC 8202, GTV-1130, GLV-1133, FIP/FC 1" WNRF, GLV-1131, GLV-1134, RGLV-1132, TT 8202

55, 3" TO STEAM JET AIR EJECTOR OF AIR-COOLED CONDENSER

3"-AUX-1109-21C-IH 88.9X5.49(A106GrB)

	Pressure kg/cm²(a)	Temp. °C	Flow T/hr
NOR.	16.0	350	0.512
MIN.	--	--	0.512
MAX.	16.0	350	4.127
MECH. DESIGN	17.6	360	

CR 3"X11/2", TO TURBINE GLAND SEALING, Ref: TURBINE INTEGRAL STEAM & DRAIN SCHEME, DWG.:1-317-01-10961

11/2"-AUX-1110-21C-IH 48.3X5.08 (A106GrB)

52, MOV-GTV-1114A, MOV-RGLV-1114B, MP EXTRACTION TO PROCESS

	Pressure kg/cm²(a)	Temp. °C	Flow T/hr
NOR.	14.0	283.0	22.0
MIN.	14.0	278.6	--
MAX.	14.0	312.4	25.0
MECH. DESIGN	15.5	325.0	

FI 8205, FT 8205, FE 8205, TE 8206, Note8, GLV-1112, GLV-1113, D121

8" VT-1118-11A-IH 219.1X6.35 (A106GrB), SET PR. 14.5 kg/cm²(g), PSV 1111, 6"-#150 WNRF, 33.4X4.55, 500, D122

4"-SM-1117-21C-IH 114.3X6.02 (A106GrB), TI 8111, TT 8111, PG 642, TG 643, TE 8111, PT 8109

10"-SM-1105-21C-IH 273.0X9.27(A106GrB), 8"-#300 BW ENDS, Note5, CR 10"X8", QCNRV EX-01

PIC 8109A, I/P, PCV 8109A, FIP/FC, CR 10"X6", 6"-#600 BW ENDS, 6"-SM-1103-31C-IH 168.3X7.11 (A106GrB)

	Pressure kg/cm²(a)	Temp. °C	Flow T/hr
NOR.	33.65	376.0	--
MIN.	15.0	312.0	2.5
MAX.	38.3	395.0	25.0
MECH. DESIGN	42.0	405.0	

PI 8105, TT 8106, TE 8106, PT 8105, TG 638**, PG 642**, 6" 1", GLV-1110, D2, Note10

PIC 8109B, I/P, PCV 8109B, FIP/FC, CR 10"X8", EX-101, 8"-300# BW ENDS, PI 8108, TT 8107, TI 8107, PY 8109B, DPT 8109B, PG 641, PT 8108, TE 8107

	Pressure kg/cm²(a)	Temp. °C	Flow T/hr
NOR.	17.1	287.0	22.0
MIN.	15.0	280.0	2.5
MAX.	21.8	321.0	25.0
MECH. DESIGN	24.0	335.0	

6" 1", GLV-1137, D3, Note10

8" SM-1104-21C-IH 219.1X6.35(A106GrB), 24"-SL-1106-11C-IH 610x9.53(A672GrB60), TO AIR COOLED CONDENSER

273.1X6.35(A335P11), 6"-#300,WNRF SA182F11,SCH.40, 01

	Pressure kg/cm²(a)	Temp. °C	Flow T/hr
NOR.	6.5	186.2	65.0
MIN.	5.85	176.0	6.5
MAX.	7.15	265.0	75.0
MECH. DESIGN	8.5	275.0	

Vent Capacity (30%) :22.5 TPH (MAX.) Set Point: 7.5 ata

14"-VT-1114-11A-IS 355.6X6.35 (A672GrB60), GLV-1118, CR 14"X8", MOV-RGLV-1117, GTV-1116, 10"-#150 WNRF, SET PR. 7.0 kg/cm²(g), PSV 101, 33.4X4.55, 500, D132, 8"-#300 WNRF, 11A 11C

12"-VT-1116-11A-IH 323.8X6.35 (A106GrB), TURBINE TRIP, TI 8115, PI 8114, PAHH 8113, 2/3 LOGIC, PI 8116, TT 8115, TO EHC PRESSURE CONTROLLER IN ELECTRONIC GOV., PT 8116, TE 8115, PT 8114, PSHH 8113A, PSHH 8113B, PSHH 8113C, PSLL 8112A, PSLL 8112B, PSLL 8112C, PG 645**, TG 644**, 12" 11/2", GLV-1115, D4, Note10

8"-SL-1115-11C-IH 219.1x6.35 (A106GrB), Note5, CR 24"X16", QCNRV EX-02, 16"-#150 BW ENDS

53, MOV-GTV-1119A, MOV-RGLV-1119B, LP EXTRACTION TO PROCESS

FI 8207, FT 8207, FE 8207, TE 8208, Note8

	Pressure kg/cm²(a)	Temp. °C	Flow T/hr
NOR.	6.0	186.2	65.0
MIN.	5.35	176.0	6.5
MAX.	6.65	265.0	75.0
MECH. DESIGN	8.5	275.0	

24"-SL-1106-11C-IH 610x9.53(A672GrB60), GLV-1138, 11/2", GLV-1137, D131

1"-VT-1122-11A-IH 33.4X3.38(A106GrB), 323.9X6.35, MAIN STEAM LINE DRAINS, SPARE, D101, D102, D103, 168.3X7.11(A335P11), 1"-SW-1112-11A-IH 33.4X4.55 (A106GrB), 56, SERVICE WATER, GLV-1140, GLV-1141, SPARE, GLV-1142

ATM. FLASH TANK TK-001

MP EXTRACTION LINE DRAINS: SPARE, D122, D121, 168.3X7.11(A106GrB)

AUX. STEAM LINE DRAINS: D113, D112, D111, SPARE, 168.3X7.11(A106GrB)

LP EXTRACTION LINE DRAINS: D132, D131, SPARE, 168.3X7.11(A106GrB)

500, GLV-1145, 48.3X5.08, 11/2"-CD-1123-11A-IH 48.3X5.08(A106GrB)

