Corrigendum -3 Dated January 14, 2016 to Tender specification

Tender No. BHEL: PSSR: SCT 1601

Work: Handling at Site Stores / Storage yard, Transportation to Site of Work, Erection, Testing and Commissioning of Steam Turbine, Generator, Auxiliaries, other BOI including Insulation, Supply and Application of Final Painting for Unit-VI of 1x600 MW set at APGENCO RAYALASEEMA THERMAL POWER PROJECT, V.V. REDDY NAGAR, KADAPA DISTRICT, ANDHRA PRADESH

1) **The Title of the Work is modified as follows:**
Handling at Site Stores / Storage yard, Transportation to Site of Work, Erection, Testing and Commissioning of Steam Turbine, Generator, Auxiliaries, **CW Pumps, Motors & Auxiliaries** other BOI including Insulation, Supply and Application of Final Painting for Unit-VI of 1x600 MW set at APGENCO Rayalaseema Thermal Power Project, V.V. Reddy Nagar, Kadapa District, Andhra Pradesh

2) **VOLUME-IA PART II PRICE BID is Revised.**
The **PRICE BID (Revision 01)** is available at our website www.bhel.com/tender/tender_home.php under **NIT Nubmer: NIT_25675** Bidders are requested to submit their price offers in the PRICE BID (Revision 01) only. Those Bidders who have already submitted their offer shall resubmit the PRICE BID (Revision 01) on or before the due date and time of offer submission, consisting of the following, in a separate envelope super scribed as

	PART-II (PRICE BID Revision 01) TENDER NO.: NAME OF WORK: PROJECT: DUE DATE OF SUBMISSION: **Addressed to:** **Sub-contracts Dept., 7th floor, A-wing, BHEL PSSR,** **690, Anna Salai, Nandhanam, Chennai-35. Ph: 044 24330209** Containing the following:
i)	Covering letter/ Offer forwarding letter of Tenderer
ii)	Volume II- PRICE BID (Revision 01) (Duly filled in Schedule of Rates- rate/ price to be entered in words as well as figures)

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3) **The following is added in VOLUME-IA PART-I CHAPTER – II – SCOPE OF WORKS as clause no. 1.2.2.11**

Erection of 5 Nos. CW Pumps (4 Working and 1 Standby) with Motors shall also be under the scope of the Contractor. The approximate total Tonnage of CW Pumps, Motors and Aux. is 283MT. Terminal Points are Suction Bell Mouth on CW Pump Suction End and up to Discharge Elbow Counter Flange on the Pump Discharge End.

4) **The following clause is added in VOLUME-IA PART-I CHAPTER – V – T&Ps & MMEs TO BE DEPLOYED BY BHEL ON SHARING BASIS under clause no. 1.5.1**

Sl No.	T&P Description	Quantity
9	EOT crane at CW pump house without operator	1 No.

5) **The following clause is added in VOLUME-IA PART-I CHAPTER – V – T&Ps & MMEs TO BE DEPLOYED BY BHEL ON SHARING BASIS as clause no. 1.5.4.5**

EOT Crane (Customer Crane) without operator shall be provided at free of cost to the Contractor for Erection of CW pumps, Motors and Accessories. However, in case EOT crane is not made ready on time, Contractor has to make his own arrangement for erection of the CW Pumps, Motors and Accessories.

6) **The clause 1.5.5 in VOLUME-IA PART-I CHAPTER – V – T&Ps & MMEs TO BE DEPLOYED BY BHEL ON SHARING BASIS is revised as below:**

Higher capacity crane will be provided for Pre-assembly. & Erection of Feed water Storage Tank (FST), De-aerator and suitable crane will be provided for pre-assembly, erection and dismantling of the portal crane. In case the available higher capacity Crane at the time of erection could not reach the exact location of FST/De-aerator and other heavy items, then these may have to be lifted in parts to suitable location, assemble and drag to required erection location. The required T&Ps for this process like rails, winches etc. have to be arranged by contractor. However apart from EOT crane, all other T&P's (including telescopic/lattice boom crane) for erection of CW pumps, motors and aux. are to be arranged by the contractor.

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7) **VOLUME-IA PART-I CHAPTER – VII – TERMS OF PAYMENT Clause 1.7.1, Sl. No. 1.7.1.4 is revised as follows**

1.7.1.4	PUMPS AND AUXILIARIES -11.05 %	--
1.7.1.4a	Erection / Testing and Commissioning of Main Oil Pump, JOP, EOP, AOP, Centralized Lube Oil Purification System, along with all Auxiliaries	0.75%
1.7.1.4b	Erection / Testing and Commissioning of one Motor Driven BFP, along with all Auxiliaries	1.68%
1.7.1.4c	Erection / testing and commissioning of two nos Turbine Driven BFP, along with all Auxiliaries	3.80%
1.7.1.4d	Erection, Testing, Grouting etc. of DMCW (boiler & TG) Pumps and Motors	0.32%
1.7.1.4e	Erection, Testing, Grouting etc. of Condensate Extraction Pumps and Motors	1.30%
1.7.1.4f	Erection, Testing, Grouting etc. of CW Pumps and Motors	3.20%
	Subtotal for Pumps and Auxiliaries	**11.05%**

8) **The following clauses in VOLUME-IA PART-I CHAPTER – IX – BILL OF QUANTITY are revised as follows.**

8.1) **Clause No. 1.9.1.1 is revised as follows**

Sl. No	**Description**	**Approx Weight (In MT)**	**Rate Sche-dule ID**
a)	Steam Turbine & Aux	1005	1
b)	Turbo Generator & Aux	527	
c)	Condenser & Aux	734	
d)	LP,HP Heaters	410	
e)	BFP, Booster Pumps ,Turbo drives & Motors	205	
f)	CEP, Cooling Water Pumps with Motors & Frames	334	
g)	FST & Deaerator, Drain Cooler	116	
h)	RE joints, Flash Tanks & connected CW pipes	183	
i)	Bought Out Items (BOI)	539	
	Total	**4053**	

8.2) **'NOTE to clause 1.9.1.1 above'- Sl No. 1 is revised as below:**

1) A lump sum price is to be quoted in the price bid for Erection & Commissioning of **STG system** consisting of all equipments detailed under Clause No. 1.9.1.1(Weight schedule-summary) of this chapter that shall also cover works like integral piping, and final painting, as applicable. The Lumpsum quoted value for Erection Works shall include the Variation of +15% (Fifteen percent) in total indicated weight **(4053 MT)**. In case of variation in weight beyond +15%, the quantity exceeding +15% of the tendered quantity will be paid at the average tonnage rate arrived at by dividing the lumpsum quoted/accepted value by 115% of total indicated weight.

8.3) **Clause No. 1.9.2) The detailed break-up of weights is furnished below for information:** is revised as below:

A. TURBINE PACKAGE					
SL NO	**PKG NO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
1	75001	EMBEDMENT FOR ANCHOR POINTS	4400X1600 X1000	5447	4388
2	75003	COMPONENTS FOR BASE PLATE ASSEMBLY	4900 x 1200 x 600	6673	5920
3	75004	COMPONENTS OF BASE PLATE	2800 x 1700 x 600	3635	3058
4	75101	BASE PLATE FOR LP CASING	1850 x 1400 x 500	9437	8640
5	75102/1	LP OUTER CASING PARTS	7060 x 1480 x 2760	8085	8070
6	75102/2	LP OUTER CASING PARTS	7060 x 1480 x 2760	8085	8070
7	75103/1	LP OUTER CASING PARTS	7060 x 1480 x 2760	8085	8070
8	75103/2	LP OUTER CASING PARTS	7060 x 1480 x 2760	8085	8070
9	75104/1	LPC OUTER CASING PARTS	4570x 3230 x 980	2500	2455
10	75104/2	LPC OUTER CASING PARTS	4570x 3230 x 980	2500	2455

A. TURBINE PACKAGE					
SL NO	**PKG NO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
11	75105/1	LPC OUTER CASING PARTS	4570x 3230 x 980	2500	2455
12	75105/2	LPC OUTER CASING PARTS	4570x 3230 x 980	2500	2455
13	75106/1	COMPONENTS OF LP CASING UPPERPART	3500 x 300 x 300	495	405
14	75106/2	COMPONENTS OF LP CASING UPPERPART	3500 x 300 x 300	495	405
15	75106/3	LP OUTER CASING PARTS	3450 x 1000 x 1100	900	478
16	75106/4	LP OUTER CASING PARTS	3450 x 1000 x 1100	900	478
17	75107/1	LONGITUDINAL GIRDER (LEFT)	6800 x 1820 x 1570	15182	15107
18	75107/2	LONGITUDINAL GIRDER (LEFT)	6800 x 1820 x 1570	15182	15107
19	75108/1	LONGITUDINAL GIRDER (RIGHT)	6800 x 1820 x 1570	15182	15107
20	75108/2	LONGITUDINAL GIRDER (RIGHT)	6800 x 1820 x 1570	15182	15107
21	75109/1	LP FRONT WALL (TS)	6820 x 3750 x 910	10053	9878
22	75109/2	LP FRONT WALL (TS)	6820 x 3750 x 910	10053	9878
23	75110/1	LP FRONT WALL (GS)	6820 x 3750 x 910	10053	9878
24	75110/2	LP FRONT WALL (GS)	6820 x 3750 x 910	10053	9878
25	75111/1	LP SHAFT SEALING (FRONT)	1800 x 1700 x 740	2260	1801
26	75111/2	LP SHAFT SEALING (FRONT)	1800 x 1700 x 740	2260	1801
27	75112/1	LP SHAFT SEALING (REAR)	1800 x 1700 x 740	2260	1801

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SL NO	**PKG NO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
28	75112/2	LP SHAFT SEALING (REAR)	1800 x 1700 x 740	2260	1801
29	75113/1	LP SHAFT SEAL COMPENSATOR ASSLY (TS)	1440 x 1420 x 520	1456	1351
30	75113/2	LP SHAFT SEAL COMPENSATOR ASSLY (TS)	1440 x 1420 x 520	1456	1351
31	75114/1	LP SHAFT SEAL COMPENSATOR ASSLY (GS)	1440 x 1420 x 520	1456	1351
32	75114/2	LP SHAFT SEAL COMPENSATOR ASSLY (GS)	1440 x 1420 x 520	1456	1351
33	75115/1	LP JOINT COVERING	2300 x 1800 x 940	1041	841
34	75115/2	LP JOINT COVERING	2300 x 1800 x 940	1041	841
35	75201	HP/IP BEARING PEDESTAL ASSLY.	4080 x 2005 x 2126	13275	12100
36	75202	HP/IP BRG.PED.PARTS	1000 x 600 x 600	400	300
37	75301	ASSEMBLY DEVICES	1000 x 750 x 750	311	221
38	75302	INSPECTION SHAFT FOR IPC	4050X600X 900	1430	1130
39	75304	COMPONENTS OF ASSEMBLY FIXTURE FOR HPT	3800 x 2500 x 1300	6860	6395
40	75305	COMPONENTS OF ASSEMBLY FIXTURE	2300 x 2100 x 900	1800	1510
41	75306	COMPONENTS OF ASSLY FIXTURE FOR HPT	3300 x 1800 x 1300	3350	2852

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A. TURBINE PACKAGE					
SL NO	**PKG NO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
42	75307	COMPONENTS FOR ASSLY FIXTURE FOR HPT	5450 x 4050 x 400	3400	2566
43	75308/1	AUXILARIES OF LP TURBINE	3000 x 1300 x 1000	2100	1710
44	75308/2	AUXILARIES OF LP TURBINE	3000 x 1300 x 1000	2100	1710
45	75309/1	AUXLIARIES OF LP TURBINE	2000 x 1000 x 1825	1142	1142
46	75309/2	AUXLIARIES OF LP TURBINE	2000 x 1000 x 1825	1142	1142
47	75310/1	AUXLIARIES OF LP TURBINE	2000 x 1000 x 1825	1142	1142
48	75310/2	AUXLIARIES OF LP TURBINE	2000 x 1000 x 1825	1142	1142
49	75311	ASSEMBLY TOOLS	1700 x 800 x 400	1020	580
50	75312	AUXILIARIES OF IP TURBINE	1200 x 500 x 550	260	205
51	75313	AUXILIARIES OF IP TURBINE	1100 x 500 x 650	210	205
52	75314	AUXILIARIES OF IP TURBINE	1100 x 500 x 650	210	205
53	75315	BOLT HEATING EQUIPMENT AND BREECH NUT HEATING DEVICE	1700 x 900 x 700	150	90
54	75316	GROMMET SLINGS	1700 x 1700 x 300	625	548
55	75318	OIL FLUSHING AND PRESSURE TEST DEVICE	750 x 550 x 400	250	150
56	75319	STEAM BLOWING & HYDRAULIC TEST DEVICE	2900 x 2100 x 1200	4650	3910

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A. TURBINE PACKAGE					
SL NO	**PKG NO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
57	75320	TOOLS FOR GOV.SYST.&VALVES	1750 x 1200 x 1000	1500	900
58	75321	VALVE SUPPORT FOR HPT OVERHALL	1500 x 750 x 750	905	705
59	75401	IP-LP BEARING PEDESTAL ASSLY	3700 x 1860 x 2100	14500	13500
60	75501	LP/GEN. PEDESTAL ASSEMBLY	3200 x 2280 x 2070	9168	8276
61	75502	BEARING PEDESTAL (PARTS)	1600 x 800 x 600	1150	1030
62	75503	LP/LP PEDESTAL ASSEMBLY	3200X2280 X2070	9366	8474
63	75504	OIL FLUSHING AND PRESSURE TEST DEVICE	XX	250	150
64	75505	LP-LP BEARING PEDESTAL PARTS	XX	1150	1030
65	75601/1	FRONT BEARING PEDESTAL	3140 x 3140 x 2050	12386	11058
66	75601/2	HYDRAULIC TURNING GEAR	2100 x 1000 x 600	750	630
67	75601/3	MAIN OIL PUMP ASSEMBLY.	1400 x 1200 x 1000	550	380
68	75704/1	LP CASING ASSEMBLY(FASTENERS)	1800 x 1700 x 740	2653	2190
69	75704/2	LP CASING ASSEMBLY(FASTENERS)	1800 x 1700 x 740	2653	2190
70	75704/3	LP CASING ASSEMBLY(PARTS)	3760X2060 X860	4900	4511
71	75704/4	LP CASING ASSEMBLY(PARTS)	3760X2060 X860	4900	4511
72	75705/1	LP EXTRACTION A1	5000X1100 X700	1262	772
73	75705/2	LP EXTRACTION A1	5000X1100 X700	1262	772

A. TURBINE PACKAGE					
SL NO	**PKG NO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
74	75706/1	LP EXTRACTION A1	5000X1100 X700	1262	772
75	75706/2	LP EXTRACTION A1	5000X1100 X700	1262	772
76	75707/1	LP EXTRACTION A1	3420X1620 X870	1286	790
77	75707/2	LP EXTRACTION A1	1400X1300 X700	330	144
78	75707/3	LP EXTRACTION A1	1400X1300 X700	330	144
79	75707/4	LP EXTRACTION A1	1400X1300 X700	330	144
80	75707/5	EXTRACTION PIPE LINE (LPC)	1650X800X 450	470	320
81	75707/6	EXTRACTION PIPE LINE (LPC)	1650X800X 450	470	320
82	75708/1	LP EXTRACTION A2	2700X1200 X750	575	375
83	75708/2	LP EXTRACTION A2	2700X1200 X750	575	375
84	75709/1	LP EXTRACTION A2	1100X850X 850	307	226
85	75709/2	LP EXTRACTION A2	1100X850X 850	307	226
86	75710/1	EXTRACTION PIPE LINE (LPC)	3300X1750 X1100	1006	440
87	75710/2	LP EXTRACTION A2	3300X1750 X1100	1006	440
88	75711/1	LP EXTRACTION A3	1400X600X 600	302	200
89	75711/2	LP EXTRACTION A3	1400X600X 600	302	200
90	75711/3	LP EXTRACTION A3	XX	250	223
91	75711/4	LP EXTRACTION A3	XX	250	223
92	75711/5	LP EXTRACTION A3	XX	250	235

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SL NO	**PKG NO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
93	75711/6	LP EXTRACTION A3	XX	250	235
94	75716/1	LP EXTRACTION PIPE SHEATHING	2600X2000 X1400	1290	889
95	75716/2	LP EXTRACTION PIPE SHEATHING	2600X2000 X1400	1290	889
96	75717/1	INNER GUIDE PLATE OF DIFFUSER (TS)	2600X2400 X1000	2118	1334
97	75717/2	INNER GUIDE PLATE OF DIFFUSER (TS)	2600X2400 X1000	2118	1334
98	75718/1	DIFFUSER (TS)	4880x1730x 2340	3640	3630
99	75718/2	DIFFUSER (TS)	4880x1730x 2340	3640	3630
100	75719/1	DIFFUSER (GS)	4880x1730x 2340	3640	3630
101	75719/2	DIFFUSER (GS)	4880x1730x 2340	3640	3630
102	75720/1	LP INNER OUTER CASING (U/H)	6720x3150x 2325	21750	20800
103	75720/2	LP INNER OUTER CASING (U/H)	6720x3150x 2325	21750	20800
104	75721/1	LP INNER OUTER CASING (L/H) & LP INNER INNER CASING(L/H)	6750X3500 X2350	30907	29207
105	75721/2	LP INNER OUTER CASING (L/H) & LP INNER INNER CASING(L/H)	6750X3500 X2350	30907	29207
106	75722/1	LP INNER INNER CASING ASSY FASTNERS	1800X1700 X740	1760	1300
107	75722/2	LP INNER INNER CASING ASSY FASTNERS	1800X1700 X740	1760	1300
108	75723/1	LP CASING ASSEMBLY (PARTS)	450X450X2 50	140	65
109	75723/2	LP CASING ASSEMBLY (PARTS)	450X450X2 50	140	65

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SL NO	**PKG NO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
110	75724/1	LP INNER - INNER CASING (U/H) PARTIAL	4000x1570x 2000	11722	10800
111	75724/2	LP INNER - INNER CASING (U/H) PARTIAL	4000x1570x 2000	11722	10800
112	75725/1	INNER GUIDE PLATE OF DIFFUSER (GS)	2600x2400x 1000	2118	1334
113	75725/2	INNER GUIDE PLATE OF DIFFUSER (GS)	2600x2400x 1000	2118	1334
114	75728/1	STEAM INLET PIPE (LPT)	2700X1300 X900	840	512
115	75728/2	STEAM INLET PIPE (LPT)	2700X1300 X900	840	512
116	75801/1	LP ROTOR	7210X3300 X3350	62049	58277
117	75801/2	LP ROTOR	7210X3300 X3350	62049	58277
118	75901	IP ROTOR	4800x2120x 1995	23132	21765
119	75902	IP OUTER CASING (U/H)	4050x3800x 2650	25850	25450
120	75903	IP OUTER CASING (L/H)	3400x5250x 2600	25870	25450
121	75904	IP INNER CASING (U/H)	2900x3200x 1850	15200	14150
122	75905	IP INNER CASING (L/H)	2900x3200x 1850	15200	14150
123	75906	IP INLET ASSEMBLY	4500x3725x 1300	13550	13500
124	75907	IP SHAFT SEALING	1400x1200x 900	950	765
125	75908	IP TURBINE (PARTS)	2000x1900x 1000	3125	2750
126	75909	I.P. TURBINE PARTS	1000x1000x 750	475	365
127	76001/1	HP TURBINE	5675x3400x	88650	86350

A. TURBINE PACKAGE					
SL NO	**PKG NO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
			2900		
128	76001/2	EMERGENCY GOVERN0R	495x395x 695	57	48
129	76002	HP INLET ASSLY. & HP EXHAUST ASSY. (PARTS)	1200x1200x 500	80	35
130	76003	HP EXHAUST ASSEMBLY	1650x1400x 900	2000	1810
131	76004	HPT RELATED PARTS	1300x1300x 700	200	120
132	76104	ESV & CV CASING WITH VALVES	3360X3360 X2590	23146	20276
133	76105/1	ESV SERVOMOTOR WITH LIMIT SWITCHES	2300x1200x 1200	4250	3849
134	76105/2	ESV SERVOMOTOR WITH LIMIT SWITCHES	2300x1200x 1200	4250	3849
135	76107	HP CONTROL VALVE SERVOMOTOR	2800x1200x 2100	3280	2680
136	76108	ESV & CV CASING WITH VALVES	3360X3360 X2590	23146	20276
137	76112	HP CONTROL VALVE SERVOMOTOR	2800x1200x 2100	3288	2688
138	76201	SUSPENSION OF VALVE (IV)	4250x2640x 750	8078	6618
139	76202	IV & CV CASING WITH VALVES	5040x4690x 2770	33276	28276
140	76203/1	IV SERVOMOTOR WITH LIMIT SW. MOUNTIGS	2700x1450x 1400	3965	3385
141	76203/2	IV SERVOMOTOR WITH LIMIT SW. MOUNTIGS	2700x1450x 1400	3965	3385
142	76204	IP CONTROL VALVE SERVOMOTOR	3240x1240x 1950	3019	2403
143	76205/1	FRAME FOR SUSPENSION (IV)	3400x3150x 750	2026	2026
144	76205/2	FRAME FOR SUSPENSION (IV)	3400x3150x 750	2026	2026

