



भारत हेवी इलेक्ट्रिकल्स लिमिटेड

(भारत सरकार का उपक्रम)

BHARAT HEAVY ELECTRICALS LIMITED

(A Govt. of India Undertaking)

TCN - 01

Ref: PSER:SCT:KMG-T1163:TCN-01

Date: 07/02/2011

Sub	Tender change notice (TCN) 01	
Job	Material handling , Erection , Testing , Commissioning , Trial run and field efficiency test of 4X150 MW Vertical Francis Turbine-Generator along with its auxiliaries Excitation system , Control , Protection , Monitoring Systems including Electrical And Control & Instrumentation Systems , Penstock Butter Fly valve etc. at Kameng Hydro Electric Project , NEEPCO , Kimi , West Kameng District , Arunachal Pradesh.	
Ref	1.0	Tender no PSER:SCT:KMG-T1163:11.
	2.0	BHEL's NIT, vide ref no Ref: PSER:SCT:KMG-T1163 Dated 28/01/2011
	3.0	Other references (if any).

With reference to above, following points , relevant to tender, may please be noted and complied with while submitting offer.

- 1.0 Annexure-A, Annexure-B & Annexure-C has been attached.
- 2.0 Revised `No deviation certificate' is attached. Bidder to submit `No deviation certificate' as per attached format only.
- 3.0 All other terms & conditions shall remain unchanged.

Thanking you,

Yours faithfully,
for BHARAT HEAVY ELECTRICALS LTD

ENGR (SCT)

Encl

- 1.0 Annexure-A, Annexure-B & Annexure-C
- 2.0 Revised `No deviation certificate' format.

पावर सेक्टर पूर्वी क्षेत्र (मुख्यालय)

POWER SECTOR EASTERN REGION, DJ-9/1, SALT LAKE CITY, KOLKATA - 700 091

फैक्स/Fax : (033) 23211960 फोन/Phone : बोर्ड/EPABX : 23211798/ 1691

FORMAT FOR NO DEVIATION CERTIFICATE
(To be submitted in the bidder's letter head)

BHARAT HEAVY ELECTRICALS LIMITED,
Power Sector - Eastern Region,
Plot no 9/1, DJ Block, Sector – II, Salt Lake City,
Kolkata – 700 091

Sub	No Deviation Certificate.	
Job	Material handling , Erection , Testing , Commissioning , Trial run and field efficiency test of 4X150 MW Vertical Francis Turbine-Generator along with its auxiliaries Excitation system , Control , Protection , Monitoring Systems including Electrical And Control & Instrumentation Systems , Penstock Butter Fly valve etc. at Kameng Hydro Electric Project , NEEPCO , Kimi , West Kameng District , Arunachal Pradesh.	
Ref	1.0	Tender no PSER:SCT:KMG-T1163:11.
	2.0	BHEL's NIT, vide ref no Ref: PSER:SCT:KMG-T1163 Dated 28/01/2011
	3.0	BHEL's TCN-01 Vide ref. no. PSER:SCT:KMG-T1163:TCN-01 Dated 07/02/2011
	4.0	Other references (if any).

Dear Sirs,

With reference to above, this is to confirm that as per tender conditions, we have visited site before submission of our offer and noted the job content & site conditions etc. We also confirm that we have not changed/ modified the tender documents as appeared in the website/ issued by you and in case of such observance at any stage, it shall be treated as null and void.

We hereby confirm that we have not taken any deviation from tender clauses together with other references as enumerated in the above referred NIT. We hereby confirm our unqualified acceptance to all terms & conditions, unqualified compliance to technical specification and acceptance to reverse auctioning process.

In the event of observance of any deviation in any part of our offer at a later date whether implicit or explicit, the deviations shall stand null & void.

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)

ANNEXURE: A1

BILLING SCHEDULE FOR MATERIAL HANDLING

SL. NO.	DESCRIPTION	PERCENTAGE OF CONTRACT VALUE (PER MT)
1	UNLOADING	20%
2	VERIFICATION	14%
3	STACKING	20%
4	ISSUE AND DATA ENTRY	10%
5.	TRANSPORTATION FROM STORES TO PH/ CUSTOMER'S STORES	30%
6.	MATERIAL RECONCILIATION	6%

NOTE:

IF PER MT RATE IS RS. X, THEN RS.X WILL BE DEVIDED ON THE ABOVE % RATE

TRANSPORTATION AT SL. NO. 5 INCLUDES LOADING TO AND UNLOADING FROM VEHICLE ALSO.

TENDER NO. PSER:SCT:KMG-T1163:10
(TECHNICAL SPECIFICATION OF CONTRACT)
ANNEXURE: A2

BILLING SCHEDULE FOR ERECTION , COMMISSIONING AND TESTING AND HANDING OVER

SL.NO.	ACTIVITIES	% OF CONTRACT PRICE	UNIT-1	UNIT-2	UNIT-3	UNIT-4
A1	On mobilisation of initial manpower, initial T & Ps and creation of infrastructural facilities like accommodation for staff and labour with drinking water and sanitation facilities and on completion of area lighting for storage yard area.	2.00				
A	TURBINE AND AUXILIARIES					
	Erection of draft tube Elbow	0.20			0.1	0.1
	Erection of draft tube cone	0.60	0.2	0.2	0.1	0.1
	Erection of First stage embedment equipments/pipes	0.40	0.1	0.1	0.1	0.1
	Erection of second stage embedments	0.60	0.15	0.15	0.15	0.15
	Assembly of spiral casing					
	a) Jointing and lowering of stay ring, levelling, centering etc.	1.40	0.35	0.35	0.35	0.35
	b)welding of spiral casing segments	2.00	0.50	0.50	0.50	0.50
	c) Post/preweld heat treatments/stress relieving etc.	0.50	0.125	0.125	0.125	0.125
	d) NDT completion	2.00	0.5	0.5	0.5	0.5
	e) Hydro Test of spiral casing	1.50	0.375	0.375	0.375	0.375
	f) Alignment, levelling and centering of spiral casing and handing over for concreting.	2.50	0.625	0.625	0.625	0.625
	TOTAL	11.70				
B	TRIAL ASSEMBLY OF GUIDE APPARATUS					
	a) Placing of Pivot Ring, levelling etc.	0.80	0.20	0.20	0.20	0.20
	b) Lowering of guide vans	0.80	0.20	0.20	0.20	0.20
	c) Lowering of top cover	0.80	0.20	0.20	0.20	0.20
	d) Setting of guide vane clearance	0.80	0.20	0.20	0.20	0.20
	e) Dismantling of above after dowelling	0.80	0.20	0.20	0.20	0.20
	TOTAL	4.00				
C	RUNNER AND SHAFT ASSEMBLY					
	a) Assembly of runner and shaft	0.50	0.125	0.125	0.125	0.125
	b) Lowering of runner-shaft assembly	0.50	0.125	0.125	0.125	0.125
	TOTAL	1.00				