NOTES: –

1) REFERENCE DRAWINGS: –
   - A) LEGEND FOR SCHEMES 1–381–01–05844
   - B) NUMBERING PHILOSOPHY 2–381–01–04250
   - C) TURBINE INTEGRAL STEAM & DRAIN SCHEME 1–317–01–10961
   - D) P&ID FOR INSTRUMENT AIR DISTRIBUTION 3–381–01–03398
2) ALL DRAINS & VENTS SIZES SHALL BE OF 1" UNLESS OTHERWISE SPECIFIED.
3) DRAINS SHALL BE PROVIDED AT ALL LOWEST POINTS BASED ON LAYOUT.
4) THIS VALVE IS TO BE LOCATED AS CLOSE AS POSSIBLE TO TURBINE TO PERMIT THE LONGEST LENGTH OF PIPING TO BE WARMED UP.
5) QCNRV'S ARE TO BE LOCATED AS CLOSE AS POSSIBLE TO TURBINE NOZZLE
6) THE WARM UP VENT CONNECTION SHALL BE WITHIN 1 METRE FROM FROM EMERGENCY STOP VALVE
7) END CONNECTIONS FOR TAP OFFS TO BE PROVIDED ON PIPING FOR INSTRUMENTS SHALL BE AS FOLLOWS
   - –ROOT VALVE ENDING WITH 1/2" SW FOR PRESSURE
   - –STUB ENDING WITH M33x2 FOR TEMPERATURE
8) STEAM LINE FLOW ELEMENT (EXCEPT FOR MAIN STEAM LINE) SHALL BE WITH
3. MULTI VARIABLE DP TRANSMITTER, HOOKED UPTO COMPATIBLE TEMP. ELEMENT IN FIELD.
9) ALL TEMPERATURE ELEMENTS SHALL BE OF DUPLEX TYPE.
10) FOR CONTINUATION OF THESE DRAINS, PLEASE REFER TO TURBINE INTEGRAL STEAM & DRAIN SCHEME.
11) THE TAG NUMBERS INDICATED IN THIS P&ID FOR VALVES, INSTRUMENTS & EQUIPMENTS SHALL BE PREFIXED BY AREA CODE ie., 27150. (REFER NUMBERING PHILOSOPHY DOCUMENT)
12) ALL MOVs ARE NON–INTEGRAL STARTER TYPE
13) MAIN STEAM FLOW ELEMENT SHALL BE DIFF. PRESSURE TRANSMITTER. K–TYPE THERMOCOUPLE WITH TRANSMITTER &
3. PRESSURE TRANSMITTER SHALL BE DIRECTLY WIRED TO DCS FOR FLOW CALCULATION IN DCS.
14) LEGEND
   - '*' ITEM SUPPLIED ALONG WITH RESPECTIVE EQUIPMENT.
   - '**' PARAMETERS TO BE CONFIRMED BY CUSTOMER.
   - (I) INTERLOCK & PROTECTION REALISED IN DCS
   - DCS
   - ** INSTRUMENTS MOUNTED ON LOCAL GAUGE RACK

TYPICAL FOR ALL CONTROL VALVES (ZI, ZT)

TYPICAL FOR MOTOR OPERATED VALVES (INCHING) (YAC, ZAC, ZAO, YAH, YSC, ZSC, ZSO, YSO)

TYPICAL FOR MOTOR OPERATED GATE VALVE (YAC, ZAC, ZAO, YAH, YSC, ZSC, ZSO, YSO)

TAG NUMBERING INDEX

TAG NO. INDEX	TAG NOs RANGE	SPARE TAGS
EQUIPMENT TAG	--	
LINE NUMBERS [3]	1101–1124	--
VALVE TAG.	1101–1148	1143–1144
INSTRUMENTATION TAG [3]	LOCAL : 651–654 OTHERS : 8101–16 8201–09	LOCAL : 655–660 OTHERS : 8110–8120
INTERLOCK TAG.	--	
TERMINAL POINT	51 – 56	57 – 65

PE&SD INTERNAL REVIEW

REV.	NAME	SIGN.
03	SONALIKA	–sd–

REV.	DATE	ALTERED	ZONE
03	07.07.14	ALTERED S.B.N. CHD/APPD MSSN/PSB	–GENERALLY REVISED –REVISED AS PER BHEL PIPING CENTRE PROPOSED PIPES. –VENDOR DATA UPDATED FOR CONTROL VALVES & SAFETY VALVES. –REVISIONS MARKED AS [3]
02	04.04.14	ALTERED S.B.N. CHD/APPD MSSN/PSB	–REVISED AS PER MOM DATED 03–04 APR 2014. –REVISIONS MARKED AS [2]
01	17.03.14	ALTERED S.B.N. CHD/APPD MSSN/PSB	–GENERALLY REVISED –REVISED AS PER MOM DATED 18–19 FEB 2014. –STG INTEGRAL INSTRUMENT NUMBERS UPDATED AS PER REV.01 TURBINE INTEGRAL SCHEME. –REVISIONS MARKED AS [1]

CUSTOMER: TNPL — TAMILNADU NEWSPRINT AND PAPERS LTD., UNIT–2,MONDIPPATTI,MANAPPARAI,TRICHY,TAMILNADU

PROJECT CONSULTANT: SPB PROJECTS AND CONSULTANCY LIMITED, CHENNAI INDIA

TYPE OF PRODUCT/ PROJECT: TNPL UNIT–II, 1X30 MW STG

PROJECT No. : 277 | AREA CODE/ AREA : 27150/ STG

BHARAT HEAVY ELECTRICALS LTD. HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN.	S.B.N.		15.02.14	
CHD.	M.S.S.N		15.02.14	–N.A.–
APPD.	P.S.B		15.02.14	

DEPT. PE&SD | CODE 450 | UNTOL. DIMS. GR. ±/M/F | SCALE NTS | WEIGHT (KG) –N.A.– | REF. TO ASSY. DRG. –N.A.– | ITEM NO. –N.A.– | NO.OF ITEMS –N.A.–

TITLE: P&ID FOR STEAM SYSTEM

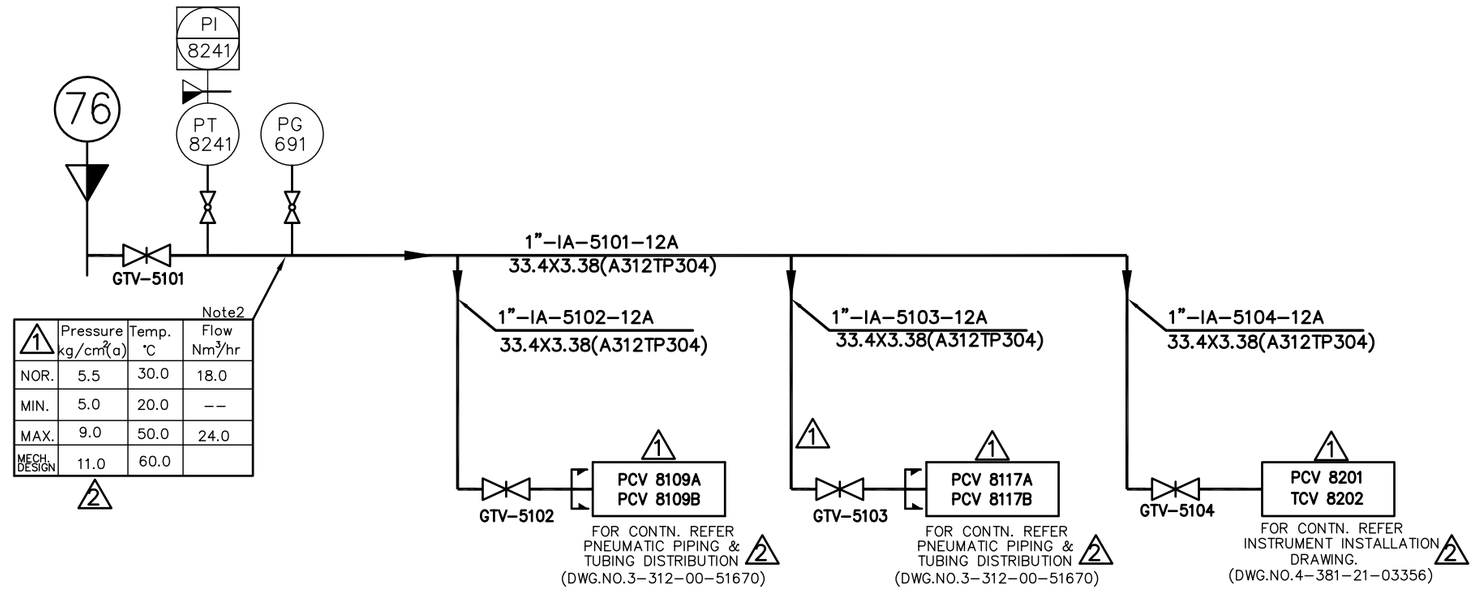
CARD CODE | BHEL DRG. NO 1–38101–05846 REV. 03 | CUSTOMER DRG.NO 5846–27510–1111 | SHT. No 1 NO. OF SHT. 1