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SL NO	**PKG NO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
145	76205/3	LOOSE ITEMS FOR FRAME FOR SUSPENSION(IV)	300x200x 200	20	17
146	76206	IV & CV CASING WITH VALVES	5040x4690x 2770	33276	28276
147	76210	IP CONTROL VALVE SERVOMOTOR	3240x1240x 1950	3003	2387
148	76301/1	SUSPENSION OF LPBP VALVE	3600x1700x 800	1836	986
149	76301/2	SUSPENSION OF LPBP VALVE	3600x1700x 800	1836	986
150	76402	INJECTOR FOR SUC. PIPE NB 350	3300x800x 800	588	338
151	76403	INJECTOR FOR SUC. PIPE NB 300	3300x1750x 1200	999	499
152	76404	MAIN OIL TANK & NOZZLE ARRGT.ASSY.	6180x3260x 2650	10697	10697
153	76405	MAIN OIL TANK & NOZZLE ARRGT.ASSY.	4200x1200x 900	402	327
154	76406	OIL STRAINERS	1500x1000x 1200	228	168
155	76407	OIL STRAINERS	1500x1000x 1200	228	168
156	76409	OIL STRAINERS	2050x1200x 1410	470	170
157	76412	LEAKAGE OIL TANK	1000x1000x 3000	515	515
158	76413	WASTE OIL TANK	1000x1000x 3000	515	515
159	76414	VAR.ORIFICES THR.VALV.&FLUSH PARTS	1700x700x 760	255	165
160	76415	VARIABLE ORIFICE 125	400x300x20 0	50	30

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A. TURBINE PACKAGE					
SL NO	**PKG NO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
161	76601	OBLIQUE REDUCER AASLY.(CAP)	1980X1580 X1380	1000	686
162	76602	OBLIQUE REDUCER AASLY.(CAP)	1980X1580 X1380	1000	686
163	76603	MANHOLE ASSLY (CAP)	2240X1760 X1830	2400	1725
164	76604	MANHOLE ASSLY (CAP)	2240X1760 X1830	2400	1725
165	76605	MITRE BEND ASSLY(CAP)	2270X2270 X1730	2400	1650
166	76606	MITRE BEND ASSLY(CAP)	2270X2270 X1730	2400	1650
167	76607	PIPE ASSLY LPT1(CAP)	8010X2600 X2370	15200	13139
168	76608	PIPE ASSLY LPT1(CAP)	8010X2600 X2370	15200	13139
169	76609	PIPE ASSLY LPT2(CAP)	5460X2240 X2160	9500	8120
170	76610	PIPE ASSLY LPT2(CAP)	5460X2240 X2160	9500	8120
171	76611	MANHOLE INLET ASSLY(CAP)	1330X2110 X1630	1850	1366
172	76612	MANHOLE INLET ASSLY(CAP)	1330X2110 X1630	1850	1366
173	76613	SPRING SUPPORT-1(CAP)	1350X720X 790	850	706
174	76614	SPRING SUPPORT-1(CAP)	1350X720X 790	850	706
175	76615	SPRING SUPPORT-2 & 3 (CAP)	1350X720X 790	700	544
176	76616	SPRING SUPPORT-2 & 3 (CAP)	1350X720X 790	700	544
177	76617	SPRING SUPPORT-4 & 5 (CAP)	1350X720X 790	700	544

A. TURBINE PACKAGE					
SL NO	**PKG NO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
178	76618	SPRING SUPPORT-4 & 5 (CAP)	1350X720X 790	700	544
179	76701	CHANGE OVER VALVE	700X650X 300	140	112
180	76702/1	CRH NRV WITH SERVOMOTOR	3200x2300x 2600	10528	8990
181	76702/2	STEAM BLOWING DEV.FOR NRV CRH LINE	2500x1600x 1200	5600	2600
182	76801	RATING,COLLABORATIO N&COMPANY'S MONOGRAM PLATE	850x550x 200	55	36
183	76901	OIL STRIPPER	600x600x 850	133	83
184	76902	OIL STRIPPER	600x600x 850	133	83
185	76903	HOUSING FOR M.S STRAINER	1900x1380x 700	3380	3380
186	76904	HOUSING FOR M.S STRAINER	1900x1380x 700	3380	3380
187	76908	HOUSING FOR HRH STEAM STRAINER	2550x1850x 1125	5400	5400
188	76909	HOUSING FOR HRH STEAM STRAINER	2550x1850x 1125	5400	5400
189	76912/1	BLANKING ARRANGEMENT FOR MS STRAINER HOUSING	1000x900x 500	455	350
190	76912/2	BLANKING ARRANGEMENT FOR HRH STEAM STRAINER HOUSING	1600x1200x 600	1210	940
191	76912/3	BLANKING ARRANGEMENT FOR MS STRAINER HOUSING	1000x900x 500	455	350
192	76912/4	BLANKING ARRANGEMENT FOR	1600x1200x 600	1210	940

Corrigendum -3 Dated January 14, 2016 to Tender specification

Tender No. BHEL: PSSR: SCT 1601

A. TURBINE PACKAGE					
SL NO	**PKG NO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
		HRH STEAM STRAINER HOUSING			
193	76913	GASKETS FOR MS & HRH STEAM STRAINER HOUSING	1000x1000x600	41	21
194	76914	COMPENSATOR	600x600x900	50	27
195	76915	ASSY. & DISASSY. DEVICES FOR MS & HRH STEAM STRAINERS	2140x1400x500	800	694
196	76917	STEAM STRAINER (MS)	1240x990x550	400	324
197	76918	STEAM STRAINER (HRH)	1900x1750x950	1350	1244
198	76919	STEAM STRAINER (MS)	1240x990x550	400	324
199	76920	STEAM STRAINER (HRH)	1900x1750x950	1350	1244
200	77001	GOV.SYSTEM CONTROL RACK ASSLY. & TRANSPORT DEVICE	2800x1360x2750	1847	1300
201	77002	SUPPLY RACK HP VALVE-2 (RIGHT)	2300x1400x2550	1797	767
202	77003	SUPPLY RACK HP VALVE-1 (LEFT)	2300x1400x2550	1797	767
203	77004	SUPPLY RACK FOR IP VALVES 1 & 2	2300x1400x2550	2080	1050
204	77006	GOVERNING SYSTEM PROTECTION RACK & TRANSPORT DEVICE	2450x1300x2250	1540	1100
				1106653	**1005051**

Corrigendum -3 Dated January 14, 2016 to Tender specification

Tender No. BHEL: PSSR: SCT 1601

B. GENERATOR PACKAGE					
SL NO	**PKG NO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
1	601	FOUNDATION PLATES	5950X1230X 800	7800	7450
2	602	FOUNDATION BOLTS	2540X655X 600	1480	760
3	603	FOUNDATION ITEMS	5800X1120X 520	1500	1000
4	604	EMBEDDED PARTS	1000X800X 400	1000	800
5	605	GENERATOR STATOR	9860X4440X 3870	304000	301000
6	606	GENERATOR ROTOR WITH SKIDPLATE	14125X1790 x1750	84300	75090
7	607	END SHIELD LOWER HALF (TE)	3900X1500X 2150	8350	8250
8	608	END SHIELD UPPER HALF (TE)	3900X1500X 2150	7350	7250
9	609	END SHIELD LOWER HALF (EE)	3900X1650X 2150	8400	8300
10	610	END SHIELD UPPER HALF (EE)	3900X1650X 2150	7400	7300
11	611	GENERATOR BEARING (EE & TE)	1390X1130X 1015	1930	1700
12	612	BAFFLE RING,BAFFLE RING CARIER & AIR GAP SEAL ASSLY	1930X1920X 1160	1100	882
13	613	TERMINAL BUSHING	2200x1830x 610	1427	1062
14	614	TERMINAL BUSHING BOX	3500x2800x 1800	7300	5302
15	615	SHAFT SEALS (EE & TE) AND OIL CATCHER (INNER & OUTER)	2110x1125x 900	1530	1108
16	616	BAFFLE RING ASSY	1750X1750X 1140	1100	600
17	617	GENERATOR ACCESSORIES	2140X2140X 1240	1700	1100
18	618	FLEXIBLE TERMINAL CONNECTIONS	1350X850X 300	472	372
19	619	GENERATOR ACCESSORIES	2240X2140X 1220	1600	1200

B. GENERATOR PACKAGE					
SL NO	**PKG NO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
20	620	GENERATOR ACCESSORIES	1640X1140X 1240	2781	2471
21	621	GENERATOR ACCESSORIES	1700X1200X 250	140	85
22	622	PRIMARY WATER TANK	10500x2400x 1200	2600	2400
23	623	P.W.TANK PIPE LINES	6800x2100x 1000	860	460
24	624	P.W.TANK PIPE LINES	3000x600x 500	454	354
25	625	PLATFORM FOR P W TANK	10500x1200x 500	974	574
26	626	COOLER HOUSING FRAME	4290X4450X 1450	21300	19992
27	627	SEAL RINGS	750x750x200	90	65
28	628	CONNECTION PIECE ASSEMBLY	1600x1050x 400	862	712
29	629	EMBEDMENTS FOR PORTAL CRANE	1400X1000X 400	1651	1391
30	631	DRY AIR BLOWER	1100X1000X 700	80	52
31	632	ERECTION PEDESTALS	5300X1500X 940	5900	5500
32	633	ROTOR INSERTION DEVICES	2460X1170X 1240	3000	2500
33	634	WIRE ROPES FOR ROTOR	1800X1800X 400	330	250
34	635	GENERATOR ERECTION DEVICES	3300X1555X 1140	1649	1174
35	636	SPECIAL TOOLS AND TACKLES	800X700X 300	130	80
36	637	BRUSHLESS EXCITER SET	5750x2350x 3400	32928	29928
37	638	BRUSHLESS EXCITER FRONT COVER	4400x3400x 3100	4478	1663
38	639	BRUSHLESS EXCITER REAR COVER	4400x3400x 3100	4978	2150
39	640	EXCITER BED PLATE ACCESSORIES & RACK ASSEMBLY	3900x1250x 1150	1741	860

Corrigendum -3 Dated January 14, 2016 to Tender specification

Tender No. BHEL: PSSR: SCT 1601

B. GENERATOR PACKAGE					
SL NO	**PKG NO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
40	641	EXCITER BED PLATE ACCESSORIES (NON TEST BED)	5800X1140X 1240	2925	1815
41	642	EXCITER ACCESSORIES	2200X1100X 1000	1111	611
42	643	EXCITER BED PLATE ACCESSORIES (NON TEST BED ITEMS)	1000X800X 800	775	695
43	644	RR WHEEL AIR GUIDE COVER	2800x1500x 2000	1572	872
44	645	SEAL OIL STORAGE TANK	5000x1800x 1700	2500	1940
45	646	PW PUMP AND FILTER UNIT	4000X4000X 3000	7065	4550
46	648	SEAL OIL UNIT	6200x2500x 3400	10000	7825
47	649	LIQUID DETECTOR RACK	2000X1000X 2100	660	460
48	650	GAS UNIT	1520x840x 840	1205	630
49	651	CO2 VAPOURISER	3480x1540x 440	250	170
50	652	H2 DISTRIBUTOR	4860x1240x 440	333	150
51	653	CO2 DISTRIBUTOR	1400x1240x 440	353	163
52	654	N2 DISTRIBUTOR	550X550X 1750	143	60
53	655	DRAIN OIL COLLECTOR	1200x600x 600	139	89
54	656	RESINS	2750x1400x 1400	100	56
55	657	TG SYSTEM INTEGRAL PIPING (VALVES)	1000x940x 900	3800	3300
56	659	CONSUMABLES		55	40
TOTAL WEIGHT				**569651**	**526613**

C. CONDENSER PACKAGES					
SL NO	**PKG NO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
1	78001/1	CONDENSER (HOT WALL-TS)	11300x2100 x1300	6140	6140
2	78001/2	CONDENSER (HOT WALL-GS)	11300x2100 x1300	6120	6120
3	78004/1	FRONT END BOTTOM PLATE	7100x3350x 625	6750	6750
4	78004/2	FRONT END BOTTOM PLATE	7100x3350x 625	6750	6750
5	78005/1	REAR END BOTTOM PLATE	7100x3350x 625	6750	6750
6	78005/2	REAR END BOTTOM PLATE	7100x3350x 625	6750	6750
7	78006/1	MIDDLE BOTTOM PLATE-1	7100x3250x 625	6025	6025
8	78006/2	MIDDLE BOTTOM PLATE-1	7100x3250x 625	6025	6025
9	78007/1	MIDDLE BOTTOM PLATE-2	7100x3250x 625	6025	6025
10	78007/2	MIDDLE BOTTOM PLATE-2	7100x3250x 625	6025	6025
11	78010/0	BOTTOM PLATE (LOOSE ITEMS)	1900x700x6 00	900	830
12	78012/1	SPRING ELEMENT (CONDENSER SUPPORT)	2000X1000 X1250	5200	5200
13	78012/2	SPRING ELEMENT (CONDENSER SUPPORT)	2000X1000 X1250	5200	5200
14	78013/1	SPRING ELEMENT (CONDENSER SUPPORT)	2000X1000 X1250	5200	5200
15	78013/2	SPRING ELEMENT (CONDENSER SUPPORT)	2000X1000 X1250	5200	5200
16	78014/1	SPRING ELEMENT (CONDENSER SUPPORT)	2000X1000 X1250	5200	5200
17	78014/2	SPRING ELEMENT (CONDENSER SUPPORT)	2000X1000 X1250	5200	5200

C. CONDENSER PACKAGES					
SL NO	**PKG NO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
18	78015/1	SPRING ELEMENT (CONDENSER SUPPORT)	2000X1000 X1250	5200	5200
19	78015/2	SPRING ELEMENT (CONDENSER SUPPORT)	2000X1000 X1250	5200	5200
20	78018/1	LOOSE ITEMS(CONDENSER SUPPORT)	1600X950X 950	6590	6400
21	78018/2	LOOSE ITEMS(CONDENSER SUPPORT)	1600X950X 950	6590	6400
22	78020/1	FRONT WATER CHAMBER(GS)	5224X3620 X340	5826	5725
23	78020/2	FRONT WATER CHAMBER(GS)	5224X3620 X340	5826	5725
24	78022/1	FRONT WATER BOX(GS)	5950X3620 X2485	14060	13910
25	78022/2	FRONT WATER BOX(GS)	5950X3620 X2485	14060	13910
26	78023/1	FRONT WATER CHAMBER(TS)	5225X3620 X340	6216	6115
27	78023/2	FRONT WATER CHAMBER(TS)	5225X3620 X340	6216	6115
28	78025/1	FRONT WATER BOX (TUR.SIDE)	5950X3620 X2485	14060	13910
29	78025/2	FRONT WATER BOX(TUR.SIDE)	5950X3620 X2485	14060	13910
30	78026/1	REAR WATER CHAMBER(GEN.SIDE)	5225X3620 X340	4633	4532
31	78026/2	REAR WATER CHAMBER(GEN.SIDE)	5225X3620 X340	4633	4532
32	78028/1	REAR WATER BOX (GEN.SIDE)	4770X3610 X2025	8231	8130
33	78028/2	REAR WATER BOX (GEN.SIDE)	4770X3370 X1950	8231	8130
34	78029/1	REAR WATER CHAMBER(TUR.SIDE)	5225X3620 X340	4633	4532

C. CONDENSER PACKAGES					
SL NO	**PKG NO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
35	78029/2	REAR WATER CHAMBER(TUR.SIDE)	5225X3620 X340	4633	4532
36	78031/1	REAR WATER BOX (TUR.SIDE)	4760X3610 X2025	8231	8130
37	78031/2	REAR WATER BOX (TUR.SIDE)	4760X3610 X2025	8231	8130
38	78032/1	SIDE WALL (TUR.END)	5248X2480 X32	3290	3290
39	78032/2	SIDE WALL (TUR.END)	5248X2480 X32	3290	3290
40	78033/1	SIDE WALL (TUR.END)	5248X1705 X32	2185	2185
41	78033/2	SIDE WALL (TUR.END)	5248X1705 X32	2185	2185
42	78034/1	SIDE WALL (TUR.END)	5248X2480 X16	1645	1645
43	78034/2	SIDE WALL (TUR.END)	5248X2480 X16	1645	1645
44	78041/1	SIDE WALL (TUR.END)	5248X2480 X32	3290	3290
45	78041/2	SIDE WALL (TUR.END)	5248X2480 X32	3290	3290
46	78042/1	SIDE WALL (TUR.END)	5248X1705 X32	2185	2185
47	78042/2	SIDE WALL (TUR.END)	5248X1705 X32	2185	2185
48	78046/1	SIDE WALL (TUR.END)	5248X2480 X16	1645	1645
49	78046/2	SIDE WALL (TUR.END)	5248X2480 X16	1645	1645
50	78047/0	SIDE WALL (LOOSE ITEMS)	5850X700X 450	2828	2728
51	78048/1	SHELL INTERNAL DETAILS	3650X1000 X800	5598	5348

C. CONDENSER PACKAGES					
SL NO	**PKG NO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
52	78048/2	SHELL INTERNAL DETAILS	3650X1000 X800	5598	5348
53	78049/1	SHELL INTERNAL DETAILS	3650X1000 X800	5598	5348
54	78049/2	SHELL INTERNAL DETAILS	3650X1000 X800	5598	5348
55	78050/1	RODS (SHELL INTERNALS)	3650X1000 X800	5598	5348
56	78050/2	RODS (SHELL INTERNALS)	3650X1000 X800	5598	5348
57	78051/1	RODS (SHELL INTERNALS)	3650X1000 X800	5598	5348
58	78051/2	RODS (SHELL INTERNALS)	3650X1000 X800	5598	5348
59	78055/1	SHELL INTERNAL DETAILS	3700X850X 350	758	608
60	78055/2	SHELL INTERNAL DETAILS	3700X850X 350	758	608
61	78056/1	SHELL INTERNAL DETAILS	3700X850X 500	4390	4240
62	78056/2	SHELL INTERNAL DETAILS	3700X850X 500	4390	4240
63	78058/1	AIR EXTRACTION PIPING	5460X990X 410	1200	1065
64	78058/2	AIR EXTRACTION PIPING	5460X990X 410	1200	1065
65	78059/1	SHELL INTERNAL DETAILS	4700X3426 X348	4092	3860
66	78059/2	SHELL INTERNAL DETAILS	4700X3426 X348	4092	3860
67	78060/1	SHELL INTERNAL DETAILS	4700X3426 X348	4092	3860
68	78060/2	SHELL INTERNAL DETAILS	4700X3426 X348	4092	3860

C. CONDENSER PACKAGES					
SL NO	**PKG NO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
69	78061/1	SHELL INTERNAL DETAILS	4700X3426 X348	4092	3860
70	78061/2	SHELL INTERNAL DETAILS	4700X3426 X348	4092	3860
71	78062/1	SHELL INTERNAL DETAILS	4700X3426 X348	4092	3860
72	78062/2	SHELL INTERNAL DETAILS	4700X3426 X348	4092	3860
73	78063/1	SHELL INTERNAL DETAILS	4700X3426 X348	4092	3860
74	78063/2	SHELL INTERNAL DETAILS	4700X3426 X348	4092	3860
75	78064/1	SHELL INTERNAL DETAILS	4700X3426 X348	3892	3660
76	78064/2	SHELL INTERNAL DETAILS	4700X3426 X348	3892	3660
77	78065/1	SHELL INTERNAL DETAILS	4700X3426 X348	4092	3860
78	78065/2	SHELL INTERNAL DETAILS	4700X3426 X348	4092	3860
79	78069/1	SHELL INTERNAL DETAILS	5500X940X 750	9265	8698
80	78069/2	SHELL INTERNAL DETAILS	5500X940X 750	9265	8698
81	78070/1	SHELL INTERNAL DETAILS	5500X940X 630	4150	3583
82	78070/2	SHELL INTERNAL DETAILS	5500X940X 630	4150	3583
83	78071/1	SHELL INTERNAL DETAILS	5500X940X 630	5258	4691
84	78071/2	SHELL INTERNAL DETAILS	5500X940X 630	5258	4691
85	78072/1	SHELL INTERNAL DETAILS	5500X940X 630	4427	3860