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(TECHNICAL SPECIFICATION OF CONTRACT)
ANNEXURE: A2

BILLING SCHEDULE FOR ERECTION , COMMISSIONING AND TESTING AND HANDING OVER

SL.NO.	ACTIVITIES	% OF CONTRACT PRICE	UNIT-1	UNIT-2	UNIT-3	UNIT-4
D	FINAL ASSEMBLY OF GUIDE APPARATUS					
	a) Erection of Pivot Ring	1.00	0.25	0.25	0.25	0.25
	b) Erection of Lower bush housing	0.50	0.125	0.125	0.125	0.125
	c)Erection of Guide Vanes	0.50	0.125	0.125	0.125	0.125
	c)Erection of Top Cover and top bush housing	0.50	0.125	0.125	0.125	0.125
	d) Erection of regulating ring	0.50	0.125	0.125	0.125	0.125
	e) Erection of linkage	0.50	0.125	0.125	0.125	0.125
	f) Guide Vane bedding and setting of GV clearances.	1.00	0.25	0.25	0.25	0.25
	g) Dry operation of GV.	2.00	0.5	0.5	0.5	0.5
	Total	6.50				
E	Turbine Pit Liner					
	Welding, NDT and erection of turbine pit liners	1.00	0.25	0.25	0.25	0.25
	TOTAL	1.00				
F	MAIN INLET VALVE					
	a) Assembly and Hyd. Test of MIV	1.00	0.25	0.25	0.25	0.25
	b: Foundation preparation and installation of MIV	1.00	0.25	0.25	0.25	0.25
	c) Erection of By-pass valve and servo after stroke& leak testing	0.50	0.125	0.125	0.125	0.125
	d)Erection of pipe lines, pressure testing	0.50	0.125	0.125	0.125	0.125
	e) Erection of Inlet pipe, welding and NDT	1.00	0.25	0.25	0.25	0.25
	f) Dry operation of MIV and By-pass valve	1.00	0.25	0.25	0.25	0.25
	TOTAL	5.00				
G	PENSTOCK BUTTERFLY VALVE					
1	ASSEMBLY & ERECTION OF BF VALVE	10.00	5.00	5.00		
2	INSTALLATION OF SERVOMOTOR one set per valve	0.50	0.25	0.25		
3	Installation of INLET & OUTLET PIPE one set per valve	0.80	0.40	0.40		

TENDER NO. PSER:SCT:KMG-T1163:10
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ANNEXURE: A2

BILLING SCHEDULE FOR ERECTION , COMMISSIONING AND TESTING AND HANDING OVER

SL.NO.	ACTIVITIES	% OF CONTRACT PRICE	UNIT-1	UNIT-2	UNIT-3	UNIT-4
4	Installation of BY PASS VALVE one set per valve	0.50	0.25	0.25		
5	TESTING	0.20	0.10	0.10		
6	Piping of penstock valve one set per valve	0.80	0.40	0.40		
7	Erection of PLATFORM, RAILING & STAIRCASE one set per valve	0.20	0.10	0.10		
8	installation of VACCUM BREAKING VALVE one set per valve	0.20	0.10	0.10		
9	Erection of HYDRAULIC POWER PACK one set per valve	0.20	0.10	0.10		
10	Installation of FLOAT/ INUNDATION SWITCH (two nos) one set per valve	0.20	0.10	0.10		
11	Installation of LOCAL CONTROL PANEL WITH DC UNINTERRRUPTED 30A 24V POWER SUPPLY one no. per valve	0.20	0.10	0.10		
12	Installation of UNIT GAUGE PANEL,PRESSURE TRANSMITTER,MOISTURE DETECTOR,JUNCTION BOX/LIMITSWITCH etc. one no. per valve	0.20	0.10	0.10		
13	Laying & termination of CONTROL CABLE	0.60	0.30	0.30		
14	FILLING OF OIL	0.20	0.10	0.10		
15	COMMISSIONING OF PENSTOCK BF VALVE	0.20	0.10	0.10		
	TOTAL	15.00				