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 3-381-01-03398

SHT. 1 OF 1



NOTES: –

1. REFERENCE DRAWINGS: –
   - A) LEGEND FOR SCHEMES 1–381–01–05844
   - B) NUMBERING PHILOSOPHY 2–381–01–04250
   - C) TURBINE INTEGRAL STEAM & DRAIN SCHEME 1–317–01–10961
   - D) P&ID FOR STEAM SYSTEM 1–318–01–05846
2. INSTRUMENT AIR QUANTITY IS PRELIMINARY AND SHALL BE CONFIRMED AFTER DETAIL ENGINEERING.
3. PIPES SHALL BE OF STAINLESS STEEL (SA312TP304).
4. PIPES SHALL HAVE SCREWED ENDS AND THE PIPING THREADS SHALL BE AS PER ASA–B–2.1.
5. ALL FITTINGS TILL THE TERMINATING VALVES SHALL BE PROVIDED AND THESE SHALL BE OF STAINLESS STEEL.
6. ALL VALVES SHALL BE OF STAINLESS STEEL.
7. PIPE JOINT CONNECTIONS SHALL BE SEAL WELDED TO AVOID LEAKAGES.
8. THE TAG NUMBERS INDICATED IN THIS P&ID FOR VALVES, INSTRUMENTS & EQUIPMENTS SHALL BE PREFIXED BY AREA CODE ie., 27150. (REFER NUMBERING PHILOSOPHY DOCUMENT)
9. END CONNECTIONS FOR TAP OFFS TO BE PROVIDED ON PIPING FOR INSTRUMENTS SHALL BE AS FOLLOWS
   –ROOT VALVE ENDING WITH 1/2" SW FOR PRESSURE
10. LEGEND

1 (a) DELETED

(b) ⊖ DCS

TAG NUMBERING INDEX

TAG NO. INDEX	TAG NOs RANGE	SPARE TAGS
EQUIPMENT TAG	--	
LINE NUMBERS	5101–5104	–
VALVE TAG.	5101–5104	
INSTRUMENTATION TAG	676 8241	677– 680 8242–8300
INTERLOCK TAG.	--	
TERMINAL POINT	76	77–80

SCOPE OF SUPPLY

BHEL | CUSTOMER

BHEL INTERNAL SCOPE

BHEL (T&C ENGG) | BHEL (PE&SD)

CUSTOMER: TNPL — TAMILNADU NEWSPRINT AND PAPERS LTD., UNIT–2,MONDIPPATTI,MANAPPARAI,TRICHY,TAMILNADU

PROJECT CONSULTANT: SPB-PC experience the excellence — SPB PROJECTS AND CONSULTANCY LIMITED, CHENNAI INDIA

TYPE OF PRODUCT/ PROJECT: TNPL UNIT–II, 1X30 MW STG

PROJECT No. : 277 | AREA CODE/ AREA : 27150/ STG

BHARAT HEAVY ELECTRICALS LTD. HYDERABAD

	NAME	SIGN.	DATE
DRN.	S.B.N.		15.02.14
CHD.	M.S.S.N		15.02.14
APPD.	P.SUDHIR BABU		15.02.14

NO.OF VAR. –N.A–

DEPT.	UNTOL. DIMS. GR.	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM NO.	NO.OF ITEMS
PE&SD	℄/M/℉	–NTS–	–N.A–	–N.A–	–N.A–	–N.A–
CODE 450						

TITLE: P&ID FOR INSTRUMENT AIR DISTRIBUTION

CARD CODE –N.A–

DRG. NO. 3–381–01–03398 REV. 02

CUST. DRG. NO. 3398–27150–1351

SHT. No 1 NO. OF SHT. 1

PE&SD INTERNAL REVIEW

REV.02	NAME	SIGN.
C&I	SONALIKA	–sd–

REV.	DATE	ALTERED	CHD/APPD	ZONE
02	04.04.14	SBN MSSN/PSB		– REVISED BASED ON MOM 03–04 APR 2014. – REVISIONS MARKED AS 2
01	26.03.14	SBN MSSN/PSB		– GENERALLY REVISED – REVISED BASED ON BHEL's RESPONSES DATED 19.03.14. – REVISIONS MARKED AS 1