C. CONDENSER PACKAGES					
SL NO	**PKG NO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
86	78072/2	SHELL INTERNAL DETAILS	5500X940X 630	4427	3860
87	78074/1	LOWER DOME WALL (TS)	11000X340 0X300	8309	8209
88	78075/1	LOWER DOME WALL (TS)	10075X340 0X300	7245	7145
89	78075/2	LOWER DOME WALL (TS)	11133X395 0X600	10535	10535
90	78076/1	LOWER DOME WALL (TS)	7214X362X 32	368	318
91	78076/2	LOWER DOME WALL (TS)	9373X2310 X500	5955	5955
92	78077/1	LOWER DOME WALL (TS)	1936X2500 X50	821	771
93	78077/2	LOWER DOME WALL (TS)	3229X1800 X200	820	720
94	78078/1	LOOSE ITEMS (LOWER DOME WALL-TS)	3473X350X 200	305	305
95	78078/2	LOOSE ITEMS (LOWER DOME WALL-TS)	3673X350X 200	323	323
96	78102/2	LOWER DOME WALL (GS)	11000X345 0X300	8309	8209
97	78103/1	LOWER DOME WALL (GS)	11126X360 0X500	10882	10832
98	78103/2	LOWER DOME WALL (GS)	10775X285 0X300	7245	7145
99	78104/1	LOWER DOME WALL (GS)	9278X2227 X650	5560	5460
100	78104/2	LOWER DOME WALL (GS)	7214X360X 32	318	318
101	78105/1	LOWER DOME WALL (GEN.END)	3312X1808 X32	758	758
102	78105/2	LOWER DOME WALL (GEN.END)	2500X1936 X32	771	771

C. CONDENSER PACKAGES					
SL NO	**PKG NO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
103	78106/1	LOOSE ITEMS (LOWER DOME WALL GS)	3673X350X 32	323	323
104	78106/2	LOOSE ITEMS (LOWER DOME WALL GS)	3473X350X 50	305	305
105	78109/1	LOWER DOME WALL (F.W/B SIDE)	7164X3465 X600	6942	6842
106	78109/2	LOWER DOME WALL (F.W/B SIDE)	7164X3465 X600	6942	6842
107	78110/1	LOWER DOME WALL (FRONT W/BOX SIDE)	6224X2730 X300	4713	4713
108	78110/2	LOWER DOME WALL (FRONT W/BOX SIDE)	6224X2830 X300	4713	4713
109	78111/1	LOWER DOME WALL (FRONT W/BOX SIDE)	2813X350X 50	293	243
110	78111/2	LOWER DOME WALL (FRONT W/BOX SIDE)	2813X350X 50	343	243
111	78112/1	LOOSE ITEMS (LOWER DOME WALL FRONT W/BOX SIDE)	3000X1000 X1000	552	552
112	78112/2	LOOSE ITEMS (LOWER DOME WALL FRONT W/BOX SIDE)	3000X1000 X1000	552	552
113	78114/1	LOWER DOME WALL (REAR W/BOX SIDE)	5956X1760 X550	2941	2841
114	78114/2	LOWER DOME WALL (REAR W/BOX SIDE)	5956X1760 X550	2941	2841
115	78115/1	LOWER DOME WALL (REAR W/BOX SIDE)	7164X1442 X300	1897	1797
116	78115/2	LOWER DOME WALL (REAR W/BOX SIDE)	7164X1442 X300	2249	2149
117	78116/1	LOWER DOME WALL (REAR W/BOX SIDE)	6915X3460 X2400	7405	7305
118	78116/2	LOWER DOME WALL (REAR W/BOX SIDE)	6915X3260 X2400	7202	7102

C. CONDENSER PACKAGES					
SL NO	**PKG NO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
119	78117/1	LOWER DOME WALL (REAR W/BOX SIDE)	5544X350X 50	531	481
120	78117/2	LOWER DOME WALL (REAR W/BOX SIDE)	5544X350X 50	531	481
121	78118/1	LOOSE ITEMS(LOWER DOME WALL REAR W/BOX SIDE)	1500X1300 X1200	627	627
122	78118/2	LOOSE ITEMS(LOWER DOME WALL REAR W/BOX SIDE)	2000X1200 X1000	768	768
123	78121/1	DOME INTERNAL STIFFENING	7000X400X 400	2921	2921
124	78121/2	DOME INTERNAL STIFFENING	7000X400X 400	2921	2921
125	78122/1	DOME INTERNAL STIFFENING	3400X400X 400	1529	1529
126	78122/2	DOME INTERNAL STIFFENING	3400X400X 400	1529	1529
127	78123/1	DOME INTERNAL STIFFENING	950X400X4 00	222	222
128	78123/2	DOME INTERNAL STIFFENING	950X400X4 00	222	222
129	78124/1	DOME INTERNAL STIFFENING	3000X1000 X600	2023	2023
130	78124/2	DOME INTERNAL STIFFENING	3000X1000 X600	2023	2023
131	78125/1	DOME INTERNAL STIFFENING	3000X1200 X1000	3490	3490
132	78125/2	DOME INTERNAL STIFFENING	3000X1200 X1000	3490	3490
133	78126/1	DOME INTERNAL STIFFENING	3400X1200 X1200	4100	4100
134	78126/2	DOME INTERNAL STIFFENING	3400X1200 X1200	4100	4100

C. CONDENSER PACKAGES					
SL NO	**PKG NO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
135	78129/1	LP HEATER NO SUPPORT ARRANGEMENT	2150X1800 X1150	3350	3000
136	78129/2	LP HEATER NO SUPPORT ARRANGEMENT	2150X1800 X1150	3350	3000
137	78130/1	LP HEATER NO SUPPORT ARRANGEMENT	5950X1125 X580	3250	2950
138	78130/2	LP HEATER NO SUPPORT ARRANGEMENT	5950X1125 X580	3250	2950
139	78132/1	UPPER DOME WALL (TUR/GEN SIDE)	6800X1650 X300	3575	3575
140	78132/2	UPPER DOME WALL (TUR/GEN SIDE)	6800X1650 X300	3575	3575
141	78133/1	UPPER DOME WALL (TUR/GEN SIDE)	6800X1650 X300	3575	3575
142	78133/2	UPPER DOME WALL (TUR/GEN SIDE)	6800X1650 X300	3575	3575
143	78136/1	UPPER DOME WALL (FWB SIDE)	5464X3600 X300	6152	6152
144	78136/2	UPPER DOME WALL (F/W/B SIDE)	5464X3600 X300	6152	6152
145	78137	UPPER DOME WALL(LOOSE ITEMS)	XX	600	600
146	78139/1	UPPER DOME WALL (RWB SIDE)	6000X3580 X600	6393	6393
147	78139/2	UPPER DOME WALL (RWB SIDE)	6000X3580 X600	6393	6393
148	78142/1	FRONT W/BOX HINGE ARRANGEMENT	2500X1000 X750	1830	1682
149	78142/2	FRONT W/BOX HINGE ARRANGEMENT	2500X1000 X750	1830	1682
150	78143/1	LOOSE ITEMS(W/B HINGE ARRANGEMENT)	2000X1500 X500	778	643
151	78143/2	LOOSE ITEMS(W/B HINGE ARRANGEMENT)	2000X1500 X500	778	643

C. CONDENSER PACKAGES					
SL NO	**PKG NO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
152	78150	FRONT& REAR W/BOX HINGE ARRANGEMENT	1670x1040x 480	914	914
153	78150/1	FRONTW/BOX HINGE ARRANGEMENT	2810X840X 230	650	595
154	78150/2	FRONTW/BOX HINGE ARRANGEMENT	2810X840X 230	650	595
155	78151	FRONT& REAR W/BOX HINGE ARRANGEMENT	1670x1040x 480	914	914
156	78154/1	STEAM THROW DEVICE	5500X940X 630	15593	15026
157	78154/2	STEAM THROW DEVICE	5500X940X 630	15593	15026
158	78157/1	CONDENSER (LOOSE ITEMS)	850X250X2 50	36	30
159	78157/2	CONDENSER (LOOSE ITEMS)	850X250X2 50	36	30
160	78158/1	CONDENSER (LOOSE ITEMS)	2900x956x4 06	500	500
161	78158/2	CONDENSER (LOOSE ITEMS)	2900x956x4 06	500	500
162	78159/1	CONDENSER (LOOSE ITEMS)	1000x500x5 00	350	300
163	78159/2	CONDENSER (LOOSE ITEMS)	1000x500x5 00	350	300
164	78165	CONDENSER (LOOSE ITEMS)	1000x600x5 00	30	25
165	78166/1	STAND PIPE NO.1	2750X420X 400	110	100
166	78166/2	STAND PIPE NO.1	2750X420X 400	110	100
167	78167	CONDENSER STAND PIPE	3150X350X 330	216	200
168	78169/1	STAND PIPE NO.2	2750X420X 390	110	100

C. CONDENSER PACKAGES					
SL NO	**PKG NO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
169	78169/2	STAND PIPE NO.2	2750X420X390	110	100
170	78301	GLAND STEAM CONDENSER	1750x1700x1700	1610	1510
171	78304	LOOSE ITEMS OF GSC	700x300x200	60	34
172	78305	LOOSE ITEMS GSC (FRAGILE)	600x500x350	35	10
173	78315/1	L.P.HEATER NO.1	12300X1500X1700	12910	12410
174	78315/2	L.P.HEATER NO.1	12300X1500X1700	12910	12410
175	78316/1	LOOSE ITEMS OF LPH 1	500x400x400	300	250
176	78316/2	LOOSE ITEMS OF LPH 1	500x400x400	300	250
177	78317/1	L.P.HEATER NO.1 STAND PIPE	2200X700X500	65	60
178	78317/2	L.P.HEATER NO.1 STAND PIPE	2200X700X500	65	60
179	78318/1	LPH 1 PANEL MOUNTED INSTRUMENT	2600X500X400	80	50
180	78318/2	LPH 1 PANEL MOUNTED INSTRUMENT	2600X500X400	80	50
181	78319/1	LOOSE ITEMS LP HEATER NO.1	700X500X500	200	150
182	78319/2	LOOSE ITEMS LP HEATER NO.1	700X500X500	200	150
183	78320/1	TROLLEY FOR LP HEATER NO.1	1150X1050X250	400	400
184	78320/2	TROLLEY FOR LP HEATER NO.1	1150X1050X250	400	400
185	78401	TURBINE OIL COOLER	5850x1700x2300	13250	12450

C. CONDENSER PACKAGES					
SL NO	**PKG NO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
186	78405	TURBINE OIL COOLER	5850x1700x 2300	13250	12450
187	78406	LOOSE ITEMS(TOC)	800x800x50 0	130	120
188	78424	HYDROGEN COOLER	4500X1100 X1150	3667	3232
189	78425	HYDROGEN COOLER	4500X1100 X1150	3667	3232
190	78428	LOOSE ITEMS (HYDROGEN COOLERS)	1050X1050 X350	330	270
191	78431	EXCITER AIR COOLER	3780X920X 830	1980	1450
192	78432	EXCITER AIR COOLER	3780X920X 830	1980	1450
193	78436	CONTROL FLUID COOLER	3300x850x1 030	1506	1315
194	78437	CONTROL FLUID COOLER	3300x850x1 030	1506	1315
195	78438	LOOSE ITEMS(CFC)	600x600x50 0	103	86
		TOTAL		**758722**	**734475**

D. LP HEATER & HP HEATER					
Sl. No	**Equipment**	**Length (mm)**	**Breadth (mm)**	**Height (mm)**	**Gross weight (Kg)**
1	LP Heater-2	13800	1600	2200	27500
2	LP Heater-3	13800	1600	2200	27500
3	HP Heater-5A	10800	1700	2500	49000
4	HP Heater-5B	10800	1700	2500	49000
5	HP Heater-6A	12800	1750	2500	64000

6	HP Heater-6B	12800	1750	2500	64000
7	HP Heater-7A	11200	1750	2500	64300
8	HP Heater-7B	11200	1750	2500	64300
Total					409600

E BOILER FEED PUMPS, BOOSTER PUMPS, MDBFP MOTOR and Aux.						
SL. No.	**DESCRIPTION**	**QTY/UNIT**		**Approx Weight (KGS)**	**Packing size (mm) (L x W x H)**	**Total weight in Kgs**
		TD BFP -2NOS	**MD BFP -1NO**			
01	Motor Driven Boiler Feed Pump (MD BFP) with Base Plate & Tubing	NA	1	11500	3200 x 2000 x 3100	11500
02	Turbine Driven Boiler Feed Pump (TD BFP) with Base Plate & Tubing	2	NA	11100	3200 x 2000 x 3450	22200
03	Motor Driven Boiler Feed Booster Pump (MD BP) with Base Plate & Tubing	NA	1	4600	2200 x 1900 x 3000	4600
04	Turbine Driven Boiler Feed Booster Pump (TD BP) with Base Plate & Tubing	2	NA	4710	2200 x 1900 x 3000	9420
05	BFP + Booster Pump Mech. seal skid	2 + 2	1 + 1	1000	1600 x 1300 x 1700	6000
06	MD BFP + Hydraulic Coupling Grillage	NA	1	3800	6400 x 2700 x 400	3800
07	MD BFP Motor + BP Grillage	NA	1	3710	6100 x 2700 x 400	3710
08	Hydraulic Coupling	NA	1	11000	3700 x 2800 x 3900	11000
09	HC L.O & W.O Oil Coolers & accessories	NA	1 SET	3285	3900 x 2000 x 2150	3285
10	Recirculation Valve	2	1	900	1000 x 1000 x 2800	2700

11	Conical Suction Strainer at BFP suction	2	1	1200	3100 x 1000 x 1000	3600
12	Basket type Suction Strainer at BP suction	2	1	2350	1500 x 1500 x 1600	7050
13	MD BFP MOTOR 12000KW		1	25000	4500 x 4700 x 3000	25000
Total						**113865**

E DRIVE TURBINE & AUXILIARIES OF TDBFP				
Sl No.	**ITEM DESCRIPTION**	**QTY (Nos.)**	**TOTAL WEIGHT (Kgs)**	**DIMENSIONS(mm) LXWXH**
1	Steam Turbine	1	32,000	3850x4150x2350
2	Gear Box	1	1100	910x950x750
3	Lube oil console Package - I	1	10000	5300x3200x2900
4	Lube oil console Package - II	1	10000	4000x2800x2900
5	Emergncy oil Pump assly.	1	1500	2000x1000x800
6	Jacking oil pump assly	1	600	650x1200x600
7	Oil purification unit	1	2500	2200x2500x1800
8	Governing console	1	575	1300x1000x1000
9	Steam turbine loose items	1	3250	-
10	Turbine piping	1	18,650	-
11	BFPDT Twin Cooler	2	11400	Ø508xH5000
Total			**91575**	

Corrigendum -3 Dated January 14, 2016 to Tender specification

Tender No. BHEL: PSSR: SCT 1601

F. CONDENSER EXTRACTION PUMPS, CW PUMPS					
Sl. No.	**DESCRIPTION**	**QTY/ UNIT**	**APPROX. WT (KGS)**	**PACKING SIZE (L x W x H) (mm)**	**Total Weight (Kg)**
F.01	Condensate Extraction Pump	3	6220	10,000 x 1700 x 1800	18660
F.02	Foundation Frame	3	580	1600 x 1600 x 300	1740
F.03	Canister	3	2700	7600 x 1300 x 1300	8100
F.04	Basket type Suction Strainer at CEP	3	1350	1600 x 1600 x 1700	4050
F.05	CEP MOTOR 1000KW	3	6000	2600 (H) X DIA 2100	18000
F.06	CW Pump Motors	5	21000	4700x 4100x 4300	105000
F.07	CW Pump, Frames & Aux.	5			178000
Total					**333550**

CW Pump, frames & Aux Item Weights (Breakup of weights of Sl No. F.07 above)				
Sl. No	**Material Description**	**Quantity**	**UOM**	**Net Weight(KG)**
1	CONNECTING COUPLING-RTPP 600 MW	1.000	EA	300.000
2	SUCTION BELLMOUTH ASSLY	1.000	EA	2,105.000
3	PUMP CASING ASLY - RTPP600	1.000	EA	2,900.000
4	IMPELLER ASSEMBLY (CW1O)	1.000	EA	717.000
5	PUMP SHAFT ASSLY-RTPP 600	1.000	EA	947.000
6	INTER SHAFT ASSLY-RTPP 600	1.000	EA	810.000
7	DRIVE SHAFT ASSLY-RTPP 600	1.000	EA	772.000
8	ELEMENT-I (FMC)-RTPP 600	1.000	EA	1,400.000
9	ELEMENT-II (FMC)-RTPP 600	1.000	EA	1,650.000
10	ELEMENT-III (FMC)-RTPP 600	1.000	EA	2,025.000
11	DISCHARGE ELBOW (FMC)-RTPP600	1.000	EA	9,050.000
12	MOTOR SUPPORT FRAME-RTPP 600MW	1.000	EA	3,050.000
13	MOTOR STOOL-RTPP 600MW	1.000	EA	3,030.000
14	INTER FOUNDATION RING(FMC)-RTPP 600MW	1.000	EA	2,475.000
15	PULSATION DAMPENER 1/2"NPT-M/F SS	2.000	EA	1.000
16	"CONNECTION M20X1.5/1/2"" NPT"	4.000	EA	0.480
17	NUT M20X1.5 FOR CWP INSTRUMENTATION	4.000	EA	0.320
18	NIPPLE 20 FOR CWP INSTRUMENTATION	4.000	EA	0.040
19	AL PACKING OD 18/ID 6.5 x 2 THK, VAR 01	8.000	EA	0.080
20	COUPLING CS 3/8" CL 3000 SOC WELD ENDS	4.000	EA	0.800

CW Pump, frames & Aux Item Weights (Breakup of weights of Sl No. F.07 above)				
Sl. No	**Material Description**	**Quantity**	**UOM**	**Net Weight(KG)**
21	CROSS 3/8" 3000 SW CS	2.000	EA	0.600
22	NIPPLE CS 2"X100 SCH80 NPT BW	1.000	EA	0.700
23	NIPPLE CS 1/2" SCH80 L=100 NPT & BW ENDS	2.000	EA	0.400
24	GLB VLV CL 300 1/2" SW INLET & OUT CONN	2.000	EA	1.720
25	PIPE COUPLING	4.000	EA	8.000
26	ST UNION,SS,1/2"6000,SWAGELOK:SS-810-6	4.000	EA	1.200
27	MALE CONNR,SS316A,1/2"NPT-M,CL6000B48.25	8.000	EA	2.400
28	MALE CONNR,SS316A,1/4"NPT-M,CL6000B48.25	8.000	EA	2.400
29	FEM CONN,SS316A,1/2"NPT-F ,CL6000,B41.9	2.000	EA	0.600
30	MANIFOLD, 2VLV 1/2"NPT-F CL3000 SS BODY	2.000	EA	1.600
31	PIPE(SMLS)- 26.7X 3.91 CS SA106 GR B	12.000	M	26.376
32	PIPE CS, HTS 16 X 2.6 S/L A106GRB	15.000	M	12.885
33	PIPE SS 12.7 X 2.1 A312 TP321	10.000	M	5.590
34	PIPE(SMLS) 60.3X 5.54 CS SA106 GR B	4.000	M	29.928
35	FLANGE SOW CS 1/2" CL 150 RAISED FACE	6.000	EA	3.000
36	FLANGE SOW CS 3/4" CL 150 RAISED FACE	14.000	EA	8.400
37	FLANGE SOW CS 2" CL 150 RAISED FACE	6.000	EA	13.200
38	BOLT HEX M12X45-8.8	52.000	EA	2.808
39	NUT HEX P M12 -8	52.000	EA	0.936
40	BOLT HEX M16X70-8.8	52.000	EA	7.228
41	NUT HEX P M16-8	52.000	EA	1.768
42	ELBOW 90DEG CS 1/2" CL 3000 SW ENDS	4.000	EA	1.560
43	ELBOW 90DEG CS 3/4" CL 3000 SW ENDS	6.000	EA	3.420
44	ELBOW 90DEG CS 2" SOC WELD ENDS CL 3000	2.000	EA	4.000
45	FLOW GLASS INDICATOR NS 3/4"	1.000	EA	2.200
46	STRONG BACK (FOR IMPELLER)	1.000	EA	1.000
47	TIE ROD VAR - 01	2.000	EA	2.000
48	TIE ROD SHAFT CWP FORSPL.TOOLS	2.000	EA	5.340
49	`C` SPANNER	1.000	EA	4.900
50	`C` SPANNER	1.000	EA	5.900
51	`C` SPANNER	1.000	EA	4.700
52	`C` SPANNER	1.000	EA	7.200
53	SUPPORT BEAM	2.000	EA	460.000
54	STRONG BACK(FOR COUPLING)	1.000	EA	21.470
55	13 SNT BEARING(COLLAR BORE 165) FOR CWP	1.000	EA	800.000
56	STUFFING BOX COVER	1.000	EA	16.500
57	ANTI EXTRUSION RING	1.000	EA	2.700
58	LANTERN RING	1.000	EA	3.860
59	RESTRICTION BUSH	1.000	EA	5.800
60	CUTLESS RUBBER BEARING	1.000	EA	35.000