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(TECHNICAL SPECIFICATION OF CONTRACT)
ANNEXURE: A2

BILLING SCHEDULE FOR ERECTION , COMMISSIONING AND TESTING AND HANDING OVER

SL.NO.	ACTIVITIES	% OF CONTRACT PRICE	UNIT-1	UNIT-2	UNIT-3	UNIT-4
H	<u>CONTROL & MONITERING SYSTEM CONTROL & MONITERING SYSTEM 80 MVAR BUS SHUNT REACTOR, PENSTOCK BUTTERFLY VALVES, 400 KV SWITCHYARD (DUE TO CHANGE OF BUS BAR SCHEME).</u>					
1	INSTALLATION		0.10			
2	COMMISIONING		0.10			
I	<u>PROTECTION SYSTEM FOR 80 MVAR SHUNT REACTOR)</u>					
1	INSTALLATION		0.10			
2	COMMISIONING		0.10			
J	<u>POWER & INSTRUMENTATION CABLES FOR VALVE HOUSE</u>					
1	LAYING & TERMINATION		0.10			
2	TESTING & COMMISIONING		0.10			
K	<u>415V AC DISTRIBUTER BOARD FOR VALVE HOUSE</u>					
1	ERECTION		0.10			
2	TESTING & COMMISIONING		0.10			
L	<u>HVWS SYSTEM FOR 80 MVAR SHUNT REACTOR)</u>					
1	ERECTION		0.10			
2	TESTING & COMMISIONING		0.10			
	TOTAL	1.00				
M	GOVERNOR					
	a) Erection of Mechanical cabinet	0.40	0.10	0.10	0.10	0.10
	b) Erection of Electrical panel	0.40	0.10	0.10	0.10	0.10
	c) Erection of Governor Oil pipe lines and Hyd. Test.	0.80	0.20	0.20	0.20	0.20

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ANNEXURE: A2

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SL.NO.	ACTIVITIES	% OF CONTRACT PRICE	UNIT-1	UNIT-2	UNIT-3	UNIT-4
	d) Commissioning of OPU	0.80	0.20	0.20	0.20	0.20
	TOTAL	2.40				
N	GENERATOR					
	1) Stator					
	a) Assembly of stator frame segments	1.00	0.25	0.25	0.25	0.25
	b) Stator core assembly	2.00	0.50	0.50	0.50	0.50
	c) Laying of Top and Bottom Bars	2.00	0.50	0.50	0.50	0.50
	d) Brazing of stator Bars	1.00	0.25	0.25	0.25	0.25
	e) Dry out and HV Test	1.00	0.25	0.25	0.25	0.25
	f) Foundation preparation and lowering of Stator ; placement of stator.	1.00	0.25	0.25	0.25	0.25
	g) Testing and erection of stator air coolers and allied piping in complete with hydro testing.	0.50	0.125	0.125	0.125	0.125
	2) Rotor					
	a) Rotor spider shaft assembly in service Bay	1.00	0.25	0.25	0.25	0.25
	b) Rotor core assembly	1.00	0.25	0.25	0.25	0.25
	c) Inspection, drying (if required)and Rotor poles assembly	1.00	0.25	0.25	0.25	0.25
	d) Completion of pole connection, Dry out and HV test	1.00	0.25	0.25	0.25	0.25
	e) Lowering of rotor,	1.00	0.25	0.25	0.25	0.25
	TOTAL	13.50				
O	BOTTOM BRACKET					
	a) Assembly, welding & testing of bottom bracket	0.50	0.125	0.125	0.125	0.125
	b) Lowering, centering and levelling of bottom bracket	0.50	0.125	0.125	0.125	0.125
	TOTAL	1.00				
P	UPPER BRACKET					
	a) Assembly of upper bracket	0.50	0.125	0.125	0.125	0.125
	b) Lowering of bracket	0.50	0.125	0.125	0.125	0.125
	TOTAL	1.00				
Q	BRAKE JACK ASSEMBLY					
	a) Erection of Brake and Jack system, pipings, Hyd. Testing.	0.40	0.10	0.10	0.10	0.10
	b) Commissioning of B&J system	0.60	0.15	0.15	0.15	0.15
	TOTAL	1.00				
R	HP TUBE OIL SYSTEM					
	a) Erection of pumps-motors, pipings and Testing	0.50	0.125	0.125	0.125	0.125

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ANNEXURE: A2

BILLING SCHEDULE FOR ERECTION , COMMISSIONING AND TESTING AND HANDING OVER

SL.NO.	ACTIVITIES	% OF CONTRACT PRICE	UNIT-1	UNIT-2	UNIT-3	UNIT-4
	b)Commissioning of HP Lube Oil system	0.50	0.125	0.125	0.125	0.125
	TOTAL	1.00				
S	TURBINE & GENERATOR BEARINGS AND BOXING UP					
	a) Assembly erection & testing of Thrust Bearing and corresponding coolers.	0.50	0.125	0.125	0.125	0.125
	b) Assembly, erection & testing of Upper bearing and corresponding coolers	0.50	0.125	0.125	0.125	0.125
	c) Assembly, erection & testing of Turbine guide bearings and corresponding coolers.	0.50	0.125	0.125	0.125	0.125
	d) Setting of Bearing Clearances and boxing up after alignment.	0.50	0.125	0.125	0.125	0.125
	e) Boxing up	1.00	0.25	0.25	0.25	0.25
	TOTAL	3.00				
T	ALIGNMENT					
	a) Alignment of Generator shaft	0.50	0.125	0.125	0.125	0.125
	b) Coupling of Turbine-gen. Shaft	0.50	0.125	0.125	0.125	0.125
	c) Combined alignment	1.00	0.25	0.25	0.25	0.25
	TOTAL	2.00				
U	13.8 KV IP BUSDUCT					
	a) Erection & welding of bus ducts, bus supports/insulators and bus bars.	1.00	0.25	0.25	0.25	0.25
	b) Installation of piping of pressurised system with blower.	0.50	0.20	0.10	0.10	0.10
	c) 13.8/400A tapping for excitation, UAT and LAVT panel.	0.50	0.125	0.125	0.125	0.125
	d) Leak test of Ducts	0.50	0.125	0.125	0.125	0.125
	e) HV Test of Ducts.	0.50	0.125	0.125	0.125	0.125
	TOTAL	3.00				
V	EXCITATION SYSTEM					
	a) Erection of all panels, levelling etc. and cabling & termination	0.50	0.125	0.125	0.125	0.125
	b) Erection of slip ring and collector system	0.50	0.125	0.125	0.125	0.125
	TOTAL	1.00				
W	GENERATOR TERMINAL EQUIPMENTS					
	a) Erection of LAVT panel, cabling and termination	0.20	0.05	0.05	0.05	0.05
	b) Pre-commissioning of LAVT panel	0.20	0.05	0.05	0.05	0.05
	c) Erection and commissioning of NG transformer, cabling and termination	0.60	0.15	0.15	0.15	0.15
	TOTAL	1.00				
X	UNIT AUXILIARY TRANSFORMAER					