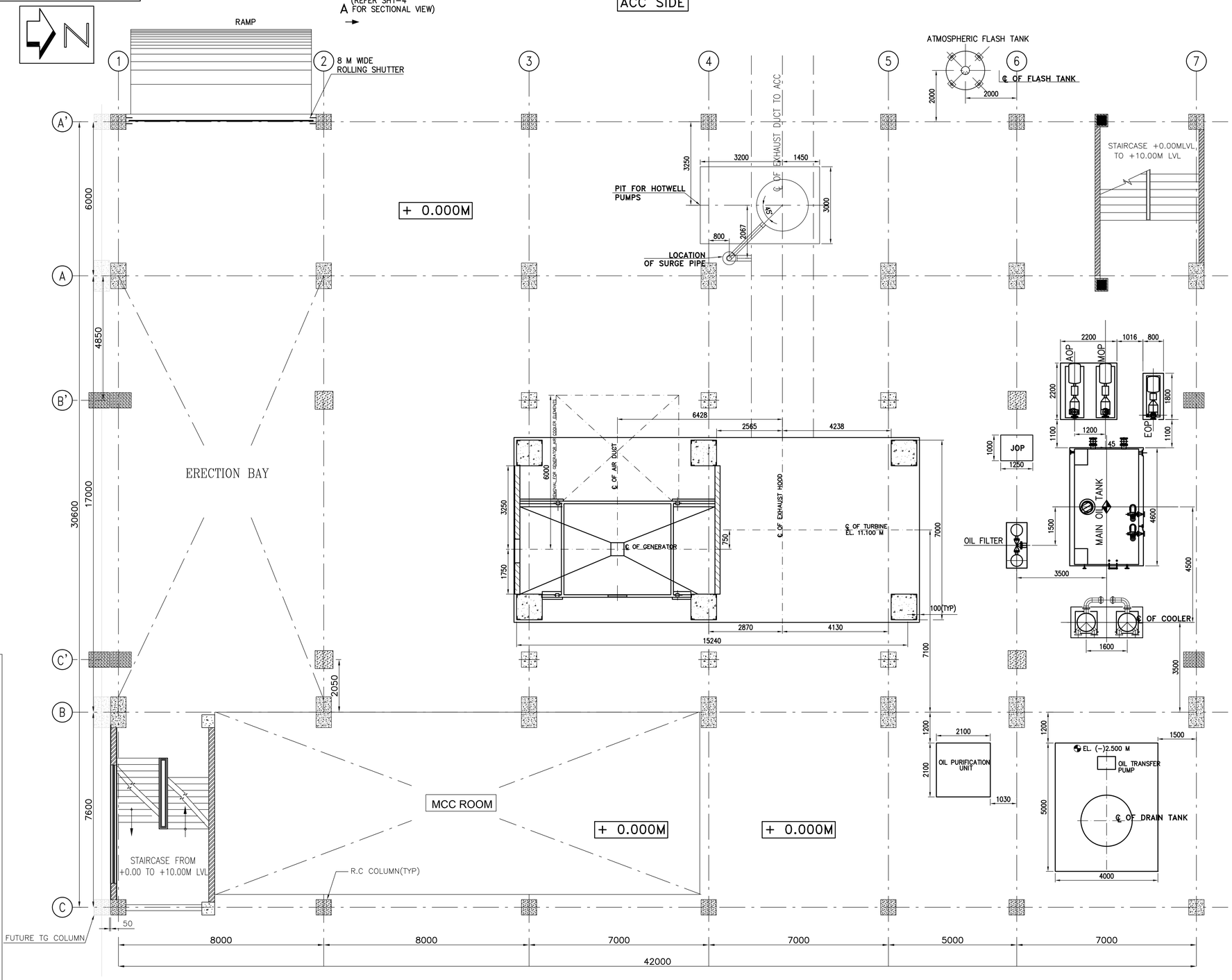
COMPUTER FILE NAME 3381010339B-S00-R02.DWG | REF. DRG. NO. | SIGN. AND DATE | INVENTORY NO

THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 1-381-01-05847 SH. 01 OF 04



PLAN AT +0.000 M LVL.

NOTES

1. ALL DIMENSIONS ARE IN MM AND ELEVATIONS ARE IN METERS.

LEGEND

MOP	MAIN OIL PUMP
AOP	AUXILIARY OIL PUMP
EOP	EMERGENCY OIL PUMP
JOP	JACKING OIL PUMP
STG	STEAM TURBINE GENERATOR
	TURBINE GENERATOR

REFERENCE DRAWING:

1. TNPL BTG LAYOUT	: M-LAY-005
2. MACHINERY ARRANGEMENT AND FOUNDATION	: 13130110935
3. GA OF CLOSED CIRCUIT AIR COOLING SYSTEM	: HY-DG-0-13991-84325
4. GA OF GLAND STEAM CONDENSER	: 21621400580
5. GA OF ATMOSPHERIC FLASH TANK	: EI-294 (EXCEL INDUSTRIES SUPPLY)
6. GENERAL LAYOUT DRAWING OF 11KV, 3000A LINE & NEUTRAL SIDE BUSDUCTS & ACCESSORIES	: 01981310001
7. GA OF GENERATOR AIR COOLER ELEMENT	: 21660300527
8. AUXILIARY FOUNDATION DRAWING	: 43810103268

REV.	DATE	ALTERED	ZONE
03	28.06.14	ALTERED RAGHU CHD/APPD SVN R/ VVSSS	ZONE1) REVISED AS PER GENERATOR BUSDUCT LAYOUT RECEIVED FROM RUDRAPUR DTD-19.06.14 2) TG DECK DIMESIONS REVISED AS PER FINAL GEAR BOX DRAWING. 3) LOCATION OF HOTWELL PUMP PIT REVISED AS PER FINAL LOCATION FROM CUSTOMER.
02	25.05.14	ALTERED NIRAJ CHD/APPD SVN R/ VVSSS	ZONE 1) REVISED AS PER GENERATOR BUSDUCT LAYOUT RECEIVED FROM RUDRAPUR 2) FOUNDATION COLUMN LOCATION REVISED AS PER LATEST FOUNDATION DRAWING.
01	26.03.14	ALTERED NIRAJ CHD/APPD SVN R/ VVSSS	ZONE REVISED AS PER COMMENTS FROM CUSTOMER DTD 05.03.14 AND 277CGCD2501RO DWGS

JCS

PROJECT CONSULTANT:
SPB PROJECTS AND CONSULTANCY LIMITED
CHENNAI INDIA

CLIENT:
TAMILNADU NEWSPRINT & PAPER LTD.
UNIT-2,MONDIPPATTI,MANAPPARAI,TRICHY,TAMILNADU

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: 1X30 MW UNIT-II TAMILNADU NEWSPRINT & PAPER LTD.

BHARAT HEAVY ELECTRICALS LTD. HYDERABAD

	NAME	SIGN	DATE
DRN.	NIRAJ		18.02.14
CHD.	SVN R		18.02.14
APPD.	V.V.S.S		18.02.14

RELEASED

DEPT: PE&SD | CODE: 450 | UNTOL. DIMS. GR. C/M/F | SCALE: 1:75 | WEIGHT (KG): N.A | REF. TO ASSY. DRG.: N.A | ITEM NO.: -N.A.- | NO.OF ITEMS: -N.A.- | NO.OF VAR.: -N.A.-

TITLE: INPUT FOR TG HALL EQUIPMENT LAYOUT GROUND FLOOR PLAN AT EL. (+)0.000m

CARD CODE: N.A.