CW Pump, frames & Aux Item Weights (Breakup of weights of Sl No. F.07 above)				
Sl. No	**Material Description**	**Quantity**	**UOM**	**Net Weight(KG)**
61	THORDON BEARINGS	2.000	EA	60.000
62	NON REVERSIBLE RATCHET	1.000	EA	355.000
63	ROLLER HOUSING IN F/M CONDITION	1.000	EA	365.000
64	SPHERICAL ROLLER BRG HSG (F/M)CONDITION	1.000	EA	76.000
65	SPRCHL ROLL BRG SKF23044 CCK/W33 H3044	1.000	EA	29.500
66	CONCL HD GRS NIPPLE BM16X1.5	2.000	EA	0.100
67	PLUG VAR NO 03	2.000	EA	0.140
68	PLUG M16 X 16	2.000	EA	2.000
69	SCRU HEX M 8X16P8.8GAL	12.000	EA	0.132
70	STUD B P M20X60-8.8	8.000	EA	1.568
71	NUT HEX P M20-8	8.000	EA	0.512
72	SCRU CAP SOC P M16X30-12.9	8.000	EA	0.648
73	STUD M30X3.5X90-8.8	12.000	EA	7.200
74	NUT HEX P M30-8	12.000	EA	2.772
75	PIN	6.000	EA	13.200
76	ROLLER BRG UPPER COVER	1.000	EA	21.000
77	ROLLER BRG BTM COVER-ASSLY	1.000	EA	22.000
78	PLATE (ROLLER HOUSING)	1.000	EA	10.000
79	,1*240.00*240.00MM	0.058	KG	0.058
80	ROUND(VLCNZDRUBBER)14MM S.H.=A65-IS3400	50.000	M	50.000
81	,1*7600.00MM	8.300	KG	8.300
82	SS STUD WITH TWO NUTS M30X3X170	36.000	EA	55.584
83	SS STUD WITH TWO NUTS M30X3X170	28.000	EA	43.232
84	SS STUD WITH TWO NUTS M30X3X170	32.000	EA	49.408
85	SS STUD WITH TWO NUTS M30X3X170	36.000	EA	55.584
86	SS STUD WITH TWO NUTS VAR.NO.03	40.000	EA	64.560
87	STUD B P M36X100-8.8	52.000	EA	52.520
88	NUT HEX P M36-8	52.000	EA	20.592
89	STUD B P M36X100-8.8	48.000	EA	48.480
90	NUT HEX P M36-8	48.000	EA	19.008
91	STUD B P M36X100-8.8	40.000	EA	40.400
92	NUT HEX P M36-8	40.000	EA	15.840
93	STUD 2 NUTS M36 X 3 X 200- ST.	52.000	EA	133.796
94	STUD B P M36X80-8.8	12.000	EA	9.696
95	NUT HEX P M36-8	12.000	EA	4.752
96	SS STUD VAR.NO.13	32.000	EA	16.960
97	HEX NUT M30x3, VAR.NO.10 (ASTMA194GR6)	32.000	EA	7.360
98	STUD B P M24X90-8.8	2.000	EA	0.814
99	NUT HEX P M24-8	2.000	EA	0.220
100	STUD B P M24X90-8.8	12.000	EA	4.884
101	NUT HEX P M24-8	12.000	EA	1.320
102	SS STUD M12X1.75X35	18.000	EA	0.720

CW Pump, frames & Aux Item Weights (Breakup of weights of Sl No. F.07 above)				
Sl. No	**Material Description**	**Quantity**	**UOM**	**Net Weight(KG)**
103	HEX NUT M12x1.75, VAR.NO.01(ASTMA194GR6)	18.000	EA	0.306
104	SS STUD M10X20	6.000	EA	0.120
105	HEX NUT M10x1.5, VAR.NO.07 (ASTMA194GR6)	6.000	EA	0.120
106	PIN TAPER EXT THRD M20X90 IS3524	4.000	EA	0.816
107	BOLT FDN M36X800-4.6	16.000	EA	119.520
108	NUT HEX P M36-8	16.000	EA	6.336
109	WASHER MCD 37ST	16.000	EA	1.424
110	COUPLING SPACER	1.000	EA	5.100
111	SPACER RING	1.000	EA	1.900
112	COUNTER FLANGE	1.000	EA	423.000
113	COUPLING SPACER-RTPP600	1.000	EA	20.200
114	THRUST COLLAR NUT	1.000	EA	129.500
115	MUFF COUPLING	1.000	EA	2,510.000
116	SUCTION BELLMOUTH ASSLY	1.000	EA	2,105.000
117	PUMP CASING ASLY - RTPP600	1.000	EA	2,900.000
118	IMPELLER ASSEMBLY (CW1O)	1.000	EA	717.000
119	PUMP SHAFT ASSLY-RTPP 600	1.000	EA	947.000
120	INTER SHAFT ASSLY-RTPP 600	1.000	EA	810.000
121	DRIVE SHAFT ASSLY-RTPP 600	1.000	EA	772.000
122	ELEMENT-I (FMC)-RTPP 600	1.000	EA	1,400.000
123	ELEMENT-II (FMC)-RTPP 600	1.000	EA	1,650.000
124	ELEMENT-III (FMC)-RTPP 600	1.000	EA	2,025.000
125	DISCHARGE ELBOW (FMC)-RTPP600	1.000	EA	9,050.000
126	MOTOR SUPPORT FRAME-RTPP 600MW	1.000	EA	3,050.000
127	MOTOR STOOL-RTPP 600MW	1.000	EA	3,030.000
128	INTER FOUNDATION RING(FMC)-RTPP 600MW	1.000	EA	2,475.000
129	PULSATION DAMPENER 1/2"NPT-M/F SS	2.000	EA	1.000
130	"CONNECTION M20X1.5/1/2"" NPT"	4.000	EA	0.480
131	NUT M20X1.5 FOR CWP INSTRUMENTATION	4.000	EA	0.320
132	NIPPLE 20 FOR CWP INSTRUMENTATION	4.000	EA	0.040
133	AL PACKING OD 18/ID 6.5 x 2 THK, VAR 01	8.000	EA	0.080
134	COUPLING CS 3/8" CL 3000 SOC WELD ENDS	4.000	EA	0.800
135	CROSS 3/8" 3000 SW CS	2.000	EA	0.600
136	NIPPLE CS 2"X100 SCH80 NPT BW	1.000	EA	0.700
137	NIPPLE CS 1/2" SCH80 L=100 NPT & BW ENDS	2.000	EA	0.400
138	GLB VLV CL 300 1/2" SW INLET & OUT CONN	2.000	EA	1.720
139	PIPE COUPLING	4.000	EA	8.000
140	ST UNION,SS,1/2"6000,SWAGELOK:SS-810-6	4.000	EA	1.200
141	MALE CONNR,SS316A,1/2"NPT-M,CL6000B48.25	8.000	EA	2.400
142	MALE CONNR,SS316A,1/4"NPT-M,CL6000B48.25	8.000	EA	2.400
143	FEM CONN,SS316A,1/2"NPT-F ,CL6000,B41.9	2.000	EA	0.600

CW Pump, frames & Aux Item Weights (Breakup of weights of Sl No. F.07 above)				
Sl. No	**Material Description**	**Quantity**	**UOM**	**Net Weight(KG)**
144	MANIFOLD, 2VLV 1/2"NPT-F CL3000 SS BODY	2.000	EA	1.600
145	PIPE(SMLS)- 26.7X 3.91 CS SA106 GR B	12.000	M	26.376
146	PIPE CS, HTS 16 X 2.6 S/L A106GRB	15.000	M	12.885
147	PIPE SS 12.7 X 2.1 A312 TP321	10.000	M	5.590
148	PIPE(SMLS) 60.3X 5.54 CS SA106 GR B	4.000	M	29.928
149	FLANGE SOW CS 1/2" CL 150 RAISED FACE	6.000	EA	3.000
150	FLANGE SOW CS 3/4" CL 150 RAISED FACE	14.000	EA	8.400
151	FLANGE SOW CS 2" CL 150 RAISED FACE	6.000	EA	13.200
152	BOLT HEX M12X45-8.8	52.000	EA	2.808
153	NUT HEX P M12 -8	52.000	EA	0.936
154	BOLT HEX M16X70-8.8	52.000	EA	7.228
155	NUT HEX P M16-8	52.000	EA	1.768
156	ELBOW 90DEG CS 1/2" CL 3000 SW ENDS	4.000	EA	1.560
157	ELBOW 90DEG CS 3/4" CL 3000 SW ENDS	6.000	EA	3.420
158	ELBOW 90DEG CS 2" SOC WELD ENDS CL 3000	2.000	EA	4.000
159	FLOW GLASS INDICATOR NS 3/4"	1.000	EA	2.200
160	13 SNT BEARING(COLLAR BORE 165) FOR CWP	1.000	EA	800.000
161	CONNECTING COUPLING-RTPP 600 MW	1.000	EA	300.000
162	STUFFING BOX COVER	1.000	EA	16.500
163	ANTI EXTRUSION RING	1.000	EA	2.700
164	LANTERN RING	1.000	EA	3.860
165	RESTRICTION BUSH	1.000	EA	5.800
166	CUTLESS RUBBER BEARING	1.000	EA	35.000
167	THORDON BEARINGS	2.000	EA	60.000
168	NON REVERSIBLE RATCHET	1.000	EA	355.000
169	ROLLER HOUSING IN F/M CONDITION	1.000	EA	365.000
170	SPHERICAL ROLLER BRG HSG (F/M)CONDITION	1.000	EA	76.000
171	SPRCHL ROLL BRG SKF23044 CCK/W33 H3044	1.000	EA	29.500
172	CONCL HD GRS NIPPLE BM16X1.5	2.000	EA	0.100
173	PLUG VAR NO 03	2.000	EA	0.140
174	PLUG M16 X 16	2.000	EA	2.000
175	SCRU HEX M 8X16P8.8GAL	12.000	EA	0.132
176	STUD B P M20X60-8.8	8.000	EA	1.568
177	NUT HEX P M20-8	8.000	EA	0.512
178	SCRU CAP SOC P M16X30-12.9	8.000	EA	0.648
179	STUD M30X3.5X90-8.8	12.000	EA	7.200
180	NUT HEX P M30-8	12.000	EA	2.772
181	PIN	6.000	EA	13.200
182	ROLLER BRG UPPER COVER	1.000	EA	21.000
183	ROLLER BRG BTM COVER-ASSLY	1.000	EA	22.000
184	PLATE (ROLLER HOUSING)	1.000	EA	10.000

CW Pump, frames & Aux Item Weights (Breakup of weights of Sl No. F.07 above)				
Sl. No	**Material Description**	**Quantity**	**UOM**	**Net Weight(KG)**
185	,1*240.00*240.00MM	0.058	KG	0.058
186	ROUND(VLCNZDRUBBER)14MM S.H.=A65-IS3400	50.000	M	50.000
187	,1*7600.00MM	8.300	KG	8.300
188	SS STUD WITH TWO NUTS M30X3X170	28.000	EA	43.232
189	SS STUD WITH TWO NUTS M30X3X170	32.000	EA	49.408
190	SS STUD WITH TWO NUTS M30X3X170	36.000	EA	55.584
191	SS STUD WITH TWO NUTS VAR.NO.03	40.000	EA	64.560
192	STUD B P M36X100-8.8	52.000	EA	52.520
193	NUT HEX P M36-8	52.000	EA	20.592
194	STUD B P M36X100-8.8	48.000	EA	48.480
195	NUT HEX P M36-8	48.000	EA	19.008
196	STUD B P M36X100-8.8	40.000	EA	40.400
197	NUT HEX P M36-8	40.000	EA	15.840
198	STUD 2 NUTS M36 X 3 X 200- ST.	52.000	EA	133.796
199	STUD B P M36X80-8.8	12.000	EA	9.696
200	NUT HEX P M36-8	12.000	EA	4.752
201	SS STUD VAR.NO.13	32.000	EA	16.960
202	HEX NUT M30x3, VAR.NO.10 (ASTMA194GR6)	32.000	EA	7.360
203	STUD B P M24X90-8.8	2.000	EA	0.814
204	NUT HEX P M24-8	2.000	EA	0.220
205	STUD B P M24X90-8.8	12.000	EA	4.884
206	NUT HEX P M24-8	12.000	EA	1.320
207	SS STUD M12X1.75X35	18.000	EA	0.720
208	HEX NUT M12x1.75, VAR.NO.01(ASTMA194GR6)	18.000	EA	0.306
209	SS STUD M10X20	6.000	EA	0.120
210	HEX NUT M10x1.5, VAR.NO.07 (ASTMA194GR6)	6.000	EA	0.120
211	PIN TAPER EXT THRD M20X90 IS3524	4.000	EA	0.816
212	BOLT FDN M36X800-4.6	16.000	EA	119.520
213	NUT HEX P M36-8	16.000	EA	6.336
214	WASHER MCD 37ST	16.000	EA	1.424
215	COUPLING SPACER	1.000	EA	5.100
216	SPACER RING	1.000	EA	1.900
217	COUNTER FLANGE	1.000	EA	423.000
218	COUPLING SPACER-RTPP600	1.000	EA	20.200
219	SS STUD WITH TWO NUTS M30X3X170	36.000	EA	55.584
220	LOCK NUT FOR TC NUT	1.000	EA	31.000
221	SUCTION BELLMOUTH ASSLY	1.000	EA	2,105.000
222	PUMP CASING ASLY - RTPP600	1.000	EA	2,900.000
223	IMPELLER ASSEMBLY (CW1O)	1.000	EA	717.000
224	PUMP SHAFT ASSLY-RTPP 600	1.000	EA	947.000
225	INTER SHAFT ASSLY-RTPP 600	1.000	EA	810.000
226	DRIVE SHAFT ASSLY-RTPP 600	1.000	EA	772.000

CW Pump, frames & Aux Item Weights (Breakup of weights of Sl No. F.07 above)				
Sl. No	**Material Description**	**Quantity**	**UOM**	**Net Weight(KG)**
227	ELEMENT-I (FMC)-RTPP 600	1.000	EA	1,400.000
228	ELEMENT-II (FMC)-RTPP 600	1.000	EA	1,650.000
229	ELEMENT-III (FMC)-RTPP 600	1.000	EA	2,025.000
230	DISCHARGE ELBOW (FMC)-RTPP600	1.000	EA	9,050.000
231	MOTOR SUPPORT FRAME-RTPP 600MW	1.000	EA	3,050.000
232	MOTOR STOOL-RTPP 600MW	1.000	EA	3,030.000
233	INTER FOUNDATION RING(FMC)-RTPP 600MW	1.000	EA	2,475.000
234	PULSATION DAMPENER 1/2"NPT-M/F SS	2.000	EA	1.000
235	"CONNECTION M20X1.5/1/2"" NPT"	4.000	EA	0.480
236	NUT M20X1.5 FOR CWP INSTRUMENTATION	4.000	EA	0.320
237	NIPPLE 20 FOR CWP INSTRUMENTATION	4.000	EA	0.040
238	AL PACKING OD 18/ID 6.5 x 2 THK, VAR 01	8.000	EA	0.080
239	COUPLING CS 3/8" CL 3000 SOC WELD ENDS	4.000	EA	0.800
240	CROSS 3/8" 3000 SW CS	2.000	EA	0.600
241	NIPPLE CS 2"X100 SCH80 NPT BW	1.000	EA	0.700
242	NIPPLE CS 1/2" SCH80 L=100 NPT & BW ENDS	2.000	EA	0.400
243	GLB VLV CL 300 1/2" SW INLET & OUT CONN	2.000	EA	1.720
244	PIPE COUPLING	4.000	EA	8.000
245	ST UNION,SS,1/2"6000,SWAGELOK:SS-810-6	4.000	EA	1.200
246	MALE CONNR,SS316A,1/2"NPT-M,CL6000B48.25	8.000	EA	2.400
247	MALE CONNR,SS316A,1/4"NPT-M,CL6000B48.25	8.000	EA	2.400
248	FEM CONN,SS316A,1/2"NPT-F ,CL6000,B41.9	2.000	EA	0.600
249	MANIFOLD, 2VLV 1/2"NPT-F CL3000 SS BODY	2.000	EA	1.600
250	PIPE(SMLS)- 26.7X 3.91 CS SA106 GR B	12.000	M	26.376
251	PIPE CS, HTS 16 X 2.6 S/L A106GRB	15.000	M	12.885
252	PIPE SS 12.7 X 2.1 A312 TP321	10.000	M	5.590
253	PIPE(SMLS) 60.3X 5.54 CS SA106 GR B	4.000	M	29.928
254	FLANGE SOW CS 1/2" CL 150 RAISED FACE	6.000	EA	3.000
255	FLANGE SOW CS 3/4" CL 150 RAISED FACE	14.000	EA	8.400
256	FLANGE SOW CS 2" CL 150 RAISED FACE	6.000	EA	13.200
257	BOLT HEX M12X45-8.8	52.000	EA	2.808
258	NUT HEX P M12 -8	52.000	EA	0.936
259	BOLT HEX M16X70-8.8	52.000	EA	7.228
260	NUT HEX P M16-8	52.000	EA	1.768
261	ELBOW 90DEG CS 1/2" CL 3000 SW ENDS	4.000	EA	1.560
262	ELBOW 90DEG CS 3/4" CL 3000 SW ENDS	6.000	EA	3.420
263	ELBOW 90DEG CS 2" SOC WELD ENDS CL 3000	2.000	EA	4.000
264	FLOW GLASS INDICATOR NS 3/4"	1.000	EA	2.200
265	13 SNT BEARING(COLLAR BORE 165) FOR CWP	1.000	EA	800.000
266	CONNECTING COUPLING-RTPP 600 MW	1.000	EA	300.000