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(TECHNICAL SPECIFICATION OF CONTRACT)
ANNEXURE: A2

BILLING SCHEDULE FOR ERECTION , COMMISSIONING AND TESTING AND HANDING OVER

SL.NO.	ACTIVITIES	% OF CONTRACT PRICE	UNIT-1	UNIT-2	UNIT-3	UNIT-4
	a) Erection of UAT, cabling and termination	0.50	0.125	0.125	0.125	0.125
	b) Commissioning/testing of UAT	0.50	0.125	0.125	0.125	0.125
	Total	1.00				
Y	CONTROL AND MOPNITORING SYSTEM					
	a) Erection of Panels; cabling and termination.	1.00	0.25	0.25	0.25	0.25
	b) Pre-commissioning/test of panels.	0.50	0.125	0.125	0.125	0.125
	TOTAL	1.50				
Z	CONTROL AND PROTECTION SYSTEM					
	a) Erection of Panels; cabling and termination.	1.00	0.25	0.25	0.25	0.25
	b) Pre-commissioning/test of panels.	0.50	0.125	0.125	0.125	0.125
	TOTAL	1.50				
AA	220V DC SYSTEM					
	a) Installation of batteries	0.80	0.80			
	b) Installation of Battery Charger panel; cabling and termination	1.60	1.60			
	c) Commissioning of 220VDC system	1.00	1.00			
	d) DCDB erection, cabling, termination and commissioning	0.60	0.60			
	TOTAL	4.00				
AB	415V LT SWITCHGEAR SYSTEM					
	a) Erection of panels and associated items; cabling and termination (UAB & SSB).	0.50	0.125	0.125	0.125	0.125
	b) Commissioning of system	0.50	0.125	0.125	0.125	0.125
	TOTAL	1.00				
W	LOW PRESSURE COMPRESSED AIR SYSTEM					
	a) Installation of Low Pressure Air system, piping etc	1.00	0.70	0.10	0.10	0.10
	b) commissioning of LP Air system	1.00	0.70	0.10	0.10	0.10
	TOTAL	2.00				
X	DEWATERING & DRAINAGE SYSTEM					
	a) Erection of Dewatering pumps-motors	0.40				
	b) Erection of drainage system pumps	0.60				
	c) Commissioning of Dewatering system	0.50				
	d) Commissioning of Drainage system	0.50				
	TOTAL	2.00				
Y	COOLING WATER SYSTEM					

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ANNEXURE: A2

BILLING SCHEDULE FOR ERECTION , COMMISSIONING AND TESTING AND HANDING OVER

SL.NO.	ACTIVITIES	% OF CONTRACT PRICE	UNIT-1	UNIT-2	UNIT-3	UNIT-4
	a) Erection of pumps-motors, strainer, pipings(HT) and coolers for primary pumps	1.00	0.70	0.10	0.10	0.10
	b) Erection of pumps-motors, strainer, pipings(HT) and coolers for secondary pumps	1.00	0.70	0.10	0.10	0.10
	b) Commissioning system	1.00	0.70	0.10	0.10	0.10
	TOTAL	3.00				
Z	FIRE FIGHTING SYSTEM					
	a) Erection of Gen. Fire fighting system	0.50	0.125	0.125	0.125	0.125
	b) Commissioning of FF system	0.50	0.125	0.125	0.125	0.125
	TOTAL	1.00				
AA	415V AC NON- SEGREGATED BUSDUCT					
	a)Erection of bus ducts, insulators, space heaters etc.	0.50				
	b) HV testing and commissioning	0.40				
	TOTAL	0.90				
BB	COMMISSIONING					
	a)Dry Test	0.40	0.10	0.10	0.10	0.10
	b)Wet Test	0.40	0.10	0.10	0.10	0.10
	c)Spinning and bearing Run	0.40	0.10	0.10	0.10	0.10
	d)Synchronisation	0.40	0.10	0.10	0.10	0.10
	e)Full Load	0.40	0.10	0.10	0.10	0.10
	f)Trial/reliability Run	0.40	0.10	0.10	0.10	0.10
	g)Handing Over	1.00	0.25	0.25	0.25	0.25
	h)Field Efficiency Test	1.60				
	TOTAL	5.00				
	GRAND TOTAL	100.00				

1)The above break-up is for billing purpose only and may not cover all the equipments covered under the scope. The total work under this scope as detailed in the tender specification shall be completed by contractor within accepted rate

2) Field Efficiency Test shall be carried out on one unit only.

ANNEXURE: B**T & Ps and IMTE s to be provided by BHEL (FREE ISSUE)**

SI no.	Description	Range/spec	Quantity	Make
1	Megger 5 KV (In step of 1 KV motorised)		1 no.	
2	Portable Oscilloscope with D M M		1 no.	Fluke
3	H. V. Test Kit-50 KV, 5Amps (min)	0 to 50 KV 500 KVA	1 set.	
4	Rectifier		1 set	
5	Core Loss Test Transformer		1 set	
6	Cable for Core Loss Test		One Set	
7	DC injection Kit		1 no.	
8	75 MT Tyre mounted crane	75MT	1 no.	
9	HYDRA	11-12MT	One	

Consumables to be provided by BHEL(FREE ISSUE)

sl no.	Description	Range/spec	Quantity	Make
1	Welding Rods for:			
a	Distributor Segment Welding		as Required	
b	Turbine Housing Welding		as Required	
c	Pit Liner Welding		as Required	
d	Inlet to M I V to Penstock		as Required	
e	F. Valve to Penstock and		as Required	
2	Finish Paint		as Required	
3	First Filling Oil		as required	