DRAWING NO. 1-381-01-05847 REV. 03

SHT. No 01 | NO. OF SHT. 04

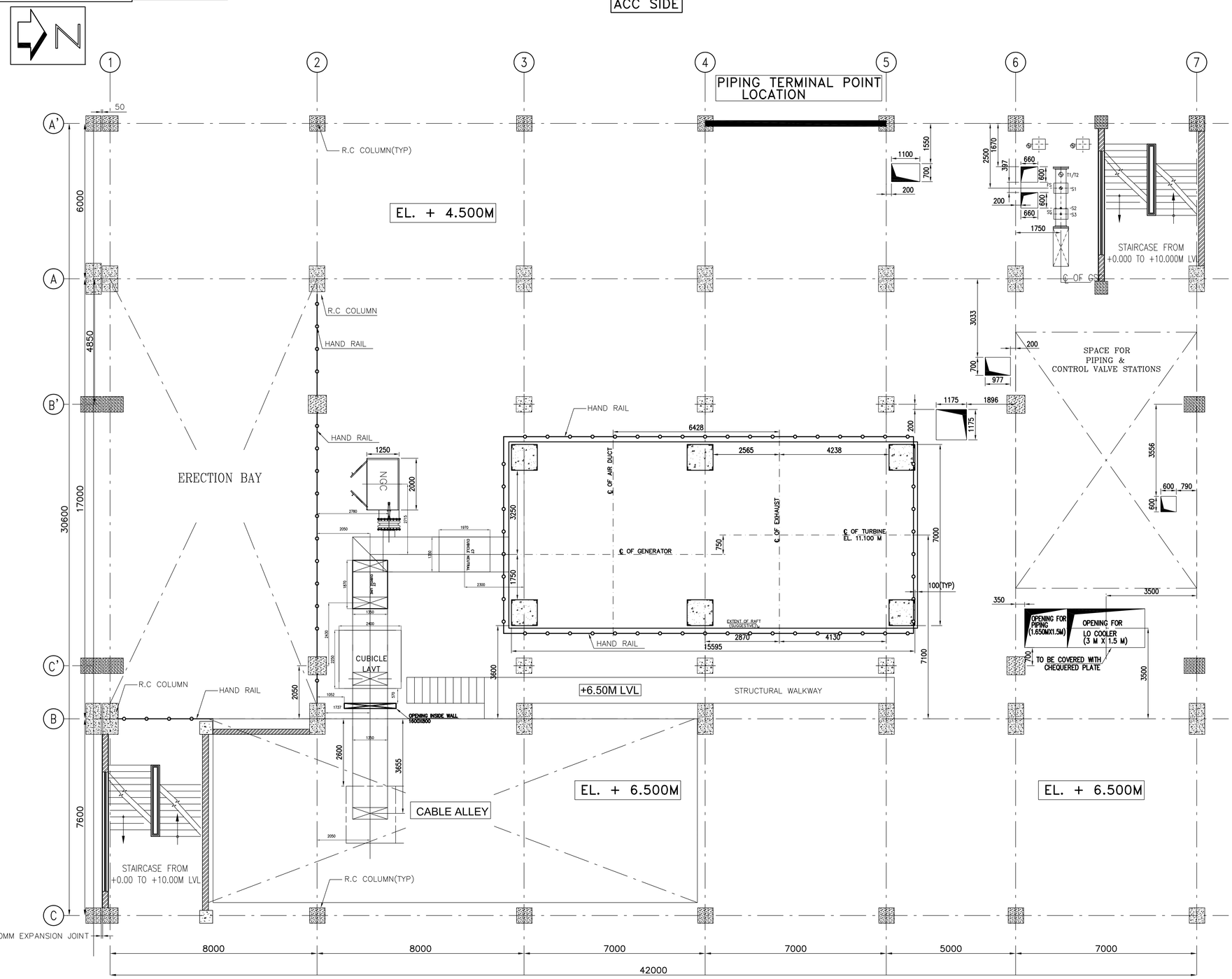
FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 1-381-01-05847

SH. 02 OF 04

ACC SIDE



NOTES

1. FOR GENERAL NOTES, REFERENCE DRAWINGS AND LEGEND PLEASE REFER TO SHT-1 OF THIS DRAWING.

HOLD:

1. LAYOUT OF BUSDUCT, LOCATIONS OF ELECTRICAL CUBICLES IS UNDER HOLD, PENDING INPUT FOR FINALIZATION.

PLAN AT +4.500 M LVL (FROM GRID A' TO B).
PLAN AT +6.500 M LVL (FROM GRID B TO C).

GENERAL DIMENSIONAL LIMITS,FITS & TOLERANCES AS PER HY0230261

COMPUTER FILE NAME: 1381010584?-S03-R02.DWG

REV.	DATE	ALTERED	CHD/APPD	ZONE
03	28.06.14	RAGHU	CHD/APPD SVN R/ VVSSS	1) REVISED AS PER GENERATOR BUSDUCT LAYOUT RECEIVED FROM RUDRAPUR DTD-19.06.14 2) TG DECK DIMESIONS REVISED AS PER FINAL GEAR BOX DRAWING. 3) LOCATION OF HOTWELL PUMP PIT REVISED AS PER FINAL LOCATION FROM CUSTOMER.
02	25.05.14	NIRAJ	CHD/APPD SVN R/ VVSSS	1) REVISED AS PER GENERATOR BUSDUCT LAYOUT RECEIVED FROM RUDRAPUR. 2) FLOOR OPENINGS ADDED.
01	26.03.14	NIRAJ	CHD/APPD SVN R/ VVSSS	REVISED AS PER COMMENTS FROM CUSTOMER DTD 05.03.14 AND 277CGCD2501RO DWGS

PROJECT CONSULTANT:
SPB PROJECTS AND CONSULTANCY LIMITED
CHENNAI INDIA

CLIENT:
TAMILNADU NEWSPRINT & PAPER LTD.
UNIT-2,MONDIPPATTI,MANAPPARAI,TRICHY,TAMILNADU

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: 1X30 MW UNIT-II TAMILNADU NEWSPRINT & PAPER LTD.

BHARAT HEAVY ELECTRICALS LTD. HYDERABAD

	NAME	SIGN	DATE	NO.OF VAR.
DRN.	NIRAJ		18.02.14	
CHD.	SVN R		18.02.14	-N.A.-
APPD.	V.V.S.S		18.02.14	

DEPT. PE&SD | CODE. 450 | UNTOL. DIMS. OR. C/M/F | SCALE 1: 75 | WEIGHT (KG) N.A | REF. TO ASSY. DRG. N.A | ITEM NO. -N.A.- | NO.OF ITEMS -N.A.-

TITLE: INPUT FOR TG HALL EQUIPMENT LAYOUT MEZZANINE FLOOR PLAN AT EL (+)4.500m

CARD CODE: N.A.