CW Pump, frames & Aux Item Weights (Breakup of weights of Sl No. F.07 above)				
Sl. No	**Material Description**	**Quantity**	**UOM**	**Net Weight(KG)**
267	STUFFING BOX COVER	1.000	EA	16.500
268	ANTI EXTRUSION RING	1.000	EA	2.700
269	LANTERN RING	1.000	EA	3.860
270	RESTRICTION BUSH	1.000	EA	5.800
271	CUTLESS RUBBER BEARING	1.000	EA	35.000
272	THORDON BEARINGS	2.000	EA	60.000
273	NON REVERSIBLE RATCHET	1.000	EA	355.000
274	ROLLER HOUSING IN F/M CONDITION	1.000	EA	365.000
275	SPHERICAL ROLLER BRG HSG (F/M)CONDITION	1.000	EA	76.000
276	SPRCHL ROLL BRG SKF23044 CCK/W33 H3044	1.000	EA	29.500
277	CONCL HD GRS NIPPLE BM16X1.5	2.000	EA	0.100
278	PLUG VAR NO 03	2.000	EA	0.140
279	PLUG M16 X 16	2.000	EA	2.000
280	SCRU HEX M 8X16P8.8GAL	12.000	EA	0.132
281	STUD B P M20X60-8.8	8.000	EA	1.568
282	NUT HEX P M20-8	8.000	EA	0.512
283	SCRU CAP SOC P M16X30-12.9	8.000	EA	0.648
284	STUD M30X3.5X90-8.8	12.000	EA	7.200
285	NUT HEX P M30-8	12.000	EA	2.772
286	PIN	6.000	EA	13.200
287	ROLLER BRG UPPER COVER	1.000	EA	21.000
288	ROLLER BRG BTM COVER-ASSLY	1.000	EA	22.000
289	PLATE (ROLLER HOUSING)	1.000	EA	10.000
290	,1*240.00*240.00MM	0.058	KG	0.058
291	ROUND(VLCNZDRUBBER)14MM S.H.=A65-IS3400	50.000	M	50.000
292	,1*7600.00MM	8.300	KG	8.300
293	SS STUD WITH TWO NUTS M30X3X170	28.000	EA	43.232
294	SS STUD WITH TWO NUTS M30X3X170	32.000	EA	49.408
295	SS STUD WITH TWO NUTS M30X3X170	36.000	EA	55.584
296	SS STUD WITH TWO NUTS VAR.NO.03	40.000	EA	64.560
297	STUD B P M36X100-8.8	52.000	EA	52.520
298	NUT HEX P M36-8	52.000	EA	20.592
299	STUD B P M36X100-8.8	48.000	EA	48.480
300	NUT HEX P M36-8	48.000	EA	19.008
301	STUD B P M36X100-8.8	40.000	EA	40.400
302	NUT HEX P M36-8	40.000	EA	15.840
303	STUD 2 NUTS M36 X 3 X 200- ST.	52.000	EA	133.796
304	STUD B P M36X80-8.8	12.000	EA	9.696
305	NUT HEX P M36-8	12.000	EA	4.752
306	SS STUD VAR.NO.13	32.000	EA	16.960
307	HEX NUT M30x3, VAR.NO.10 (ASTMA194GR6)	32.000	EA	7.360
308	STUD B P M24X90-8.8	2.000	EA	0.814

CW Pump, frames & Aux Item Weights (Breakup of weights of Sl No. F.07 above)				
Sl. No	**Material Description**	**Quantity**	**UOM**	**Net Weight(KG)**
309	NUT HEX P M24-8	2.000	EA	0.220
310	STUD B P M24X90-8.8	12.000	EA	4.884
311	NUT HEX P M24-8	12.000	EA	1.320
312	SS STUD M12X1.75X35	18.000	EA	0.720
313	HEX NUT M12x1.75, VAR.NO.01(ASTMA194GR6)	18.000	EA	0.306
314	SS STUD M10X20	6.000	EA	0.120
315	HEX NUT M10x1.5, VAR.NO.07 (ASTMA194GR6)	6.000	EA	0.120
316	PIN TAPER EXT THRD M20X90 IS3524	4.000	EA	0.816
317	BOLT FDN M36X800-4.6	16.000	EA	119.520
318	NUT HEX P M36-8	16.000	EA	6.336
319	WASHER MCD 37ST	16.000	EA	1.424
320	COUPLING SPACER	1.000	EA	5.100
321	SPACER RING	1.000	EA	1.900
322	COUNTER FLANGE	1.000	EA	423.000
323	COUPLING SPACER-RTPP600	1.000	EA	20.200
324	SS STUD WITH TWO NUTS M30X3X170	36.000	EA	55.584
325	COUPLING SUPPORT	1.000	EA	234.000
326	ABUTMENT RING(2 HALVES)	1.000	EA	26.000
327	SUCTION BELLMOUTH ASSLY	1.000	EA	2,105.000
328	PUMP CASING ASLY - RTPP600	1.000	EA	2,900.000
329	IMPELLER ASSEMBLY (CW1O)	1.000	EA	717.000
330	PUMP SHAFT ASSLY-RTPP 600	1.000	EA	947.000
331	INTER SHAFT ASSLY-RTPP 600	1.000	EA	810.000
332	DRIVE SHAFT ASSLY-RTPP 600	1.000	EA	772.000
333	ELEMENT-I (FMC)-RTPP 600	1.000	EA	1,400.000
334	ELEMENT-II (FMC)-RTPP 600	1.000	EA	1,650.000
335	ELEMENT-III (FMC)-RTPP 600	1.000	EA	2,025.000
336	DISCHARGE ELBOW (FMC)-RTPP600	1.000	EA	9,050.000
337	MOTOR SUPPORT FRAME-RTPP 600MW	1.000	EA	3,050.000
338	MOTOR STOOL-RTPP 600MW	1.000	EA	3,030.000
339	INTER FOUNDATION RING(FMC)-RTPP 600MW	1.000	EA	2,475.000
340	PULSATION DAMPENER 1/2"NPT-M/F SS	2.000	EA	1.000
341	"CONNECTION M20X1.5/1/2"" NPT"	4.000	EA	0.480
342	NUT M20X1.5 FOR CWP INSTRUMENTATION	4.000	EA	0.320
343	NIPPLE 20 FOR CWP INSTRUMENTATION	4.000	EA	0.040
344	AL PACKING OD 18/ID 6.5 x 2 THK, VAR 01	8.000	EA	0.080
345	COUPLING CS 3/8" CL 3000 SOC WELD ENDS	4.000	EA	0.800
346	CROSS 3/8" 3000 SW CS	2.000	EA	0.600
347	NIPPLE CS 2"X100 SCH80 NPT BW	1.000	EA	0.700
348	NIPPLE CS 1/2" SCH80 L=100 NPT & BW ENDS	2.000	EA	0.400
349	GLB VLV CL 300 1/2" SW INLET & OUT CONN	2.000	EA	1.720
350	PIPE COUPLING	4.000	EA	8.000
351	ST UNION,SS,1/2"6000,SWAGELOK:SS-810-6	4.000	EA	1.200

CW Pump, frames & Aux Item Weights (Breakup of weights of Sl No. F.07 above)				
Sl. No	**Material Description**	**Quantity**	**UOM**	**Net Weight(KG)**
352	MALE CONNR,SS316A,1/2"NPT-M,CL6000B48.25	8.000	EA	2.400
353	MALE CONNR,SS316A,1/4"NPT-M,CL6000B48.25	8.000	EA	2.400
354	FEM CONN,SS316A,1/2"NPT-F ,CL6000,B41.9	2.000	EA	0.600
355	MANIFOLD, 2VLV 1/2"NPT-F CL3000 SS BODY	2.000	EA	1.600
356	PIPE(SMLS)- 26.7X 3.91 CS SA106 GR B	12.000	M	26.376
357	PIPE CS, HTS 16 X 2.6 S/L A106GRB	15.000	M	12.885
358	PIPE SS 12.7 X 2.1 A312 TP321	10.000	M	5.590
359	PIPE(SMLS) 60.3X 5.54 CS SA106 GR B	4.000	M	29.928
360	FLANGE SOW CS 1/2" CL 150 RAISED FACE	6.000	EA	3.000
361	FLANGE SOW CS 3/4" CL 150 RAISED FACE	14.000	EA	8.400
362	FLANGE SOW CS 2" CL 150 RAISED FACE	6.000	EA	13.200
363	BOLT HEX M12X45-8.8	52.000	EA	2.808
364	NUT HEX P M12 -8	52.000	EA	0.936
365	BOLT HEX M16X70-8.8	52.000	EA	7.228
366	NUT HEX P M16-8	52.000	EA	1.768
367	ELBOW 90DEG CS 1/2" CL 3000 SW ENDS	4.000	EA	1.560
368	ELBOW 90DEG CS 3/4" CL 3000 SW ENDS	6.000	EA	3.420
369	ELBOW 90DEG CS 2" SOC WELD ENDS CL 3000	2.000	EA	4.000
370	FLOW GLASS INDICATOR NS 3/4"	1.000	EA	2.200
371	13 SNT BEARING(COLLAR BORE 165) FOR CWP	1.000	EA	800.000
372	CONNECTING COUPLING-RTPP 600 MW	1.000	EA	300.000
373	STUFFING BOX COVER	1.000	EA	16.500
374	ANTI EXTRUSION RING	1.000	EA	2.700
375	LANTERN RING	1.000	EA	3.860
376	RESTRICTION BUSH	1.000	EA	5.800
377	CUTLESS RUBBER BEARING	1.000	EA	35.000
378	THORDON BEARINGS	2.000	EA	60.000
379	NON REVERSIBLE RATCHET	1.000	EA	355.000
380	ROLLER HOUSING IN F/M CONDITION	1.000	EA	365.000
381	SPHERICAL ROLLER BRG HSG (F/M)CONDITION	1.000	EA	76.000
382	SPRCHL ROLL BRG SKF23044 CCK/W33 H3044	1.000	EA	29.500
383	CONCL HD GRS NIPPLE BM16X1.5	2.000	EA	0.100
384	PLUG VAR NO 03	2.000	EA	0.140
385	PLUG M16 X 16	2.000	EA	2.000
386	SCRU HEX M 8X16P8.8GAL	12.000	EA	0.132
387	STUD B P M20X60-8.8	8.000	EA	1.568
388	NUT HEX P M20-8	8.000	EA	0.512
389	SCRU CAP SOC P M16X30-12.9	8.000	EA	0.648
390	STUD M30X3.5X90-8.8	12.000	EA	7.200

CW Pump, frames & Aux Item Weights (Breakup of weights of Sl No. F.07 above)				
Sl. No	**Material Description**	**Quantity**	**UOM**	**Net Weight(KG)**
391	NUT HEX P M30-8	12.000	EA	2.772
392	PIN	6.000	EA	13.200
393	ROLLER BRG UPPER COVER	1.000	EA	21.000
394	ROLLER BRG BTM COVER-ASSLY	1.000	EA	22.000
395	PLATE (ROLLER HOUSING)	1.000	EA	10.000
396	,1*240.00*240.00MM	0.058	KG	0.058
397	ROUND(VLCNZDRUBBER)14MM S.H.=A65-IS3400	50.000	M	50.000
398	,1*7600.00MM	8.300	KG	8.300
399	SS STUD WITH TWO NUTS M30X3X170	28.000	EA	43.232
400	SS STUD WITH TWO NUTS M30X3X170	32.000	EA	49.408
401	SS STUD WITH TWO NUTS M30X3X170	36.000	EA	55.584
402	SS STUD WITH TWO NUTS VAR.NO.03	40.000	EA	64.560
403	STUD B P M36X100-8.8	52.000	EA	52.520
404	NUT HEX P M36-8	52.000	EA	20.592
405	STUD B P M36X100-8.8	48.000	EA	48.480
406	NUT HEX P M36-8	48.000	EA	19.008
407	STUD B P M36X100-8.8	40.000	EA	40.400
408	NUT HEX P M36-8	40.000	EA	15.840
409	STUD 2 NUTS M36 X 3 X 200- ST.	52.000	EA	133.796
410	STUD B P M36X80-8.8	12.000	EA	9.696
411	NUT HEX P M36-8	12.000	EA	4.752
412	SS STUD VAR.NO.13	32.000	EA	16.960
413	HEX NUT M30x3, VAR.NO.10 (ASTMA194GR6)	32.000	EA	7.360
414	STUD B P M24X90-8.8	2.000	EA	0.814
415	NUT HEX P M24-8	2.000	EA	0.220
416	STUD B P M24X90-8.8	12.000	EA	4.884
417	NUT HEX P M24-8	12.000	EA	1.320
418	SS STUD M12X1.75X35	18.000	EA	0.720
419	HEX NUT M12x1.75, VAR.NO.01(ASTMA194GR6)	18.000	EA	0.306
420	SS STUD M10X20	6.000	EA	0.120
421	HEX NUT M10x1.5, VAR.NO.07 (ASTMA194GR6)	6.000	EA	0.120
422	PIN TAPER EXT THRD M20X90 IS3524	4.000	EA	0.816
423	BOLT FDN M36X800-4.6	16.000	EA	119.520
424	NUT HEX P M36-8	16.000	EA	6.336
425	WASHER MCD 37ST	16.000	EA	1.424
426	COUPLING SPACER	1.000	EA	5.100
427	SPACER RING	1.000	EA	1.900
428	COUNTER FLANGE	1.000	EA	423.000
429	COUPLING SPACER-RTPP600	1.000	EA	20.200
430	SS STUD WITH TWO NUTS M30X3X170	36.000	EA	55.584
431	SUCTION BELLMOUTH ASSLY	1.000	EA	2,105.000
432	PUMP CASING ASLY - RTPP600	1.000	EA	2,900.000

CW Pump, frames & Aux Item Weights (Breakup of weights of Sl No. F.07 above)				
Sl. No	**Material Description**	**Quantity**	**UOM**	**Net Weight(KG)**
433	IMPELLER ASSEMBLY (CW1O)	1.000	EA	717.000
434	PUMP SHAFT ASSLY-RTPP 600	1.000	EA	947.000
435	INTER SHAFT ASSLY-RTPP 600	1.000	EA	810.000
436	DRIVE SHAFT ASSLY-RTPP 600	1.000	EA	772.000
437	ELEMENT-I (FMC)-RTPP 600	1.000	EA	1,400.000
438	ELEMENT-II (FMC)-RTPP 600	1.000	EA	1,650.000
439	ELEMENT-III (FMC)-RTPP 600	1.000	EA	2,025.000
440	DISCHARGE ELBOW (FMC)-RTPP600	1.000	EA	9,050.000
441	MOTOR SUPPORT FRAME-RTPP 600MW	1.000	EA	3,050.000
442	MOTOR STOOL-RTPP 600MW	1.000	EA	3,030.000
443	INTER FOUNDATION RING(FMC)-RTPP 600MW	1.000	EA	2,475.000
444	PULSATION DAMPENER 1/2"NPT-M/F SS	2.000	EA	1.000
445	"CONNECTION M20X1.5/1/2"" NPT"	4.000	EA	0.480
446	NUT M20X1.5 FOR CWP INSTRUMENTATION	4.000	EA	0.320
447	NIPPLE 20 FOR CWP INSTRUMENTATION	4.000	EA	0.040
448	AL PACKING OD 18/ID 6.5 x 2 THK, VAR 01	8.000	EA	0.080
449	COUPLING CS 3/8" CL 3000 SOC WELD ENDS	4.000	EA	0.800
450	CROSS 3/8" 3000 SW CS	2.000	EA	0.600
451	NIPPLE CS 2"X100 SCH80 NPT BW	1.000	EA	0.700
452	NIPPLE CS 1/2" SCH80 L=100 NPT & BW ENDS	2.000	EA	0.400
453	GLB VLV CL 300 1/2" SW INLET & OUT CONN	2.000	EA	1.720
454	PIPE COUPLING	4.000	EA	8.000
455	ST UNION,SS,1/2"6000,SWAGELOK:SS-810-6	4.000	EA	1.200
456	MALE CONNR,SS316A,1/2"NPT-M,CL6000B48.25	8.000	EA	2.400
457	MALE CONNR,SS316A,1/4"NPT-M,CL6000B48.25	8.000	EA	2.400
458	FEM CONN,SS316A,1/2"NPT-F ,CL6000,B41.9	2.000	EA	0.600
459	MANIFOLD, 2VLV 1/2"NPT-F CL3000 SS BODY	2.000	EA	1.600
460	PIPE(SMLS)- 26.7X 3.91 CS SA106 GR B	12.000	M	26.376
461	PIPE CS, HTS 16 X 2.6 S/L A106GRB	15.000	M	12.885
462	PIPE SS 12.7 X 2.1 A312 TP321	10.000	M	5.590
463	PIPE(SMLS) 60.3X 5.54 CS SA106 GR B	4.000	M	29.928
464	FLANGE SOW CS 1/2" CL 150 RAISED FACE	6.000	EA	3.000
465	FLANGE SOW CS 3/4" CL 150 RAISED FACE	14.000	EA	8.400
466	FLANGE SOW CS 2" CL 150 RAISED FACE	6.000	EA	13.200
467	BOLT HEX M12X45-8.8	52.000	EA	2.808
468	NUT HEX P M12 -8	52.000	EA	0.936
469	BOLT HEX M16X70-8.8	52.000	EA	7.228
470	NUT HEX P M16-8	52.000	EA	1.768
471	ELBOW 90DEG CS 1/2" CL 3000 SW ENDS	4.000	EA	1.560
472	ELBOW 90DEG CS 3/4" CL 3000 SW ENDS	6.000	EA	3.420
473	ELBOW 90DEG CS 2" SOC WELD ENDS CL 3000	2.000	EA	4.000

CW Pump, frames & Aux Item Weights (Breakup of weights of Sl No. F.07 above)				
Sl. No	**Material Description**	**Quantity**	**UOM**	**Net Weight(KG)**
474	FLOW GLASS INDICATOR NS 3/4"	1.000	EA	2.200
475	PRESSURE GAUGE RANGE 0-6 KG/CM2	1.000	EA	1.000
476	SMART WP PRESS. TRANS. 0 TO 10 KG/CM2	1.000	EA	10.000
477	13 SNT BEARING(COLLAR BORE 165) FOR CWP	1.000	EA	800.000
478	CONNECTING COUPLING-RTPP 600 MW	1.000	EA	300.000
479	STUFFING BOX COVER	1.000	EA	16.500
480	ANTI EXTRUSION RING	1.000	EA	2.700
481	LANTERN RING	1.000	EA	3.860
482	RESTRICTION BUSH	1.000	EA	5.800
483	CUTLESS RUBBER BEARING	1.000	EA	35.000
484	THORDON BEARINGS	2.000	EA	60.000
485	NON REVERSIBLE RATCHET	1.000	EA	355.000
486	ROLLER HOUSING IN F/M CONDITION	1.000	EA	365.000
487	SPHERICAL ROLLER BRG HSG (F/M)CONDITION	1.000	EA	76.000
488	SPRCHL ROLL BRG SKF23044 CCK/W33 H3044	1.000	EA	29.500
489	CONCL HD GRS NIPPLE BM16X1.5	2.000	EA	0.100
490	PLUG VAR NO 03	2.000	EA	0.140
491	PLUG M16 X 16	2.000	EA	2.000
492	SCRU HEX M 8X16P8.8GAL	12.000	EA	0.132
493	STUD B P M20X60-8.8	8.000	EA	1.568
494	NUT HEX P M20-8	8.000	EA	0.512
495	SCRU CAP SOC P M16X30-12.9	8.000	EA	0.648
496	STUD M30X3.5X90-8.8	12.000	EA	7.200
497	NUT HEX P M30-8	12.000	EA	2.772
498	PIN	6.000	EA	13.200
499	ROLLER BRG UPPER COVER	1.000	EA	21.000
500	ROLLER BRG BTM COVER-ASSLY	1.000	EA	22.000
501	PLATE (ROLLER HOUSING)	1.000	EA	10.000
502	,1*240.00*240.00MM	0.058	KG	0.058
503	ROUND(VLCNZDRUBBER)14MM S.H.=A65-IS3400	50.000	M	50.000
504	,1*7600.00MM	8.300	KG	8.300
505	SS STUD WITH TWO NUTS M30X3X170	28.000	EA	43.232
506	SS STUD WITH TWO NUTS M30X3X170	32.000	EA	49.408
507	SS STUD WITH TWO NUTS M30X3X170	36.000	EA	55.584
508	SS STUD WITH TWO NUTS VAR.NO.03	40.000	EA	64.560
509	STUD B P M36X100-8.8	52.000	EA	52.520
510	NUT HEX P M36-8	52.000	EA	20.592
511	STUD B P M36X100-8.8	48.000	EA	48.480
512	NUT HEX P M36-8	48.000	EA	19.008
513	STUD B P M36X100-8.8	40.000	EA	40.400
514	NUT HEX P M36-8	40.000	EA	15.840

CW Pump, frames & Aux Item Weights (Breakup of weights of Sl No. F.07 above)				
Sl. No	**Material Description**	**Quantity**	**UOM**	**Net Weight(KG)**
515	STUD 2 NUTS M36 X 3 X 200- ST.	52.000	EA	133.796
516	STUD B P M36X80-8.8	12.000	EA	9.696
517	NUT HEX P M36-8	12.000	EA	4.752
518	SS STUD VAR.NO.13	32.000	EA	16.960
519	HEX NUT M30x3, VAR.NO.10 (ASTMA194GR6)	32.000	EA	7.360
520	STUD B P M24X90-8.8	2.000	EA	0.814
521	NUT HEX P M24-8	2.000	EA	0.220
522	STUD B P M24X90-8.8	12.000	EA	4.884
523	NUT HEX P M24-8	12.000	EA	1.320
524	SS STUD M12X1.75X35	18.000	EA	0.720
525	HEX NUT M12x1.75, VAR.NO.01(ASTMA194GR6)	18.000	EA	0.306
526	SS STUD M10X20	6.000	EA	0.120
527	HEX NUT M10x1.5, VAR.NO.07 (ASTMA194GR6)	6.000	EA	0.120
528	PIN TAPER EXT THRD M20X90 IS3524	4.000	EA	0.816
529	BOLT FDN M36X800-4.6	16.000	EA	119.520
530	NUT HEX P M36-8	16.000	EA	6.336
531	WASHER MCD 37ST	16.000	EA	1.424
532	COUPLING SPACER	1.000	EA	5.100
533	SPACER RING	1.000	EA	1.900
534	COUNTER FLANGE	1.000	EA	423.000
535	COUPLING SPACER-RTPP600	1.000	EA	20.200
536	SS STUD WITH TWO NUTS M30X3X170	36.000	EA	55.584
	TOTAL			**178000**