ANNEXURE: C-1

General T & P s to be provided by the Sub-Contractor:

Sl no.	Description	Range/spec	Quantity	Preferable Make	Remarks
1	Water Level Micrometer accuracy 0.01 mm		2 no.		
2	Hand Pump for Pressure Test for oil pipeline	0 to 25 Kg/sq. cm.	1 no.		
3	Hand Pump for Pressure Test for oil pipeline	0 to 300 kg/sqcm	1 no.		
4	Hand Pump for Pressure Test for water	0 - 150 kg/sqcm	1 no.		
5	Vaccum cleaner	Industrial use	2 nos.		
6	Torque Wrench	0 to 100 kg-m	2 nos.		
7	Torque Wrench	0 to 500 kg-m	2 nos.		
8	Telescopic gauge set for bore dia. Measurement 0 to 150 mm	0 to 150 mm	1 set	Mitutoyo	
9	Micrometer Inside	0 to 5 mtrs	1 set	Mitutoyo	
10	Micrometer outside	300 to 500	1 set	Mitutoyo	
11	Micrometer outside	500 to 700 mm	1 set	Mitutoyo	
12	Micrometer outside	700 to 1000 mm	1 set	Mitutoyo	
13	Block Level	0.02 mm/mtrs	5	Mitutoyo	
14	Master level square shape with two side spirit level	0.01 mm/m	2 nos.	Mitutoyo	
15	" Y " Level / Theodolite for elevation check.		2 set		
16	Surface Plate	36" X 36"	1 nos.		
17	Surface Plate	300 x 300 mm	1 nos.		
18	Temperature & Humidity measuring device		2 no.		
19	Spring balance	Accuracy 50 gm, 15 kg range	2 nos.		
20	Slip gauge		2 set	Mitutoyo	
21	Bore gauge	6 - 200 mm	1 set	Mitutoyo	
22	Pneumatic Bolt wrench (full set)	M 4 to M 20	2 set	C P	
23	Varnier Calipers.	0 to 300 mm	2 set		
		0 to 500 mm	2 set		
24	Slip Gauge.	0 to 100 mm	1 set	Mitutoyo	
25	Depth Gauge.	0 to 300 mm	1 set	Mitutoyo	
26	Outside Micrometer	0 to 25 mm	3 set	Mitutoyo	
		0 to 50 mm	3 set	Mitutoyo	
		0 to 200 mm	2 set	Mitutoyo	
		0 to 500 mm	1 set	Mitutoyo	
		150 to 300 mm	2 set	Mitutoyo	
27	Inside Micrometer	500 to 1000 mm	1 set	Mitutoyo	
		upto 3000 mm	4 set	Mitutoyo	
28	Telesopic Micrometer for bore dia. Measurement.	upto 5000 mm	3 set	Mitutoyo	
		upto 300 mm	2 set	Mitutoyo	
29	Knife edge	6 "	04 set		
30	Knife edge	12 "	02 set		
31	Tin cutter	12 "	5 pairs		
32	Elcometer/D-meter for paint thickness measurement (Digital)	Upto 1 mm thickness	12 nos.		
33	Tool box with required tools		10 set		

ANNEXURE: C-2

General T & P s to be provided by the Sub-Contractor:					
SI No.	Description	Range/spec	Quantity	Preferable Make	Remarks
34	Transformer:O/P- 24 V with multi pt. for for safety hand lamp.		20 Set		
35	Filler Gauge 6" long	0.02 to 1 mm	10 set		
36	Filler Gauge 12" long	0.02 to 1 mm	10 set		
37	Dial Gauge Micrometer with Magnet base.	0.01 to 10 mm	20 set	Mitutoyo	
38	Dial Gauge Micrometer (Test type) with Magnet base.	0.005 to 5 mm	2 set	Mitutoyo	
39	Straight Edge.	1 mtrs	5 nos.		
40	Straight Edge.	3 mtrs	2 nos.		
41	Welding Generator with cable	300 Amps.	5 set		
		600 Amps	4 sets.		
42	Welding Rectifier with cable	600 Amps. Max	6 set		
43	T I G Welding machine.		2 set		
45	Gas Cutting Arrangement (torch with Hose Pipe etc.).		12 set		
46	GQ 4 Grinding Machine		10 set	wolf	
	FQ 4 Grinding Machine		10 sets.	wolf	
	Flexible Shaft Grinding Machine		10 sets.	wolf	
	AG7 Angle Grinding Machine		10 sets.	wolf	
	Pneumatic Straight Grinder		5 set		
	Pneumatic AG7 Angle Grinding Machine		5 set		
47	Milling Cutter of different shapes (bar, conical, round head etc.). To be used Flexible Grinding machine		10 set		
48	Drill Machines Hand Driven.	2 to 32 mm	10 set		
49	Drill Machines Magnetic Base	upto 40 mm	3 set		
50	Pneumatic Drill Machine	24 m to 50 mm	3 set		
51	Drill Bit	0 to 20 mm	10 set		
		20 to 40 mm	3 set		
52	Concrete Drill Machine.	0 to 12 mm	3 set		
		12 to 30 mm	2 set		
53	Concrete Drill Bit of required sizes.	4 to 30 mm	2 set		
54	Hole Drill of different size for cabling.	8 to 60 mm	2 set		
55	Spanners DE	6 to 36 mm	10 set		
56	Spanners Ring	6 to 36 mm	10 set		
57	Slogging Spanner	24 to 90 mm	3 set		
58	Slide wrench	10 to 30 mm	5 set		
59	Screw Driver both +/-	6" to 18" size	10 set		
60	Hammer:	5 kg	4 sets.		
		4 kg	5 sets.		
		2 kg	10 sets.		
		2 lb	15 set		
		1/2 lb	15 set		
61	Scissors.	6" & 12" size	10 pairs each		
62	Cutting Pliers.		10 pairs		
63	Monkey Pliers.		10 pairs		
64	Vice Grip Pliers.		10 pairs		
65	Nose Pliar.		15 pairs		
66	Brazing Torch (Nozzle size betn. 20 to 30).		8 set each		
67	Side Cutters.		10 pairs		
68	Copper Cutter.		10 pairs		
69	Tap Set of different size with handling device.	4 to 24 mm	5 set		
		24 to 64 mm	3 set		