DRAWING NO. 1-381-01-05847 | REV. 03

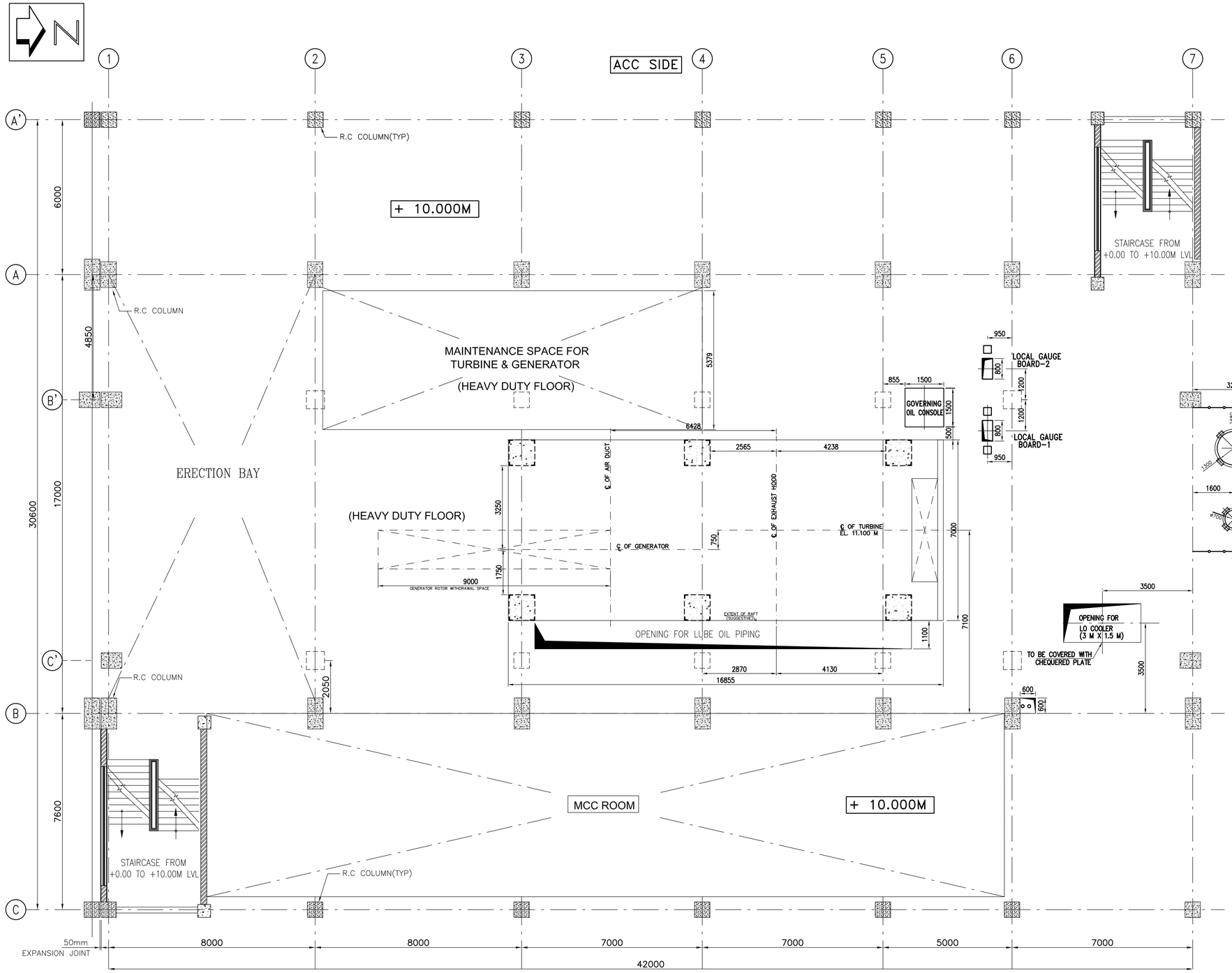
SHT. No 02 | NO. OF SHT. 04

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 1-381-01-05847

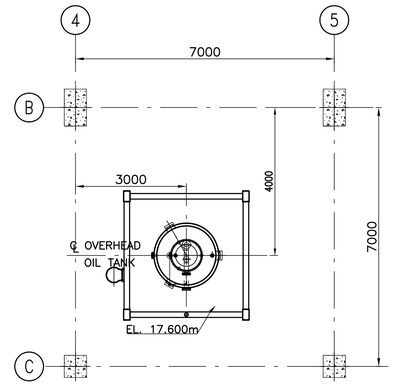
SH. 03 OF 04



PLAN AT +10.000 M LVL.

NOTES

1. FOR GENERAL NOTES, REFERENCE DRAWINGS AND LEGEND PLEASE REFER TO SHT-1 OF THIS DRAWING.



PLAN AT +15.000 M LVL.

PROJECT CONSULTANT:
SPB PROJECTS AND CONSULTANCY LIMITED
CHENNAI INDIA

CLIENT:
TAMILNADU NEWSPRINT & PAPER LTD.
UNIT-2,MONDIPPATTI,MANAPPARAI,TRICHY,TAMILNADU

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: 1X30 MW UNIT-II TAMILNADU NEWSPRINT & PAPER LTD.

BHARAT HEAVY ELECTRICALS LTD. HYDERABAD

	NAME	SIGN	DATE	NO.OF VAR.
DRN.	NIRAJ		18.02.14	
CHD.	SVN R		18.02.14	-N.A.-
APPD.	V.V.S.S		18.02.14	

DEPT.	PE&SD	SCALE	1: 75	WEIGHT (KG) N.A
CODE.	450	REF. TO ASSY. DRG.	N.A	ITEM NO. -N.A.-
UNTOL. DIMS. GR.	C/M/F			NO.OF ITEMS -N.A.-

TITLE: INPUT FOR TG HALL EQUIPMENT LAYOUT OPERATING FLOOR PLAN AT EL. (+)10.000m

CARD CODE: N.A.

DRAWING NO. 1-381-01-05847 REV. 03

SHT. No 03 NO. OF SHT. 04

REV.	DATE	ALTERED	CHD/APPD	ZONE
03	28.06.14	ALTERED RAGHU	CHD/APPD SVN R/ VVSSS	1) REVISED AS PER GENERATOR BUSDUCT LAYOUT RECEIVED FROM RUDRAPUR DTD-19.06.14 2) TG DECK DIMESIONS REVISED AS PER FINAL GEAR BOX DRAWING. 3) LOCATION OF HOTWELL PUMP PIT REVISED AS PER FINAL LOCATION FROM CUSTOMER.
02	25.05.14	ALTERED NIRAJ	CHD/APPD SVN R/ VVSSS	1) REVISED AS PER GENERATOR BUSDUCT LAYOUT RECEIVED FROM RUDRAPUR 2) FOUNDATION COLUMN LOCATION REVISED AS PER LATEST FOUNDATION DRAWING.
01	26.03.14	ALTERED NIRAJ	CHD/APPD SVN R/ VVSSS	REVISED AS PER COMMENTS FROM CUSTOMER DTD 05.03.14 AND 277CGCD2501RO DWGS

THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY

GENERAL DIMENSIONAL LIMITS,FITS & TOLERANCES AS PER HY0230261

COMPUTER FILE NAME: 1381010584?-S03-R03.DWG

SIGN. AND DATE | REF. DRG. NO. | INVENTORY NO

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 1-381-01-05847 SH. 04 OF 04

COMPUTER FILE NAME 1381010584 7-S04-R03.DWG

REF. DRG. NO.