G. DEAERATOR & FST					
Sl.No	**Equipment**	**Length (mm)**	**Breadth (mm)**	**Height (mm)**	**Gross Weight (Kg)**
1	Deaerator header	10800	3400	3700	29500
2	FST-1	13350	3700	4350	27000
3	FST-II	12500	3700	4350	26600
4	FST-III	13200	3700	4350	26550
5	Drain cooler	6200	1050	1500	5800
Total					115450

H. RE joints, flask tanks & connected CW pipes etc			
Sl. No.	**ITEM**	**UOM**	**Weight (Kg)**
1	Pipe Detail (Miter Bend) Inlet Side	Kg	17436
2	Pipe Detail (Miter Bend) Outlet Side	Kg	20388
3	Pipe Assy. L & R (Inlet Side)	Kg	7300
4	Pipe Assy. L & R (Outlet Side)	Kg	3468
5	Blank Flg. Assy. L & R (Inlet Side)	Kg	19752
6	Blank Flg. Assy. L & R (Outlet Side)	Kg	19752
7	Pipe. Assy. Tie Rod End (Inlet Side)	Kg	17592
8	Pipe. Assy. Tie Rod End (Outlet Side)	Kg	17592
9	Bare Bellows	Kg	1400
10	Tie Rod Assy.	Kg	3000
11	Fasteners	Kg	4000
12	Bottom Spring Support	Kg	4000
13	Bottom Spring Support	Kg	480
14	FLASH TANK - A	Kg	8410
15	FLASH TANK - B	Kg	8410
16	UNIT FLASH TANK	Kg	1755
17	Clean Oil Tank - 60 m^3	Kg	10540
18	Dirty Oil Tank - 60 m^3	Kg	10540
19	Oil Unloading Vessel - 01 m^3	Kg	600
20	DMCW Tank – TG & SG, 10M^3	Kg	6000
	TOTAL		**182415**

I. BOUGHT OUT ITEMS (BOI)			
Sl. No.	**ITEM**	**UOM**	**QTY**
1	ME Bellows	Lot	1
2	Ball Valves	Lot	1
3	Butterfly Valves -Steam Service	Lot	1
4	Butterfly Valves -Water Service	Lot	1
5	Cast Iron Valves(SCNRV)	Lot	1
6	Steel Valves(Gate, Globe ,NRV)	Lot	1
7	Steam Traps	Lot	1
8	Air Traps	Lot	1
9	Misc Pumps	Lot	1
10	P.H Exchangers	Lot	1
11	Lub Oil Transfer Pumps	Lot	1

I. BOUGHT OUT ITEMS (BOI)			
Sl. No.	**ITEM**	**UOM**	**QTY**
12	Chemical Dosing System (LP)	Lot	1
13	Aux. PRDS	Lot	1
14	Rotameter	Lot	1
15	Control Valves	Lot	1
16	Flow Elements	Lot	1
17	Spring loaded Bypass Valves	Lot	1
18	Lifting Beam	NO	1
19	Duplex Filter (Lub.Oil)	NO	1
20	Duplex Filter (Jacking Oil)	NO	1
21	Butterfly Valves	ST	1
22	Three Way Temp. Control Valve	NO	2
23	Double Three Way Valves	NO	2
24	Nrv With Aluminium Flap	ST	1
25	Pressure Limit Valve	NO	2
26	Oil Purification Unit	NO	2
27	Oil Vapour Exhauster	NO	2
28	Lead Diaphragm	NO	6
29	Spray Nozzles	ST	1
30	Dirt Catchers	NO	2
31	Damper	ST	1
32	Variable Load Spring Cages	ST	1
33	Flexible Bends	ST	1
34	Turbine Cleading	NO	1
35	Turbine Oil	LT	98910
36	Dry Air Preservation System	NO	1
37	Oil Purification System (Centr	NO	1
38	Turbine Integral Piping (For details, refer table below)	ST	1
39	H & S For Turbine Integral Piping	ST	1
40	Flow Nozzles For Pg Test	ST	1
41	Globe Valve	NO	2
42	Spring Loaded Nrv	NO	4
43	Control Fluid Pump	NO	2
44	Control Fluid Vapour Exhauster	NO	2
45	Control Fluid Tank (Ss)	NO	1
46	On Line Control Fluid Heater	NO	1
47	Remote Trip Solenoid Valve	NO	1
48	Control Fluid (Frf)	M3	34

Corrigendum -3 Dated January 14, 2016 to Tender specification

Tender No. BHEL: PSSR: SCT 1601

I. BOUGHT OUT ITEMS (BOI)			
Sl. No.	**ITEM**	**UOM**	**QTY**
49	Gear Pumps	NO	3
50	Lp Bypass Stop & Control Valve With Eha And Water Injection Valve	ST	1
51	Auxiliary Oil Pump With Ac Mot	NO	2
52	Emergency Oil Pump With Dc Mot	NO	1
53	Vacuum Breaker Valve With Pneu	NO	2
54	Hpt Steam Evacuation Valve	NO	1
55	Jacking Oil Pump With Ac Motor	NO	1
56	Jacking Oil Pump With Dc Motor	NO	1
57	Seal Steam Control Valve With	NO	1
58	Leak Steam Control Valve With	NO	1
59	Empty H2 Cylinder	NO	156
60	Empty Co2 Cylinder	NO	65
61	Empty N2 Cylinder	NO	12
62	Portable Gas Analyser	NO	1
63	Vapour Exhauster	NO	2
64	Refrigeration Gas Dryer	NO	2
65	Primary Water Cooler (Plate Ty	NO	2
66	Generator Integral Piping	ST	1
67	Hydrogen Coolers Piping	ST	1
68	Exciter Cover Complete With Fa	NO	1
69	Misc. Items For Generator Pipi	ST	1
70	Welded Austenitic S.S. Tubes Gr.304 (For Condensor)	ST	1
71	Condensor Air Evacuation Package (Vacuum Pump)	NO	4
	Total Weight(approx.)	**Kg**	**539000**

TG Integral Piping- Weight breakup		
Sl.No.	**DESCRIPTION**	**(Weight in KG)**
1	Lube oil Flushing	612
2	Condensate spray	4480
3	Lube oil piping	17663
4	Cooling water lube oil cooler	1398
5	Cooling water Control fluid cooler	347
6	Control fluid	9654
7	Control fluid LPBY pass	1178

TG Integral Piping- Weight breakup		
Sl.No.	**DESCRIPTION**	**(Weight in KG)**
8	Control fluid NRV	2187
9	Seal Steam	17068
10	Turbine drainage	11542
11	Control fluid flushing	1081
	Total	**67210**

9) The following is added under **VOLUME-IA PART-I CHAPTER XIV ERECTION,** Clause **1.14.1.121.4 PUMPS & MOTORS:**
   - Main Cooling Water Pump with Motor and accessories – 5 Sets

10) The following is added in **VOLUME-IA PART – II CHAPTER 1 CORRECTIONS / REVISIONS IN SPECIAL CONDITIONS OF CONTRACT, GENERAL CONDITIONS OF CONTRACT AND FORMS & PROCEDURES as Sl No. 3**

Sl No. 3

SCC Chapter IX Clause 9.1 is modified as below:
Contractor will comply with HSE (Health, Safety & Environment) requirements of BHEL as per the "HSE Plan for Site Operations by Subcontractor" (Document No. HSEP: 14 Rev00) enclosed below.

SCC Chapter IX Clause 9.2 to 9.62 is Deleted

11) **The following drawings attached below are added as VOLUME-IA PART – II Chapter 8**
   i) GA Drawing of Spray cum Tray Deaerator (Drg No. 1-63-10-11406 Rev01)
   ii) Condenser Assembly (2 sheets)(Drg No. 01601070058C192 Rev 01)
   iii) Cross Sectional Assembly of Cooling Water Pump (Drg No. 0 182 00 5 4619 Rev 00)
   iv) GA & Foundation Details of CWP + Motor (Drg No. 1 12 005 7072 Rev 03)

Corrigendum -3 Dated January 14, 2016 to Tender specification

Tender No. BHEL: PSSR: SCT 1601

12) Some of the bidders had raised queries in the published tender specification. The Clarifications issued by BHEL are furnished below:

Sl No.	Reference clause of Tender Document	Existing provision	Bidder's query	BHEL's clarification
1	TCC Volume- IA Part I Chapter-VII Clause 1.7.1	Sl No.1.7.1.7a INTEGRAL PIPING-14.37%.	Terms of payment is mentioning Integral piping whereas Weight schedule it is not indicated.	TG integral piping is included in the scope of works of this Tender. Tentative weight schedule for TG integral piping is available in this corrigendum.
2	TCC Volume- IA Part I Chapter-VII Clause 1.9.1	Total weight 3788 MT and Integral Piping not mentioned	Kindly clarify whether integral piping scope is there? If so what will be the weight?	
3	TCC Volume- IA Part I Chapter-IX- Clause 1.9.2	H. RE joints, Butterfly valves & connected CW pipes etc 21) BF Valve Dia 500 MANUAL WITH LIMIT SWITCH- 3 Nos 22) BF Valve DIA 450 ELECTRICAL- 3 Nos 23) BF Valve Dia 450 MANUAL WITH LIMIT SWITCH- 6 Nos 24) BF Valve Dia 400 (16 ATA) MANUAL WITH LIMIT SWITCH- 2 Nos	We presume that the stated butterfly valves are of CW piping systems between RE joints and 'A' row column covered in STG bidder's scope and not all butterfly valves in the power plant. Kindly clarify	The mentioned Items are deleted from the scope of work. Revised BOQ is available in this corrigendum.

Corrigendum -3 Dated January 14, 2016 to Tender specification

Tender No. BHEL: PSSR: SCT 1601

Sl No.	Reference clause of Tender Document	Existing provision	Bidder's query	BHEL's clarification
4	TCC Volume- IA Part I Chapter-IX- Clause 1.9.2	I. Bought Out Items (BOI) 3) Thermal Insulation- Calcium	Thermal insulation of this type is normally not used in earlier STG package. Inform us the area of application in STG bidder's scope. Kindly clarify	Revised BOQ is available in this corrigendum.
5	TCC Volume- IA Part I Chapter-IX- Clause 1.9.2	I. Bought Out Items (BOI) 4) ME bellows 5) Ball Valves 6) Butterfly Valves -Steam Service 7) Butterfly Valves -Water Service 8) Cast Iron Valves(SCNRV) 9) Power cycle Valves 10) Steel Valves(Gate, Globe ,NRV) 11) Steam Traps 12) Air Traps 20) Control valves 21) Flow Elements 23) Spring loaded Bypass Valves	We presume that the stated valves/ bellows are of connecting pipeline systems which are covered in STG bidder's scope and not all valves in the power plant. Kindly clarify	Power cycle valves is not applicable in this contract. Other BOI's are pertaining to TG scope only. Revised BOQ is available in this corrigendum.
6	TCC Volume- IA Part I Chapter-XIII- Clause 1.13.1	Required cranes, tractors, trailer or trucks/ slings/ tools and tackles / labour including operators, fuel, lubricants etc. for loading & unloading of materials will be in the scope of contractor. Store / storage	Pls confirm the deliver location of HP TURBINE which weight is given as 86 tons. Please advise the maximum size of the trailer required for transportation with tentative machine months	HP turbine has already reached site and is stored in storage yard. Approx. dimensions are 4m(L) x 3m(W) x 3m(H). Suitable low

Sl No.	Reference clause of Tender Document	Existing provision	Bidder's query	BHEL's clarification
		yard located at about 1500 m away from erection site.		bed trailer of suitable capacity is required.
7	TCC Volume- IA Part I Chapter-XIV- Clause 1.14.1.14	The feed water storage tank will be supplied in three sections with feed pipe, heating steam header, spray nozzles, supports etc., in loose components. These are to be erected, aligned & welded in position. Welding, NDT & heat treatment if required shall be carried out by the contractor within quoted rate.	Kindly provide Drawing for FST/ Deaerator or no of welding joints and thickness of FST and Deaerator assembly works	Drawing of FST/ Deareator is enclosed.
8	TCC Volume- IA Part I Chapter-XIV- Clause 1.14.1.20	The contractor shall have to carry out the condenser tubes insertion and expansion at site after the installation of condenser on their foundation. Before insertion of tubes the contractor shall check for absence of any dents mechanical damages or any other defects of tubes caused during storage or transportation. Tube should be thoroughly internally cleaned of all extraneous matter. Only fine emery	On going through the document, we understand that Condenser tubes will be supplied as bought out items as an single tube to erect has to be inserted, expanded, flaring and bell mouth to be done. Kindly specify the tube material, length , size & thickness, and no.s. Also is welding of tubes envisaged? If so, is an /orbital	There is no orbital welding for condenser tubes. Condenser GA drawing is enclosed in which the asked details are available.

Corrigendum -3 Dated January 14, 2016 to Tender specification

Tender No. BHEL: PSSR: SCT 1601

Sl No.	Reference clause of Tender Document	Existing provision	Bidder's query	BHEL's clarification
		paper shall be used for cleaning the tubes at the ends where expansion has to be carried out.	welding machine required for the same?	
9	TCC Volume- IA Part I Chapter-XVII- Clause 1.17.33	….Further in addition to the above, contractor has to arrange the following manpower exclusively for assisting BHEL commissioning engineers during stabilization and trial operation period. This manpower will be directly controlled by BHEL commissioning engineers only…	Pls confirm the Period of months taken for stabilization	The manpower mentioned is to be provided until handing over of the unit.

-Sd-

Senior Engineer/ Subcontracts

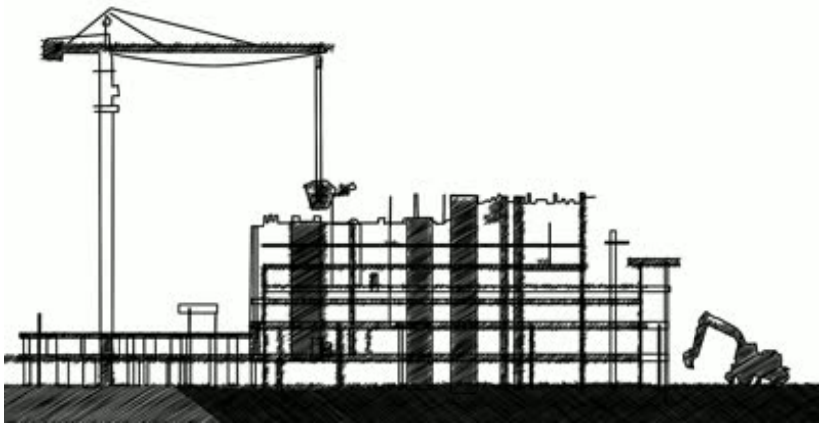
HEALTH, SAFETY and ENVIRONMENT PLAN

for

SITE OPERATIONS

by

SUB-CONTRACTORS



POWER SECTOR

बी एच ई एल BHEL	**HEALTH, SAFETY AND ENVIRONMENT PLAN FOR SITE OPERATION by SUBCONTRACTORS**	Doc no.: HSEP: 14 REV: 00
	POWER SECTOR	Date: 12.08.2014

DOCUMENT ISSUE SHEET

	Prepared	Reviewed	Approved
Name	Sanghamitra B. Jayant	A.K. Sinha	Anuj Bhatnagar
Designation	Dy. Manager PSHQ(FQA & Safety)	GM PSHQ(FQA & Safety)	ED PSHQ(FQA & Safety)
Signature		A.K.S in fact	
Date	12/8/14	12/8/14	12/8/14

HSE PLAN FOR SITE OPERATIONS BY BHEL'S SUBCONTRACTORS

AT A GLANCE

BEFORE START

SIGNING OF MOU
Agree to comply to HSE requirement- Statutory and BHEL's

PLAN

HSE ORGANISATION	
Manpower • 1 (one) safety officer for every 500 workers or part thereof • 1(one) safety-steward/ supervisor for every 100 workers **Qualification** As per Cl. 7.1	**HSE Roles and responsibilities** • Site In-charge- As per clause 7.2.1 • Safety officer- As per clause 7.2.2

HSE Planning
for Man , Machinery/Equipment/Tools & Tackles

PROVIDE

HSE INFRASTUCTURE	
• PPEs • Drinking Water • Washing Facilities • Latrines and Urinals • Provision of shelter for rest • Medical facilities	• Canteen facilities • Labour Colony • Emergency Vehicle • Pest Control • Scrapyard • Illumination

TRAIN

HSE TRAINING , AWARENESS & PROMOTION	
Training • Induction training • Height work and other critical areas • Tool Box talk & Pep Talk	**Awareness & Promotion** • Signage • Poster • Banner • Competition • Awards

COMMUNICATE

HSE COMMUNICATION	
Incident Reporting • Accident- Fatal & Major • Property damage • Near Miss	**Event Reporting** • Celebrations • Training • Medical camp

EXECUTE SAFELY

OPERATIONAL CONTROL PROCEDURES

PERMIT TO WORK

Height work (above 2 metres), Hot Work, Heavy Lifting, Confined Space, Radiography, excavation(More than 4 metres)

SAFETY DURING WORK EXECUTION

- Welding
- Rigging
- Cylinder- storage & Movement
- Demolition work
- T&Ps
- Chemical Handling
- Electrical works
- Fire
- Scaffolding
- Height work
- Working Platform
- Excavation
- Ladder
- Lifting
- Hoisting appliance

HOUSE KEEPING

WASTE MANGEMENT

TRAFFIC MANAGEMENT

ENVIRONMENTAL CONTROL

EMERGENCY PREPAREDNESS AND RESPONSE PLAN

CHECKS

HSE AUDITS & INSPECTION

- Daily Checks
- Inspection of PPEs
- Inspection of T& Ps
- Inspection of Cranes & Winches
- Inspection of Height work
- Inspection of Welding and Gas cutting
- Inspection of elevators etc

HSE PERFORMANCE EVALUATION PARAMETERS

NON CONFORMANCE

PENALTY for NON CONFORMANCE

Refer Clause 16

Incremental penalty

For repeated violation by the same person, the penalty would be double of the previous penalty

For repeated fatal incident in the same Unit incremental penalty to be imposed. The subcontractor will pay 2 times the penalty compared to previously paid in case there are repeated cases of fatal incidents under the same subcontractor for the same package in the same unit.

1.0 PURPOSE

1.1 The purpose of this HSE Plan is to provide for the systematic identification, evaluation, prevention and control of general workplace hazards, specific job hazards, potential hazards and environmental impacts that may arise from foreseeable conditions during installation and servicing of industrial projects and power plants.

1.2 This document shall be followed by BHEL's subcontractors at all installation and servicing sites. In case customer specific documents are to be implemented, this document will be followed in conjunction with customer specific documents.

1.3 Although every effort has been made to make the procedures and guidelines in line with statutory requirements, in case of any discrepancy relevant statutory guidelines must be followed.

1.4 In case the customer has any specific requirement, the same is to be fulfilled.

2.0 SCOPE

The document is applicable for BHEL's Subcontractors at all installation / servicing activities of BHEL Power Sector as per the relevant contractual obligations.

3.0 OBJECTIVES AND TARGETS

The HSE Plan reflects that BHEL places high priority upon the Occupational Health, Safety and Environment at workplaces.

- Ensure the Health and Safety of all persons at work site is not adversely affected by the work.
- Ensure protection of environment of the work site.
- Comply at all times with the relevant statutory and contractual HSE requirements.
- Provide trained, experienced and competent personnel. Ensure medically fit personnel only are engaged at work.
- Provide and maintain plant, places and systems of work that are safe and without risk to health and the environment.
- Provide all personnel with adequate information, instruction, training and supervision on the safety aspect of their work.
- Effectively control, co-ordinate and monitor the activities of all personnel on the Project sites including subcontractors in respects of HSE.
- Establish effective communication on HSE matters with all relevant parties involved in the Project works.
- Ensure that all work planning takes into account all persons that may be affected by the work.
- Ensure fitness testing of all T&Ps/Lifting appliances like cranes, chain pulley blocks etc. are to be certified by competent person.
- Ensure timely provision of resources to facilitate effective implementation of HSE requirements.
- Ensure continual improvements in HSE performance
- Ensure conservation of resources and reduction of wastage.
- Capture the data of all incidents including near misses, process deviation etc. Investigate and analyze the same to find out the root cause.
- Ensure timely implementation of correction, corrective action and preventive action.