ANNEXURE: C-3

General T & P s to be provided by the Sub-Contractor:					
SI No	Description	Range/spec	Quantity	Preferable Make	Remarks
70	Reamers of different size.	10 to 20 mm	5 set		
		20 to 40 mm	3 set		
71	Reamers adjustable	20 to 40 mm	2 set each		
72	Die Nut of different size with handle.	4 to 24 mm	5 set		
73	Pipe thread die	1/2 to 3 " size	3 set		
74	Scraper.	for babbitt and MS	15 set		
76	Jack (mechanical) of various capacity	2,5,10 tons	8 set each		
77	Jack hydraulic various capacity	30,100 tons	6 set each		
78	Chain-Pulley Block various capacity	0 to 20 tons	5 each set		
79	Huck-Chuck	0 10 ton	5 set		
80	Sling various length 4 to 12 mtrs	0 to 30 tons	6 set each		
81	DE Sackle of different type.	0 to 50 tons	6 set each		
82	" 1 " Bolt of different sizes.	0 to 20 tons	6 set each		
83	Wrenchet with different size socket.	6 to 36 mm	5 set each		
84	Soldering Iron		4 set	Soldron	
85	De-soldering Pump.		6 set		
86	Gasket Hole Cutter of different size.	6 to 40 mm	2 set		
87	Palte Hole Cutter for Cable Galands etc.	upto 1 " size	20 set		
88	Vacuum Cleaner.	Industrial use	2 set		
89	Hot Air Gun (2 KW).	Industrial use	2 set		
90	Hot Air Gun.	Heavy duty	6 nos.		
91	Blower	Industrial use	6 set		
92	SS Wire mesh for Oil Flushing	200 mesh			
93	Flexible Stainless Steel Hose Pipe with joint flange.	2" and 4" dia	20 mtr each		
94	Hose Clip of different size.	1/2 " to 4 " pipe	10 nos each		
95	Extension Board with Fuse, Socket & Switch and Continuous Cord length of 15 meters.	Heavy duty	30 nos.		
96	Air Drier	Industrial use	2 nos.		
97	Hose Pipe	Heavy duty	500 mtrs		
98	Paint Spray Gun.	for epoxy and high gloss paints	10 nos.		
99	Power Saw Machine.	General Purpose - reciprocating	1 set		
100	Pipe Cutting Machine.		1 sets		
101	Hacksaw frame with blade.		10 sets		
102	Mini Hacsaw frame with blade.		10 sets		
103	Knife		20 nos.		
104	Wire Stripper.		5 pairs.		
105	Crimping Tool for insulated lugs & Crimps .	0.5 to up to 6.0 Sq. mm	6 pairs		
106	Crimping Tool for non-insulated lugs & Crimps .	0.5 to up to 6.0 Sq. mm	3 pairs		
107	Shim Cutter.	12 "	5 pairs.		
108	Portable Oven for Welding Electrodes .	up to 300 C	10 nos.		
109	Becking Oven for welding Electrodes	up to 300 C	2 nos.		
110	Chisel of different sizes.	6 "	10 nos.		
		9 "	10 nos.		
		12 "	10 nos		
111	Number Punch & Letter Punch.		3 set		
112	Center Punch.		10 nos.		

ANNEXURE: C-4

General T & P s to be provided by the Sub-Contractor:					
SI No	Description	Range/spec	Quantity	Preferable Make	Remarks
113	Hand Filter Machine.		2 nos.		
114	Divider.		5 nos.		
115	Right Angle.		10 nos.		
116	Combination Set.		5 sets		
117	Steel Scale.	6 "	20 nos.		
		12 "	20 nos.		
		1 meter	5 nos.		
118	Measuring Tape	1 meter	20 nos.	Freemans	
		3 meter	10 nos.	Freemans	
		5 meter	5 meter	Freemans	
		15 meter	15 meter		
119	"C" or "G" Clamp.	8 "	15 nos.		
		12 "	15 nos.		
		18 "	15 nos.		
120	Bench Vice .	Big	4 sets		
		Small	5 sets		
121	Pipe Vice.		4 sets		
122	Bench Grinder.		3 nos.		
123	Flat Files, Both Fine and Rough.	12 "	10 nos. each.		
	Triangular Files, Both Fine and Rough.	12 "	10 nos. each.		
	Half-Round Files, Both Fine and Rough.	12 "	10 nos. each.		
	Round, Both Fine and Rough.	12 "	10 nos. each.		
124	Needle File set.		10 nos.		
125	Allen key Set.	up to 36 mm.	10 nos.		
126	Torch Light.		10 nos.		
127	Halogen Light.	500 Watt	as reqd.		
128	Power Distribution Board with Earth Leakage Detector to be mounted on each distribution board and Cable.		3 nos.		
129	Hydraulic Pipe Bending Machine with different size adaptor.	upto 50 mm dia.	2 nos.		
130	Huck-Chuck.	5, 10 & 15 Ton Capacity	5 nos each		
131	Turn Buckle.	5 Ton Capacity	10 nos.		
132	Scraper.		20 nos.		
133	Pipe/chain wrench	20 to 50 mm	3 set		
134	Digital Tachometer	0 to 500 r.p m.	1 set		
135	Micro Water Level		2 set		
136	Block Level (Master Level)	0.02 mm / meter accuracy	3 set		
137	Hand Pump for Pressure Test with Pressure Gauge.	0 to 250 Kg/ sq. cm.	2 set		
138	Torque Wrench for smaller bolts up to 16 mm dia.				
139	" Y " Level.		01 set		
140	Precision Plumb		05 nos.		
141	Spring Balance with L. C. 50 gm.	0 to 10 kg.	03 nos.		
142	Spring Balance with L. C. 1.0 gm and with Digital Display.	0 to 5 kg.	03 nos.		
143	Pipe Scaffolding Materials		as required		
144	Alluminium Ladders	10 meter long	2 set		
145	Steel Almirah		3 nos.		
146	Steel Trunk with lock	1.5 X 1.0 X 1/2 meter ht.	05 nos.		
147	Steel Rack		5 nos.		
148	Crow Bar and Pinch Bar		12 nos.		