SIGN. AND DATE

INVENTORY NO

GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261

NOTES:

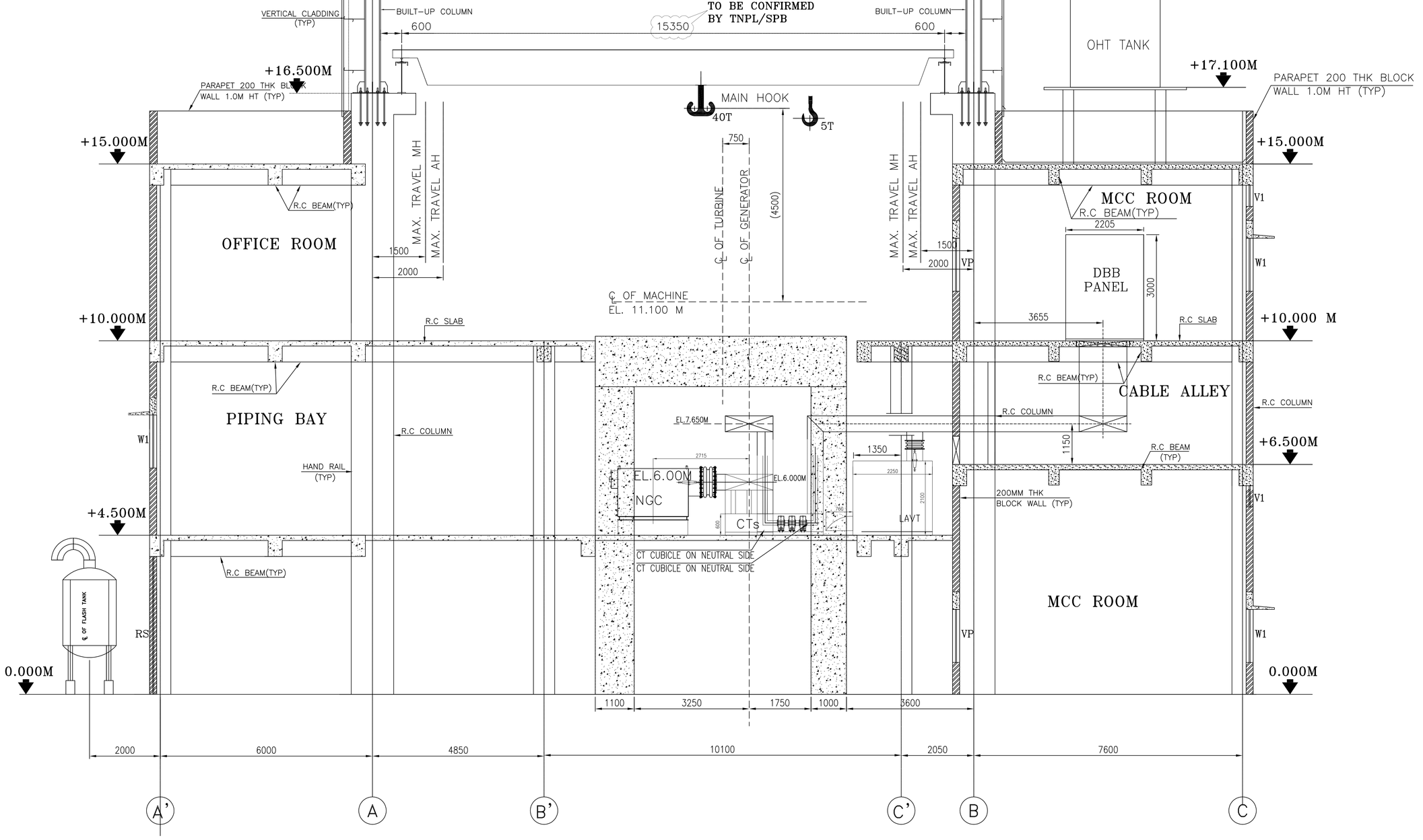
1. FOR GENERAL NOTES, REFERENCE DRAWINGS AND LEGEND PLEASE REFER TO SHT-1 OF THIS DRAWING.

HOLD:

1. LAYOUT OF BUSDUCT, LOCATIONS OF ELECTRICAL CUBICLES IS UNDER HOLD, PENDING INPUT FOR FINALIZATION.

TG EQUIPMENTS LOAD TABLE (PRELIMINARY)

SL No.	DESCRIPTION	ERECTION LOAD (KG)	CIVIL DESIGN LOAD (KG)
1	MAIN OIL TANK	5482	32000
2	OIL PUMPS (MOP,AOP)	1200/EACH	1400/EACH
3	OIL PUMP (EOP)	750/EACH	800/EACH
4	OIL CENTRIFUGE	1350	1600
5	JOP CONSOLE	1000	1000
6	OIL COOLER – 2 NO'S	4000/EACH	5300/EACH
7	OIL FILTER	750	1000
8	GENERATOR AIR COOLER ELEMENT (7Nos.)	960/EACH	960/EACH
9	ATM FLASH TANK	3000	7000
10	NGT CUBICLE	1200	1200
11	LAVT CUBICLE	1200	1200
12	OVER HEAD LO TANK	2350	11500
13	DRAIN TANK	1150	4100
14	LO DRAIN TRANSFER PUMP	1000	1000
15	GLAND STEAM CONDENSER	1000	1500
16	GOVERNING OIL CONSOLE	1200	1200
17	LOCAL GAUGE BOARD	800/EACH	800/EACH
18	WARM UP VENT SILENCER	500	600
19	LP STEAM SV VENT SILENCER	1300	1500
20	MP STEAM SV VENT SILENCER	950	1300



ACC SIDE

SECTION A-A

PROJECT CONSULTANT:

SPB PROJECTS AND CONSULTANCY LIMITED
CHENNAI INDIA

CLIENT:

TAMILNADU NEWSPRINT & PAPER LTD.
UNIT-2, MONDIPPATTI, MANAPPARAI, TRICHY, TAMILNADU

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: 1X30 MW UNIT-II TAMILNADU NEWSPRINT & PAPER LTD.

BHARAT HEAVY ELECTRICALS LTD. HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN.	NIRAJ	Sd/-	18.02.14	
CHD.	SVN R		18.02.14	-N.A.-
APPD.	V.V.S.S		18.02.14	

DEPT. PE&SD | CODE. 450 | UNTOL. DIMS. GR. C/M/F | SCALE 1:75 | WEIGHT (KG) N.A | REF. TO ASSY. DRG. N.A | ITEM NO. -N.A.- | NO.OF ITEMS -N.A.-

TITLE: INPUT FOR TG HALL EQUIPMENT CROSS SECTIONAL VIEW

CARD CODE N.A.