HSE TARGETS

EXPLOSION	**ZERO**
FATALITY	**ZERO**
LOST TIME INJURY	**ZERO**
FIRE	**ZERO**
VEHICLE INCIDENTS	**ZERO**
ENVIRONMENTAL INCIDENTS	**ZERO**

4.0 BHEL POWER SECTOR HEALTH, SAFETY & ENVIRONMENT POLICY

Power Sector HSE Policy

We, at BHEL Power Sector, reaffirm our belief that the Health and Safety of our stakeholders and conservation of Environment is of utmost importance and takes precedence in all our business decisions. In pursuit of this belief and commitment, we strive to:

- ✓ **Ensure total compliance with applicable legislation, regulations and other requirements concerning Occupational Health, Safety and Environment.**
- ✓ **Ensure continual improvement in the Occupational Health, Safety and Environment Management System performance.**
- ✓ **Enhance Occupational Health, Safety and Environment awareness amongst employees, customers and suppliers by proactive communication and training.**
- ✓ **Review periodically and improve Occupational Health, Safety and Environment Management System to ensure its continuing suitability, adequacy and effectiveness in a continuously changing business environment.**
- ✓ **Develop a culture of safety through active leadership and provide appropriate training at all levels to enable employees to fulfill their Health, Safety and Environmental obligations.**
- ✓ **Incorporate appropriate Occupational Health, Safety and Environmental criteria into business decisions for selection of plant, technology and services as well as appointment of key personnel.**
- ✓ **Ensure availability at all times of appropriate resources to fully implement the Occupational Health, Safety and Environmental policy of the company.**

This policy will be communicated to all employees and made available to interested parties.

Sd/-

Date: 01.05.2013 **Director (Power)**

5.0 MEMORANDUM OF UNDERSTANDING:

After award of work, subcontractors are required to enter into a memorandum of understanding as given below:

Memorandum of Understanding

BHEL, Power Sector _____ Region is committed to Health, Safety and Environment Policy (HSE Policy).

M/s _____ do hereby also commit to comply with the same HSE Policy while executing the Contract Number _____

M/s _____ shall ensure that safe work practices as per the HSE plan. Spirit and content therein shall be reached to all workers and supervisors for compliance.

In addition to this, M/S _____ shall comply to all applicable statutory and regulatory requirements which are in force in the place of project and any special requirement specified in the contract document of the principal customer.

M/s _____ shall co-operate in HSE audits/inspections conducted by BHEL /customer/ third party and ensure to close any non-conformity observed/reported within prescribed time limit.

Signed by authorized representative of M/s ----------

Name :

Place & Date:

6.0 TERMS AND DEFINITIONS

6.1 DEFINITIONS

6.1.1 INCIDENT

Work- related or natural event(s) in which an injury , or ill health (regardless of severity), damage to property or fatality occurred, or could have occurred.

6.1.2 NEAR MISS

An incident where no ill health, injury, damage or other loss occurs, but it had a potential to cause, is referred to as "Near-Miss".

6.1.3 MAN-HOUR WORKED

The total number of man hours worked by all employees including subcontractors working in the premises. It includes managerial, supervisory, professional, technical, clerical and other workers including contract labours. Man-hours worked shall be calculated from the payroll or time clock recorded including overtime. When this is not feasible, the same shall be estimated by multiplying the total man-days worked for the period covered by the number of hours worked per day. The total number of workdays for a period is the sum of the number of men at work on each day of period. If the daily hours vary from department to department separate estimate shall be made for each department and the result added together.

6.1.4 FIRST AID CASES

First aids are not essentially all reportable cases, where the injured person is given medical treatment and discharged immediately for reporting on duty, without counting any lost time.

6.1.5 LOST TIME INJURY

Any work injury which renders the injured person unable to perform his regular job or an alternative restricted work assignment on the next scheduled work day after the day on which the injury occurred.

6.1.6 MEDICAL CASES

Medical cases come under non-reportable cases, where owing to illness or other reason the employee was absent from work and seeks Medical treatment.

6.1.7 TYPE OF INCIDENTS & THEIR REPORTING:

The three categories of Incident are as follows:

Non-Reportable Cases:

An incident, where the injured person is given medical help and discharged for work without counting any lost time.

Reportable Cases:
In this case the injured person is disable for 48 hours or more and is not able to perform his duty.

Injury Cases:
These are covered under the heading of non-reportable cases. In these cases the incident caused injury to the person, but he still continues his duty.

6.1.8 **TOTAL REPORTABLE FREQUENCY RATE**

Frequency rate is the number of Reportable Lost Time Injury (LTI) per one Million Man hours worked. Mathematically, the formula read as:

$$\frac{\text{Number of Reportable LTI}}{\text{Total Man Hours Worked}} \times 1{,}000{,}000$$

6.1.9 **SEVERITY RATE**

Severity rate is the Number of days lost due to Lost Time Injury (LTI) per one Million Man hours worked. Mathematically, the formula reads as:

$$\frac{\text{Days lost due to LTI}}{\text{Total Man Hours Worked}} \times 1{,}000{,}000$$

6.1.10 **INCIDENCE RATE**

Incidence Rate is the Number of LTI per one thousand manpower deployed. Mathematically, the formula reads as:

$$\frac{\text{Number of LTI}}{\text{Average number of manpower deployed}} \times 1000$$

7.0 HSE ORGANISATION

Number of safety officers:
The subcontractor must deploy one safety officer for every 500 workers or part thereof in each package. In addition, there must be one safety-steward/safety-supervisor for every 100 workers.

Deployment: The subcontractor should deploy sufficient safety officers and safety-steward/Safety-supervisor, as per requirement given above, since initial stage and add more in proportion to the added strength in work force. Any delay in deployment will attract a penalty of Rs.30,000/- per man month for the delayed period.

7.1 QUALIFICATION FOR HSE PERSONNEL

Sl.no	Designation	Qualification	Experience
1	Safety officer (Construction Agency)	Degree or Diploma in Engineering with full time diploma in Industrial Safety with construction safety as one of the subjects	Minimum two years for degree holder and five years for diploma holder in the field of Construction of power plant/ major industries

2	Safety-Steward/ Safety-Supervisor	Degree or diploma in any discipline with full time diploma in Industrial Safety with construction safety as one of the subjects	Minimum two years

7.2 RESPONSIBILITIES

7.2.1 **SITE IN -CHARGE OF SUBCONTRACTOR**

- Shall sign Memorandum of Understanding (MoU) for compliance to BHEL's HSE Plan for Site Operations as per clause 5.0
- Shall engage qualified safety officer(s) and steward (s) as per clause 7.0
- Shall adhere to the rules and regulations mentioned in this code, practice very strictly in his area of work in consultation with his concerned engineer and the safety coordinator.
- Shall screen all workmen for health and competence requirement before engaging for the job and periodically thereafter as required.
- Shall not engage any employee below 18 years.
- Shall arrange for all necessary PPEs like safety helmets, belts, full body harness, shoes, face shield, hand gloves etc. before starting the job. Shall ensure that no working men/women carry excessive weight more than stipulated in Factory Rule Regulation R57.
- Shall ensure that all T&Ps engaged are tested for fitness and have valid certificates from competent person.
- Shall ensure that provisions stipulated in contract Labour Regulation Act 1970, Chapter V C.9, canteen, rest rooms/washing facilities to contracted employees at site.
- Shall adhere to the instructions laid down in Operation Control Procedures (OCPs) available with the site management.
- Shall ensure that person working above 2.0 meter should use Safety Harness tied to a life line/stable structure.
- Shall ensure that materials are not thrown from height. Cautions to be exercised to prevent fall of material from height.
- Shall report all incidents(Fatal/Major/Minor/Near Miss)to the Site engineer /HSE officer of BHEL.
- Shall ensure that Horseplay is strictly forbidden.
- Shall ensure that adequate illumination is arranged during night work.
- Shall ensure that all personnel working under subcontractor are working safely and do not create any Hazard to self and to others.
- Shall ensure display of adequate signage/posters on HSE.
- Shall ensure that mobile phone is not used by workers while working.
- Shall ensure conductance of HSE audit, mockdrill, medical camps, induction training and training on HSE at site.
- Shall ensure full co-operation during HQ/External /Customer HSE audits.

- Shall ensure submission of look-ahead plan for procurement of HSE equipment's and PPEs as per work schedule.
- Shall ensure good housekeeping.
- Shall ensure adequate valid fire extinguishers are provided at the work site.
- Shall ensure availability of sufficient number of toilets /restrooms and adequate drinking water at work site and labour colony.
- Shall ensure adequate emergency preparedness.
- Shall be member of site HSE committee and attend all meetings of the committee
- Power source for hand lamps shall be maximum of 24 v.
- Temporary fencing should be done for open edges if Hand – railings and Toe-guards are not available.

7.2.2 **HEALTH, SAFETY AND ENVIRONMENT OFFICER OF SUBCONTRACTOR**

- Carry out safety inspection of Work Area, Work Method, Men, Machine & Material, P&M and other tools and tackles.
- Facilitate inclusion of safety elements into Work Method Statement.
- Highlight the requirements of safety through Tool-box / other meetings.
- Help concerned HOS to prepare Job Specific instructions for critical jobs.
- Conduct investigation of all incident/dangerous occurrences & recommend appropriate safety measures.
- Advice & co-ordinate for implementation of HSE permit systems, OCPs & MPs.
- Convene HSE meeting & minute the proceeding for circulation & follow-up action.
- Plan procurement of PPE & Safety devices and inspect their healthiness.
- Report to PS Region/HQ on all matters pertaining to status of safety and promotional program at site level.
- Facilitate administration of First Aid
- Facilitate screening of workmen and safety induction.
- Conduct fire Drill and facilitate emergency preparedness
- Design campaigns, competitions & other special emphasis programs to promote safety in the workplace.
- Apprise PS– Region on safety related problems.
- Notify site personnel non-conformance to safety norms observed during site visits / site inspections.
- Recommend to Site In charge, immediate discontinuance of work until rectification, of such situations warranting immediate action in view of imminent danger to life or property or environment.
- To decline acceptance of such PPE / safety equipment that do not conform to specified requirements.
- Encourage raising Near Miss Report on safety along with, improvement initiatives on safety.
- Shall work as interface between various agencies such customer, package-in-charges, subcontractors on HSE matters

8.0 PLANNING BY SUBCONTRACTOR

8.1 MOBILISATION OF MACHINERY/EQUIPMENT/TOOLS BY SUBCONTRACTOR

- As a measure to ensure that machinery, equipment and tools being mobilized to the construction site are fit for purpose and are maintained in safe operating condition and complies with legislative and owner requirement, inspection shall be arranged by in-house competent authority for acceptance as applicable.

- The machinery and equipment to be embraced for this purpose shall include but not limited to the following:

  - Mobile cranes.
  - Side Booms.
  - Forklifts.
  - Grinding machine.
  - Drilling machine.
  - Air compressors.
  - Welding machine.
  - Generator sets.
  - Dump Trucks.
  - Excavators.
  - Dozers
  - Grit Blasting Equipment.
  - Hand tools.

- Subcontractor 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 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 subcontractor shall strictly adhere to such instructions. The 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.

8.2 MOBILISATION OF MANPOWER BY SUBCONTRACTOR

- The subcontractor shall arrange induction and regular health check of their employees as per schedule VII of BOCW rules by a registered medical practitioner.
- The subcontractor shall take special care of the employees affected with occupational diseases under rule 230 and schedule II of BOCW Rules. The employees not meeting the fitness requirement should not be engaged for such job.
- Ensure that the regulatory requirements of excessive weight limit (to carry/lift/ move weights beyond prescribed limits) for male and female workers are complied with.
- Appropriate accommodation to be arranged for all workmen in hygienic condition.

8.3 PROVISION OF PPEs

- Personnel Protective Equipment (PPEs), in adequate numbers, will be made available at site & their regular use by all concerned will be ensured
- The following matrix recommends usage of minimum PPEs against the respective job.

Sl. No	Type of work	PPEs
1	Concrete and asphalt mixing	Nose mask, hand glove, apron and gum boot
2	Welders/Grinders/ Gas cutters	Welding/face screen, apron, hand gloves, nose mask and ear muffs if noise level exceeds 90dB. Helmet fitted with welding shield is preferred for welders
3	Stone/ concrete breakers	Ear muffs, safety goggles, hand gloves
4	Electrical Work	Rubber hand glove, Electrical Resistance shoes
5	Insulation Work	Respiratory mask, Hand gloves, safety goggles
6	Work at height	Double lanyard full body harness, Fall arrestor (specific cases)
7	Grit/Sand blasting	Blast suit, blast helmet, respirator, leather gloves
8	Painting	Plastic gloves, Respirators (particularly for spray painting)
9	Radiography	As per BARC guidelines

- The PPEs shall conform to the relevant standards as below and bear ISI mark.

Relevant is-codes for personal protection

IS: 2925 – 1984	Industrial Safety Helmets.
IS: 4770 – 1968	Rubber gloves for electrical purposes.
IS: 6994 – 1973 (Part-I)	Industrial Safety Gloves (Leather &Cotton Gloves).
IS: 1989 – 1986 (Part-I-II)	Leather safety boots and shoes.
IS: 5557 – 1969	Industrial and Safety rubber knee boots.
IS: 6519 – 1971	Code of practice for selections care and repair of Safety footwear.
IS: 11226 – 1985	Leather Safety footwear having direct molding sole.
IS: 5983 – 1978	Eye protectors.
IS: 9167 – 1979	Ear protectors.
IS: 1179-1967	Eye & Face protection during welding
IS: 3521 – 1983	Industrial Safety Belts and Harness
IS:8519 -1977	Guide for selection of industrial Safety equipment for body protection
IS:9473-2002,14166-1994,14746-1999	Respiratory Protective Devices

The list is not exhaustive. The safety officer may demand additional PPEs based on specific requirement.

- Where workers are employed in sewers and manholes, which are in use, the subcontractor 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 incident to the public
- Besides the PPEs mentioned above, the persons shall use helmet and safety shoe. The visitors shall use Helmet and any other PPEs as deemed appropriate for the area of work.

Colour scheme for Helmets:

1. Workmen: Yellow
2. Safety staff: Green or white with green band
3. Electrician: Red
4. Others including visitors: White

- All the PPEs shall be checked for its quality before issue and the same shall be periodically checked. The users shall be advised to check the PPEs themselves for any defect before putting on. The defective ones shall be repaired/ replaced.
- The issuing agency shall maintain register for issue and receipt of PPEs.
- The Helmets shall have logo or name (abbreviation of agency name permitted) affixed or printed on the front.
- The body harnesses shall be serial numbered.

8.4 ARRANGEMENT OF INFRASTRUCTURE

8.4.1 DRINKING WATER

- Drinking water shall be provided and maintained at suitable places at different elevations.
- Container should be labeled as " Drinking Water"
- Cleaning of the storage tank shall be ensured atleast once in 3 months indicating date of cleaning and next due date.
- Potability of water should be tested as per IS10500 at least once in a year.

8.4.2 WASHING FACILITIES

- In every workplace, adequate and suitable facilities for washing shall be provided and maintained.
- Separate and adequate cleaning facilities shall be provided for the use of male and female workers. Such facilities shall be conveniently accessible and shall be kept in clean and hygienic condition and dully illuminated for night use.
- Overalls shall be supplied by the subcontractor to the workmen and adequate facilities shall be provided to enable the painters and other workers to wash during the cessation of work.

8.4.3 LATRINES AND URINALS

- Latrines and urinals shall be provided in every work place.
- Urinals shall also be provided at different elevations.
- They shall be adequately lighted and shall be maintained in a clean and sanitary condition at all times, by appointing designated person.
- Separate facilities shall be provided for the use of male and female worker if any.

8.4.4 **PROVISION OF SHELTER DURING REST**

Proper Shed & Shelter shall be provided for rest during break

8.4.5 **MEDICAL FACILITIES**

8.4.5.1 **MEDICAL CENTRE (As per Schedule V, X and XI of BOCW central Rules, 1998)**

- A medical centre shall be ensured/identified at site with basic facilities for handling medical emergencies. The medical center can be jointly developed on proportionate sharing basis with permission from BHEL
- A qualified medical professional, not less than MBBS, shall be deployed at the medical centre
- The medical centre shall be equipped with one ambulance, with trained driver and oxygen cylinder.
- Medical waste shall be disposed as per prevailing legislation (Bio-Medical Waste –Management and Handling Rules, 1998)

8.4.5.2 **FIRST AIDER**

- Ensure availability of Qualified First-aider throughout the working hours.
- Every injury shall be treated, recorded and reported.
- Refresher course on first aid shall be conducted as necessary.
- List of Qualified first aiders and their contact numbers should be displayed at conspicuous places.

8.4.5.3 **FIRST AID BOX (as per schedule III of BOCW)**

- The subcontractor shall provide necessary first aid facilities as per schedule III of BOCW. At every work place first aid facilities shall be provided and maintained.

- The first aid box shall be kept by first aider who shall always be readily available during the working hours of the work place.His name and contact no to be displayed on the box.
- 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 first aid box shall be distinctly marked with a Green Cross on white background.

- Details of contents of first aid box is given in Annexure No. 01
- Monthly inspection of First Aid Box shall be carried out by the owner as per format no. HSEP:13-F01
- The subcontractor should conduct periodical first –aid classes to keep his supervisor and Engineers properly trained for attending to any emergency.

8.4.5.4 **HEALTH CHECK UP (As per schedule VII and Form XI)**

The persons engaged at the site shall undergo health checkup as per the format no. HSEP:13-F02 before induction. The persons engaged in the following works shall undergo health checkup at least once in a year:

a. Height workers
b. Drivers/crane operators/riggers

c. Confined space workers
d. Shot/sand blaster
e. Welding and NDE personnel

8.4.6 **PROVISION OF CANTEEN FACILITY**

- Canteen facilities shall be provided for the workmen of the project inside the project site.
- Proper cleaning and hygienic condition shall be maintained.
- Proper care should be taken to prevent biological contamination.
- Adequate drinking water should be available at canteen.
- Fire extinguisher shall be provided inside canteen.
- Regular health check-up and medication to the canteen workers shall be ensured.

8.4.7 **PROVISION OF ACCOMODATION/LABOUR COLONY**

- The subcontractor shall arrange for the accommodation of workmen at nearby localities or by making a labour colony.
- Regular housekeeping of the labour colony shall be ensured.
- Proper sanitation and hygienic conditions to be maintained.
- Drinking water and electricity to be provided at the labour colony.
- Bathing/ washing bay
- Room ventilation and electrification.

8.4.8 **PROVISION OF EMERGENCY VEHICLE**

- Dedicated emergency vehicle shall be made available at workplace by each subcontractor to handle any emergency

8.4.9 **PEST CONTROL**

Regular pest control should be carried out at all offices, mainly laboratories, canteen, labour colony and stores.

8.4.10 **SCRAPYARD**

- In consultation with customer, scrapyard shall be developed to store metal scrap, wooden scrap, waste, hazardous waste.
- Scrap/Waste shall be segregated as Bio-degradable and non-bio-degradable and stored separately.

8.4.11 **ILLUMINATION**

- The subcontractor 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 at dark places and during night hours at the work spot as well as at the pre-assembly area.

- Adequate and suitable light shall be provided at all work places & their approaches including passage ways as per IS: 3646 (Part-II). Some recommended values are given below:

S. No.	Location	Illumination (Lux)
A.	**Construction Area**	
1.	Outdoor areas like store yards, entrance and exit roads	20
2.	Platforms	50
3.	Entrances, corridors and stairs	100
4.	General illumination of work area	150
5.	Rough work like fabrication, assembly of major items	150
6.	Medium work like assembly of small machined parts rough measurements etc.	300
7.	Fine work like precision assembly, precision measurements etc.	700
8.	Sheet metal works	200
9.	Electrical and instrument labs	450
B.	**Office**	
1.	Outdoor area like entrance and exit roads	20
2.	Entrance halls	150
3.	Corridors and lift cars	70
4.	Lift landing	150
5.	Stairs	100
6.	Office rooms, conference rooms, library reading tables	300
7.	Drawing table	450
8.	Manual telephone exchange	200

- Lamp (hand held) shall not be powered by mains supply but either by 24V or dry cells.
- Lamps shall be protected by suitable guards where necessary to prevent danger, in case of breakage of lamp.
- Emergency lighting provision for night work shall be made to minimise danger in case of main supply failure.