ANNEXURE: C-5

General T & P s to be provided by the Sub-Contractor:					
SI No	Description	Range/spec	Quantity	Preferable Make	Remarks
149	Ear Phone		6 sets		
150	Phase Sequence Meter	upto 500 Volts.	2 nos.		
151	single Phase Varac	5 Amps. 220 Volts.	4 nos.		
152	Three Phase Varac	15 Amps. 415 Volts.	3 nos.		
153	Rheostat	500 Ohm, 5 Amps,	3 nos.		
154	Socket Spanner with Ratchet	M 6 to M 36	5 set		
155	Box Spanner with Ratchet	M 6 to M 36	5 set		
156	Srew Pitch Gauge	Metric	4 sets.		
157	Srew Pitch Gauge	BSF	2 sets.		
158	Srew Pitch Gauge	BSW	2 sets.		
159	Srew Pitch Gauge	BSP	2 sets.		
160	Mercury Thermometer	0 to 120 Deg. Celcius	15 nos.		
161	Theodolite		02 set		
162	Stop Watch		5 nos.		
163	Spray Paint Gun		5 nos.		
164	Airless paint gun		4 nos.		
165	Plastic Bucket (both big & small)		12 nos each.		
166	MS Sheet Trays		12 nos.		

ANNEXURE-C-6

Special T & P and Office accessories to be provided by the Sub-Contractor:					
SI No	Description	Range/spec	Quantity	Preferable Make	Remarks
1	Diesel Generator Set	300 K VA, 415 Volts	1 set		
2	Compressure with Receiver	7 kg/sq. cm. Pressure and 200 CFM with Continous Operation	1 set		
3	Closed Body Truck with detachyable sides	20T	02 no.		
4	Fork Lift Crane	5 Ton	1 no.		
5	General Purpose Lathe Machine	High Speed Pecision - 2 meter length, with milling cutter attachment	1 no.		
6	Radial Drill Machine with different size bit	Drilling capacity for steel upto 50 mm, Drilling Radius Max./min mm: 1500/530	1 no.		
7	Hydraulic(Automatic) bolt torque wrench	For torqueing bolt upto 150 mm size, with all auxilieries	02 set	Sweeney	
8	Power Hacksaw	Blade size 40 mm, Blade length 1000 mm min	1 no.		
9	Heavy Duty Bench Grinder	Wheel size dia 300mm, width 40 mm min	1 no.		
10	Mechanical / Hydraulic Trailer	up to 50 Ton & suitable trailor for above 20 tonne and ODC	1 no.		
11	PC with UPS & other accessories for Material management		2 sets.		

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12	MIG welding set		2 sets.		
13	Polyster / Fibre Slings	for handling / lifting turbine & generator shaft, stator bars, rotor poles and similar items upto 30 tons	02 set each	Slingset	

ANNEXURE: C-7

Consumables to be provided by the Sub-Contractor:					
sl no.	Description	Range/spec	Quantity	Preferable Make	Remarks
1	D. P. Test Kit.		as reqd.		
2	Welding Rods of approved brand by BHEL.	General Purpose	as required		
	Welding Rods of approved Brand by BHEL for : Pressure oil Pipelines of Gov.ernor, M I V, B F Valve and other Auxillieries except those given by BHEL		as required		
3	Arc Gouging Electrode (copper coated)	6 mm, 9 mm, 12 mm.	as required		
4	Welding Rod for TIG Welding		as required		
5	Mallet or Plastic Hammer	2 lb.	20 set		
	Mallet or Plastic Hammer	1 lb.	20 set		
	Mallet or Plastic Hammer	1/2 lb.	20 set		
6	Marking Clothe.		as required		
7	Rags.		as required		
8	Cotton Waste.		as required		
10	Micro Filter for Oil Flushing as required by BHEL Engineer		as required		
11	Petrol.		as required		
12	Diesel.		as required		
13	Kerosene.		as required		
14	Paint Remover.		as required		
15	Red-Oxide Metal Primer for touch up paint for preservation		200 ltrs.		
17	Rustoline.		as required		
18	C. T. C.		as required		
19	C. R. C.		as required		
20	Acid (HCl. Or Ortho-Phosphoric for Acid cleaning of Oil Pipelines).		as required		
21	Distilled water.		as required		
22	Base for Acid cleaning of Oil Pipelines.		as required		
23	White Spirit.		as required		
24	Oxygen.		as required		
25	Acetyline.		as required		
26	Argon.		as required		
27	Asbestos clothe.		as required		
28	Sand Paper / Amery Clothe.	100 mm wide, fine & course both	as required		
29	Rubber Gasket Sheet.		as required		
30	Rubber Sheet of Different Thickness for general purpose.	2 mm, 4 mm, 6 mm thk.	as required		
31	Stainless Steel Shim of different thickness.		as required		
32	Gasket Sealing Compound.		as required		
33	Fevi quick.		as required		
34	Robber Jointing Compound (Dunlop).		as required		
35	Lock Tight for thread and others.		as required		
36	Tafelon Tape.		as required		
37	Grinding Wheel for both Angle & Straight Grinder		as required		
38	Sander Wheel.		as required		
39	Boffing Wheel.		as required		
40	Wire Wheel		as required		
41	Heating Elementfor Heating Chamber		as required		