DRAWING NO. 1-381-01-05847 REV. 03

SHT. No 04 | NO. OF SHT. 04

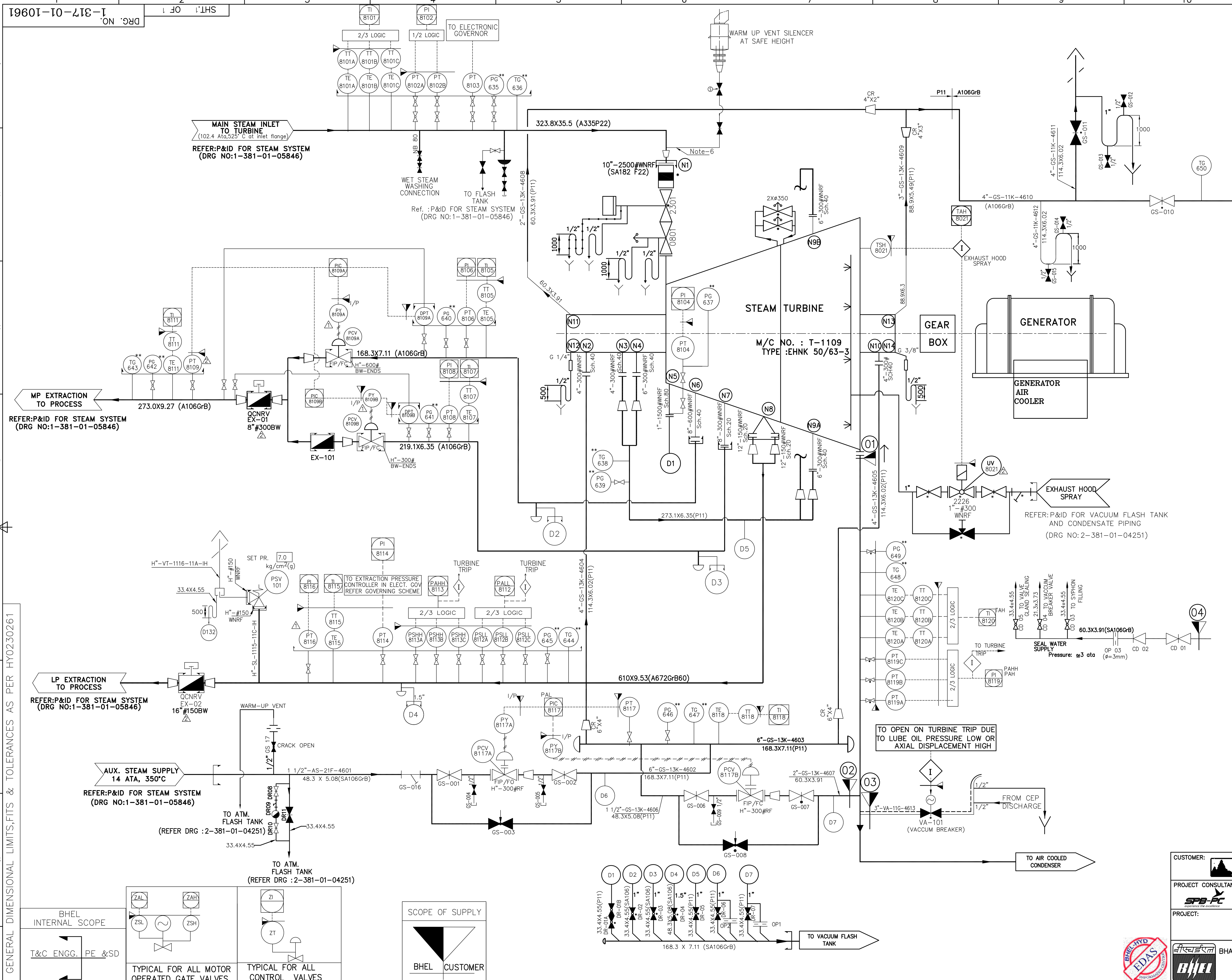
REV.	DATE	ALTERED	ZONE
03	28.06.14	ALTERED RAGHU CHD/APPD SVN R/ VVSSS	1) REVISED AS PER GENERATOR BUSDUCT LAYOUT RECEIVED FROM RUDRAPUR DTD-19.06.14 2) TG DECK DIMENSIONS REVISED AS PER FINAL GEAR BOX DRAWING. 3) LOCATION OF HOTWELL PUMP PIT REVISED AS PER FINAL LOCATION FROM CUSTOMER.
02	25.05.14	ALTERED NIRAJ CHD/APPD SVN R/ VVSSS	REVISED AS PER GENERATOR BUSDUCT LAYOUT RECEIVED FROM RUDRAPUR
01	26.03.14	ALTERED NIRAJ CHD/APPD SVN R/ VVSSS	REVISED AS PER COMMENTS FROM CUSTOMER DTD 05.03.14 AND 277CGCD2501RO DWGS

REV.	DATE	ALTERED	ZONE
		ALTERED CHD/APPD	

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 1-317-01-10961 SHT.1 OF 1



NOTES:-

1) THIS SCHEME IS SHALL BE READ IN CONJUCTION WITH P&ID FOR STEAM SYSTEM.
2) ALL DRAINS & VENTS SIZES SHALL BE OF 1" UNLESS OTHERWISE SPECIFIED.
3) DRAINS SHALL BE PROVIDED AT ALL LOWEST POINTS BASED ON LAYOUT.
4) REFERENCE DRAWINGS:-
   a) LEGEND FOR SCHEMES 1-381-01-05844
   b) GOVERNING SCHEME 1-T1109-00204
   c) P&ID FOR STEAM SYSTEM 1-381-01-05846
   D) P&ID FOR VACUUM FLASH TANK & CONDENSATE PIPING 2-381-01-04251
5) QCNRV'S ARE TO BE LOCATED AS CLOSE AS POSSIBLE TO TURBINE NOZZLE
6) THIS WARM UP VENT CONNECTION SHALL BE WITHIN 1 METRE FROM EMERGENCY STOP VALVE
7) END CONNECTIONS FOR TAP OFFS TO BE PROVIDED ON PIPING FOR INSTRUMENTS SHALL BE AS FOLLOWS
   -ROOT VALVE ENDING WITH 1/2" SW FOR PRESSURE
   -STUB ENDING WITH M33X2 FOR TEMPERATURE
8) LEGEND
   '*' ITEM SUPPLIED ALONG WITH RESPECTIVE EQUIPMENT.
   INTERLOCK & PROTECTION REALISED IN DCS
   DCS (CUSTOMER SCOPE)
   ** INSTRUMENTS MOUNTED ON LOCAL GAUGE RACK

BHEL INTERNAL SCOPE

T&C ENGG. PE &SD

TYPICAL FOR ALL MOTOR OPERATED GATE VALVES

TYPICAL FOR ALL CONTROL VALVES

SCOPE OF SUPPLY: BHEL | CUSTOMER

STATUS OF DRAWING: FOR APPROVAL

CUSTOMER: TNPL TAMILNADU NEWSPRINT & PAPERS LIMITED

PROJECT CONSULTANT: SPB PROJECTS AND CONSULTANCY LIMITED, CHENNAI INDIA

PROJECT: 1X30MW STG UNIT-2, MONDIPPATTI,MANAPPARAI,TRICHY,TAMILNADU

BHARAT HEAVY ELECTRICALS LTD. HYDERABAD

	NAME	SIGN.	DATE
DRN.	A K JHA		11.02.14
CHD.	B.SINGH		11.02.14
APPD.	S.R.V.K		11.02.14

REV.	DATE	ALTERED	CHD/APPD	ZONE
02	19.03.14	A K JHA	B SINGH/SRVK	REVISED AS PER CUSTOMER COMMENT & MARKED AS △
01	01.03.14	A K JHA	B SINGH/SRVK	REVISED AS PER CUSTOMER COMMENT

DEPT. TCEP, CODE 415; 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.; NO.OF VAR. N.A.

TITLE: TURBINE INTEGRAL STEAM AND DRAIN P&ID

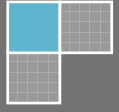
CARD CODE NA; DRG. NO. 1-317-01-10961; REV. 02; SHT. No 01; NO. OF SHT. 01

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

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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 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 of Tender Notice No.

HY/PE&SD/PUR/RIL HMD and RIL DMD/E.C-MECH/001

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 Nagpur 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:

Form WAM 6 (contd…)

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