ANNEXURE: C-8

Consumables to be provided by the Sub-Contractor:					
sl no.	Description	Range/spec	Quantity	Preferable Make	Remarks
42	Heating Element for Regulated heating for Strech Releaving		as required		
43	Painting Brush		as required		
45	Structural Steel like MS Angle, MS Channel, MS Beam, & MS Plates		as required		
46	Wooden Sleepers		as required		
47	Temporary Rust Preventive Coating and Grease for Preservation		as required		
48	Tarpentine Oil		as required		
49	Solder for soldering		as required		
50	Temperature Stic for measuring Temp. of 200 to 300 Deg. Celcius		as required		
51	Flannel Cloth		as required		
52	Dry Cel	1.5 Volt	as required		
53	Dry Cell	9.0 Volt	as required		
54	G I Wire	dia.1.00 mm	as required		
55	Bulbs for Hand Lamps		as required		
56	Balbs for Halogen Lights		as required		
57	Wooden Plank, slipers (wood & concret)		as required		
58	Broom		as required		
59	Candle		as required		
60	Soap or Soda		as required		
61	Grafite Grease		as required		
62	Molykot Grease		as required		
63	Manila / Nilon Rope	3/4 ", 1 " & 1 1/2 "	as required		
64	FIRST AID Box with Medicine		as required		
65	Welding Glass	Plain & Black both	as required		
66	Gring Mask Glass		as required		
67	Welding Mask		as required		
68	Drinder's Mask		as required		
69	Aprron for Welder and Winders		as required		
70	Hand Gloves, both Leather & Cotton		as required		
71	Hand Gloves for both HT & LT Electric		as required		
72	Gum Boot		as required		
73	Safety Shoe		as required		
74	Safety Helmet		as required		
75	Safety Belt		as required		
76	Portable Head Lamp (Miners')		as required		
77	Value Grinding Paste	Fine Grade	as required		
78	Oil Stone	Rough & Fine	as required		
79	Engineers Blue		as required		
80	Emery Paper & Clothe	both Course 7 Fine	as required		
81	Rubber Sealing Compound		as required		
82	Gasket Sealing Compound		as required		
83	Wire Brush		as required		
84	General purpose Grease.		10 kg		
85	White Petroleum Jelly.		as required		
86	Cable Tie of 100 mm, 150 mm, 200 mm and 300 mm. long.		as required		
87	Ferrule Number for Wiring (alfa -numeric & numeric).		as required		
88	Permanent Marker.		as required		

ANNEXURE: C-9

Consumables to be provided by the Sub-Contractor:					
sl no.	Description	Range/spec	Quantity	Preferable Make	Remarks
89	Marking Paint.		as required		
90	Masking Tape.		as required		
91	Cello. Tape.		as required		
92	P V C Tape.		as required		
93	Fuse Wire.		as required		
94	Soldering Flux.				
95	Piano Wire with Plumb.		as required		
96	Carpenter Tools.		2 sets		
97	Anchor Bolts.				
98	Persian Blue.		as required		
99	2.5 Sq. mm. flexible copper wire for Testing etc.		400 meters		
100	Rubber sealing compound of GE Make		as required		
101	Reinol Cream		as required		
102	Quadridrum		as required		
103	Coconut Oil		as required		
104	Soap		as required		
105	Cable Gland of size below-5 mm		as required		

ANNEXURE: C-10

Safety Devices to be provided by the Sub-Contractor:					
sl no.	Description	Range/spec	Quantity	Preferable Make	Remarks
1	Nose Mask		as required		
2	Ear Mask		as required		
3	Safety Helmet		as required		
4	Material Handling Gloves		as required		
5	Rubber Hand Gloves for Handling of Chemicals in Stator Winding materials etc.		as required		
6	Safety Hand-Lamp (24 Volt)		as required		
7	Safety Goggles for Grinding, Cutting, Boffing etc.		as required		
8	Welding Helmets		as required		
9	Welding Gloves		as required		
10	Boiler Suits for Welder and Winders.		as required		
11	Fire Fighting Cylinders for Different type of Fires (I. e. Electric, Oil etc.).		as required		
12	Fire Fighing Buckets.		as required		

ANNEXURE: C-11

Electrical and C& I IMTEs to be provided by the Sub-Contractor:					
sl no.	Description	Range/spec	Quantity	Preferable Make	Remarks
1	Millivolt/milliamps injection kit	DC 200mV to 2 Vto 20V, 200mill amps to 20Amps.	1		
2	Signal Generator		1		
3	Analog multimeter		4		
4	3.5 Digital Multimeter		4		
5	Micro-Ohm meter	0-10000 micro-ohm, -1000 mili ohm,0-10 ohm	2		
6	Oscilloscope	20MZ	1		
7	Tachometer-non-contact type	0-700 rpm	1		
8	Tong Tester	0-10A, 0-100A, 0-5000A	One each		
9	Milliamps. Tong tester	0-200 milliamps.	1		
10	Phase sequensce meter	50-500V	1		

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11	Standratd Pr. Gauge	0-10 , 0-50, 0-150kg/cm2	One each		
12	Tead Wt tester		1		
13	Non-contact type thermo meter	0-150 Degre Cen	1		
14	Secondary Injection Kit	0-50A	1		
15	Primary Injection Kit	0-5000A	1		
16	Ultra sonic flaw detector		1		
17	Digital Insulation Tester	2.5 and 5 KV	One each		
18	Hand Megger	200/500/1000C	One each		
19	3-Ph variac	415V/15A	2		
20	1-Ph variac	220V	2		
21	Rheostat	5Amps, 20 ohms	3		
22	Mechanical phase shifter	0-360 Deg.	1		
23	Phase Angle meter	0-360 Deg.	1		
24	Needle pullar		2		
25	Temperature bath		1		