If the subcontractor fails to take appropriate safety precautions or to provide necessary safety devices and equipment or to carry out instructions issued by the authorized BHEL official, BHEL shall have the right to take corrective steps at the risk and cost of the subcontractor

9.0 HSE TRAINING& AWARENESS

9.1 HSE INDUCTION TRAINING

All persons entering into project site shall be given HSE induction training by the HSE officer of BHEL /subcontractor beforebeing assigned to work.
In-house induction training subjects shall include but not limited to:

- Briefing of the Project details.
- Safety objectives and targets.
- Site HSE rules.
- Site HSE hazards and aspects.
- First aid facility.
- Emergency Contact No.
- Incident reporting.
- Fire prevention and emergency response.
- Rules to be followed in the labour colony (if applicable)

- Proper safety wear & gear must be issued to all the workers being registered for the induction (i.e., Shoes/Helmets/Goggles/Leg guard/Apron etc.)
- They must arrive fully dressed in safety wear & gear to attend the induction.
- Any one failing to conform to this safety wear& gear requirement shall not qualify to attend.
- On completing attending subcontractor's in-house HSE induction, each employee shall sign an induction training form (format no. HSEP:13-F03) to declare that he had understood the content and shall abide to follow and comply with safe work practices. They may only then be qualified to be issued with a personal I.D. card, for access to the work site.

9.2 HSE TOOLBOX TALK

- HSE tool Box talk shall be conducted by frontline foreman/supervisor of subcontractor to specific work groups prior to the start of work. The agenda shall consist of the followings:
  - Details of the job being intended for immediate execution.
  - The relevant hazards and risks involved in executing the job and their control and mitigating measures.
  - Specific site condition to be considered while executing the job like high temperature, humidity, unfavorable weather etc.
  - Recent non-compliances observed.
  - Appreciation of good work done by any person.
  - Any doubt clearing session at the end.
- Record of Tool box talk shall be maintained as per format no. HSEP:13-F04
- Tool box talk to be conducted at least once a week for the specific work.

9.3 TRAINING ON HEIGHT WORK

Training on height work shall be imparted to all workers working at height by in-house/external faculty at least twice in a year. The training shall include following topics:

- Use of PPEs
- Use of fall arrester, retractable fall arrester, life line, safety nets etc.
- Safe climbing through monkey ladders.
- Inspection of PPEs.
- Medical fitness requirements.
- Mock drill on rescue at height.
- Dos & Don'ts during height work.

9.4 HSE TRAINING DURING PROJECT EXECUTION

- Other HSE training shall be arranged by BHEL/ subcontractor as per the need of the project execution and recommendation of HSE committee of site.
- The topics of the HSE training shall be as follows but not limited to:
  - Hazards identification and risk analysis (HIRA)
  - Work Permit System
  - Incident investigation and reporting
  - Fire fighting
  - First aid
  - Fire-warden training
  - EMS and OHSMS
  - T & Ps fitness and operation

- Electrical safety
- Welding, NDE & Radiological safety
- Storage, preservation & material handling.

- A matrix shall be maintained to keep an up-to-date record of attendance of training sessions carried out.

9.5 HSE PROMOTION-SIGNAGE, POSTERS, COMPETITION, AWARDS ETC

9.5.1 **Display of HSE posters and banners**

- Site shall arrange appropriate posters, banners, slogans in local/Hindi/English languages at work place

9.5.2 **Display of HSE signage**

- Appropriate HSE signage shall be displayed at the work area to aware workmen and passersby about the work going on and do's and don'ts to be followed

9.5.3 **Competition on HSE and award**

- Site will arrange different competition (slogan, poster, essay etc.) on HSE time to time (Safety day, BHEL day, World Environment Day etc.) and winners will be suitably awarded.

9.5.4 **HSE awareness programme**

- Subcontractor shall arrange HSE awareness programme periodically on different topics including medical awareness for all personnel working at site

10.0 HSE COMMUNICATION

10.1 INCIDENT REPORTING

- The subcontractor shall submit report of all incidents, fires and property damage etc to the Engineer immediately after such occurrence, but in any case not later than 24 hours of the occurrence. Such reports shall be furnished in the manner prescribed by BHEL. (Refer HSE procedure for incident investigation, analysis and reporting for details)
- In addition, periodic reports on safety shall also be submitted by the subcontractor to BHEL from time to time as prescribed by the Engineer. Compiled monthly reports of all kinds of incidents, fire and property damage to be submitted to BHEL safety officer as per prescribed formats.
- HSE incidents of site shall be reported to BHEL site Management as per Procedure for Incident Investigation and Reporting in format no. HSEP:14-F15. Corrective action shall be immediately implemented at the work place and compliance shall be verified by BHEL HSE officer and until then, work shall be put on hold by Construction Manager.

10.2 HSE EVENT REPORTING

- Important HSE events like HSE training, Medical camp etc. organized at site shall be reported to BHEL site management in detail with photographs for publication in different in-house magazines
- Celebration of important days like National Safety Day, World Environment Day etc. shall also be reported as mentioned above.

11.0 OPERATIONAL CONTROL

All applicable OCPs (Operational control procedures) will be followed by subcontractor 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 subcontractor will follow this as well, within quoted rate. These OCPs (applicable ones) will be made available to subcontractor during work execution at site. However for reference purpose, these are kept with Safety Officer of BHEL at the Power Sector Regional HQ, or available in downloadable format in the website, which may be refereed by subcontractor, if they so desire.

LIST OF OCPs

Safe handling of chemicals	Safety in use of cranes	Hydraulic test
Electrical safety	Storage and handing of gas cylinders	Spray insulation
Energy conservation	Manual arc welding	Trial run of rotary equipment
Safe welding and gas cutting operation	Safe use of helmets	Stress relieving
Fire safety	Good house keeping	Material preservation
Safety in use of hand tools	Working at height	Cable laying/tray work
First aid	Safe excavation	Transformer charging
Food safety at canteen	Safe filling of hydrogen in cylinder	Electrical maintenance
Illumination	Vehicle maintenance	Safe handling of battery system
Handling and erection of heavy metals	Safe radiography	Computer operation
Safe acid cleaning	Waste disposal	Storage in open yard
Safe alkali boil out	Working at night	For sanitary maintenance
Safe oil flushing	Blasting	Batching
Steam blowing	DG set	Piling rig operation
Safe working in confined area	Handling & storage of mineral wool	Gas distribution test
Safe operation of passenger lift, material hoists & cages	Drilling, reaming and grinding(machining)	Cleaning of hotwell / deaerator
Electro-resistance heating	Compressor operation	O&M of control of AC plant & system
Air compressor	Passivation	Safe Loading of Unit
Safe EDTA Cleaning	Safe Chemical cleaning of Pre boiler system	Safe Boiler Light up
Safe Rolling and Synchronisation		

11.1 HSE ACTIVITIES

HSE activities shall be conducted at site based on the HSEMSM developed by Power Sector and issued to site by Regions.
While planning for any activity the following documents shall be referred for infrastructural requirements to establish control measures:

1) HSE Procedure for Register of OHS Hazards and Risks
2) HSE Procedure for Register of Environmental Aspects and Impacts
3) HSE Procedure for Register of Regulations

4) Operational Control Procedures
5) HSE Procedure for Emergency Preparedness and Response Plan
6) Contract documents

11.2 WORK PERMIT SYSTEM

- The following activities shall come under Work Permit System
  a. Height working above 2 metres
  b. Hot working at height
  c. Confined space
  d. Radiography
  e. Excavation more than 4 meter depth
  f. Heavy lifting above 50 ton
  Refer Annexure 05 for Work permit formats.
- "HSE Procedure for Work Permit System" shall be followed while implementing permit system. Where customer is having separate Work Permit System the same shall be followed.
- Permit applicant shall apply for work permit of particular work activity at particular location before starting of the work with Job Hazard Analysis.
- Permit signatory shall check that all the control measures necessary for the activity are in place and issue the permit to the permit holder.
- Permit holder shall implement and maintain all control measures during the period of permit .He will close the permit after completion of the work. The closed permit shall be archived in HSE Department of site.

11.3 SAFETY DURING WORK EXECUTION

Respective OCPS are to be followed and adherence to the same would be contractually binding

11.3.1 WELDING SAFETY

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.

11.3.2 RIGGING

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.

11.3.3 CYLINDERS STORAGE AND MOVEMENT

All gas cylinders shall be stored in upright position. Suitable trolley shall be used. There shall be flash-back arrestors conforming to IS-11006 at both cylinder and burner ends. Damaged tube and regulators must be immediately replaced. No of cylinders shall not exceed the specified quantity as per OCP
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.

When cylinders are transported by powered vehicle they shall be secured in a vertical position.

11.3.4 **DEMOLITION WORK**

Before any demolition work is commenced and also during the process of the work the following shall be ensured:

- All roads and open areas adjacent to the work site shall either be closed or suitably protected.
- 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.
- 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.

11.3.5 **T&Ps**

All T&Ps/ MMEs should be of reputed brand/appropriate quality & must have valid test/calibration certificates bearing endorsement from competent authority of BHEL..Subcontractor to also submit monthly reports of T&Ps deployed and validity test certificates to BHEL safety Officer as per the format/procedure of BHEL.

11.3.6 **CHEMICAL HANDLING**

Displaying safe handling procedures for all chemicals such as lube oil, acid, alkali, sealing compounds etc , at work place.Where it is necessary to provide and/or store petroleum products or petroleum mixture & explosives, the subcontractor 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 subcontractor shall be responsible for obtaining the same.

11.3.7 **ELECTRICAL SAFETY**

- Providing adequate no. of 24 V sources and ensure that no hand lamps are operating at voltage level above 24 Volts.
- Fulfilling safety requirements at all power tapping points.
- 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.
- The subcontractor 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.
- All portable electric tools used by the subcontractor 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 subcontractor to carry out all types of electrical works. Details of earth resource ad their test date to be given to BHEL safety officer as per the prescribed formats of BHEL
- The subcontractor 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 subcontractor.
- 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 subcontractor shall maintain adequate number of qualified electricians to maintain his temporary electrical installations.
- Area wise Electrical safety inspection is to be carried out on monthly basis as per "Electrical Safety Inspection checklist' and the report is to be submitted to BHEL safety officer
- 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
- The subcontractor shall carefully follow the safety requirement of BHEL/ the purchaser with the regard to voltages used in critical areas.

11.3.8 **FIRE SAFETY**

- Providing appropriate fire fighting equipment at designated work place and nominate a fire officer/warden adequately trained for his job.
- Subcontractor shall provide enough fire protecting equipment of the types and numbers at his office, stores, temporary structure in labor 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 subcontractor of any of his responsibility and liabilities to fire incident occurring either to his materials or equipment or those of others.
- Emergency contacts nos must be displayed at prominent locations
- 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.

11.3.9 **SCAFFOLDING**

- 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.
- 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.

11.3.10 **WORK AT HEIGHT**:

- Guardrails and toe-board/barricades and sound platform conforming to IS:4912-1978 should be provided.

- Wherever necessary, life-line(pp or metallic) and fall arrestor along with Polyamide rope or Retractable lifeline should be provided.
- Safety Net as per IS:11057:1984 should be used extensively for prevention/ arrest of men and materials falling from height. The safety nets shall be fire resistant, duly tested and shall be of ISI marked 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.
- Reaching beyond barricaded area without lifeline support, moving with support of bracings, walking on beams without support, jumping from one level to another, throwing objects and taking shortcut must be discouraged.
- Use of Rebar steel for making Jhoola and monkey-ladder (Rods welded to vertical or inclined structural members), temporary platform etc. must be avoided.
- Monkey Ladder should be properly made and fitted with cages.
- Jhoola should be made with angles and flats and tested like any lifting tools before use.
- Lanyard must be anchored always and in case of double lanyard, each should be anchored separately.
- In case of pipe-rack, persons should not walk on pipes and walk on platforms only.
- In case of roof work, walking ladder/ platform should be provided along with lifeline and/ or fall arrestor.
- Empty drums must not be used.
- For chimney or structure painting, both hanging platform and men should be anchored separately to a firm structure alongwith separate fall arrestor. Rope ladder should be discouraged.

11.3.11 **WORKING PLATFORM**

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. 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.

11.3.12 **EXCAVATION**

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.

11.3.13 **LADDER SAFETY**

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.

A sketch of the ladders and scaffolds proposed to be used shall be prepared and approval of the Engineer obtained prior to Construction.

11.3.14 **LIFTING SAFETY**

- It will be the responsibility of the subcontractor to ensure safe lifting of the equipment, taking due precaution to avoid any incident and damage to other equipment and personnel.

- All requisite tests and inspection of handling equipment, tools & tackle shall be periodically done by the subcontractor by engaging only the Competent Persons as per law.
- Defective equipment or uncertified shall be removed from service.
- Any equipment shall not be loaded in excess of its recommended safe working load.

11.3.15 **HOISTING APPLIANCE**

- 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 incidentally displaced.
- When workers employed on electrical installations which are already energized, insulating 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.

11.4 ENVIRONMENTAL CONTROL

Environment protection has always been given prime importance by BHEL. Environmental damage is a major concern of the principal subcontractor and every effort shall be made, to have effective control measures in place to avoid pollution of Air, Water and Land and associated life. Chlorofluorocarbons such as carbon tetrachloride and trichloroethylene shall not be used. Waste disposal shall be done in accordance with the guidelines laid down in the project specification.

Any chemical including solvents and paints, required for construction shall be stored in designated bonded areas around the site as per Material Safety Data Sheet (MSDS).

In the event of any spillage, the principle is to recover as much material as possible before it enters drainage system and to take all possible action to prevent spilled materials from running off the site. The subcontractor shall use appropriate MSDS for clean-up technique

All subcontractors shall be responsible for the cleanliness of their own areas.

The subcontractors shall ensure that noise levels generated by plant or machinery are as low as reasonably practicable. Where the subcontractor anticipates the generation of excessive noise levels from his operations the subcontractor shall inform to Construction Manager of BHEL accordingly so that reasonable &practicable precautions can be taken to protect other persons who may be affected.
It is imperative on the part of the subcontractor 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.
The subcontractor shall carry out periodic air and water quality check and illumination level checking in his area of work place and take suitable control measure.

11.5 HOUSEKEEPING

- 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 subcontractor. Such cleanings has to be done by

subcontractor within quoted rate, on daily basis by an identified group. If such activity is not carried out by subcontractor / BHEL is not satisfied, then BHEL may get it done by other agency and actual cost along with BHEL overheads will be deducted from contractor's bill. Such decisions of BHEL shall be binding on the subcontractor

- Proper housekeeping to be maintained at work place and the following are to be taken care of on daily basis.
- All surplus earth and debris are removed/disposed off from the working areas to identified locations.
- Unused/Surplus cables, steel items and steel scrap lying scattered at different places/elevation within the working areas are removed to identified locations.
- All wooden scrap, empty wooden cable drums and other combustible packing materials, shall be removed from workplace to identified locations. Sufficient waste bins shall be provided at
- Different work places for easy collection of scrap/waste. Scrap chute shall be installed to remove scrap from high location.
- Access and egress (stair case, gangways, ladders etc.) path should be free from all scrap and other hindrances.
- Workmen shall be educated through tool box talk about the importance of housekeeping and encourage not to litter.
- Labour camp area shall be kept clear and materials like pipes, steel, sand, concrete, chips and bricks, etc. shall not be allowed in the camp to obstruct free movement of men and machineries.
- Fabricated steel structures, pipes & piping materials shall be stacked properly.
- No parking of trucks/trolleys, cranes and trailers etc. shall be allowed in the camp, which may obstruct the traffic movement as well as below LT/HT power line.
- Utmost care shall be taken to ensure over all cleanliness and proper upkeep of the working areas

11.6 WASTE MANAGEMENT

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.

11.6.1 BINS AT WORK PLACE

- Sufficient rubbish bins shall be provided close to workplaces.
- Bins should be painted yellow and numbered.
- Sufficient nos. of drip trays shall be provided to collect oil and grease.
- Sufficient qty. of broomsticks with handle shall be provided.
- Adequate strength of employees should be deployed to ensure daily monitoring and service for waste management.

11.6.2 STORAGE AND COLLECTION

- Different types of rubbish/waste should be collected and stored separately.
- Paper, oily rags, smoking material, flammable, metal pieces should be collected in separate bins with close fitting lids.
- Rubbish should not be left or allowed to accumulate on construction and other work places.
- Do not burn construction rubbish near working site.

11.6.3 **SEGREGATION**

- Earmark the scrap area for different types of waste.
- Store wastes away from building.
- Oil spill absorbed by non-combustible absorbent should be kept in separate bin.
- Clinical and first aid waste stored and incinerated separately.

11.6.4 **DISPOSAL**

- Sufficient containers and scrap disposal area should be allocated.
- All scrap bin and containers should be conveniently located.
- Provide self-closing containers for flammable/spontaneously combustible material.
- Keep drainage channels free from choking.
- Make schedule for collection and disposal of waste.

11.6.5 **WARNING AND SIGNS**

- Appropriate sign to be displayed at scrap storage area
- No toxic, corrosive or flammable substance to be discarded into public sewage system.
- Waste disposal shall be in accordance with best practice.
- Comply with all the requirements of Pollution Control Board (PCB) for storage and disposal of hazardous waste.

11.7 TRAFFIC MANAGEMENT SYSTEM

11.7.1 **SAFE WORKPLACE TRANSPORT SYSTEM**

- Traffic routes in a work place shall be suitable for the persons or vehicles using them. This shall be sufficient in number and of sufficient size. This shall reflect the suitability of traffic routes for vehicles and pedestrians.
- Where vehicles and pedestrians use the same traffic routes there shall be sufficient space between them. Where necessary all traffic routes must be suitably indicated. Pedestrians or vehicles must be able to use traffic routes without endangering those at work. There must be sufficient separation of traffic routes from doors, gates and pedestrian traffic routes.
- For internal traffic, lines marked on roads / access routes and between buildings shall clearly indicate where vehicles are to pass.
- Temporary obstacles shall be brought to the attention of drivers by warning signs or hazard cones.
- Speed limits shall be clearly displayed. Speed ramps preceded by a warning signs or marker are necessary.
- The traffic route should be wide enough to allow vehicles to pass and re-pass oncoming or parked traffic and it may be advisable to introduce on-way system or parking restrictions.
- Safest route shall be provided between places where vehicles have to call or deliver.
- Avoid vulnerable areas/items such as fuel or chemicals tanks or pipes, open or unprotected edges and structures likely to collapse

- Safe areas shall be provided for loading and unloading.
- Avoid sharp or blind bends. If this is not possible hazards should be indicated e.g. blind corner.
- Ensure road crossings are minimum and clearly signed.
- Entrance and gateways shall be wide enough to accommodate a second vehicle without causing obstruction.
- Set sensible speed limits which are clearly sign posted.
- Where necessary ramps should be used to retard speed. This shall be preceded by a warning sign or mark on the road.
- Forklift trucks shall not pass over road hump unless of a type capable of doing so.
- Overhead electric cable, pipes containing flammable hazardous chemical shall be shielded by using goal posts height gauge posts or barriers.
- Road traffic signs shall be provided on prominent locations for prevention of incidents and hazards and for quick guidance and warning to employees and public. Safety signs shall be displayed as per the project working requirement and guideline of the state in which project is done. Vehicles hired or used shall not be parked within the 15m radius of any working area. Any vehicle, that is required to be at the immediate/near the vicinity, shall be approved by the person in-charge of the site.

11.7.2 TRAFFIC ROUTE FOR PEDESTRIANS

- Where traffic routes are used by both pedestrians and vehicles road shall be wide enough to allow vehicles and pedestrians safely.
- Separate routes shall be provided for pedestrians to keep them away from vehicles. Provide suitable barriers/guard at entrances/exit and the corners or buildings.
- Where pedestrian and vehicle routes cross, appropriate crossing shall be provided.
- Where crowd is likely to use roadway e.g. at the end of shift, stop vehicles from using them at such times.
- Provide high visibility clothing for people permitted in delivery area.

11.7.3 WORK VEHICLE

Work vehicle shall be as safe stable efficient and roadworthy as private vehicles on public roads. Site management shall ensure that drivers are suitably trained. All vehicle e.g. heavy motor vehicle forklift trucks dump trucks mobile cranes shall ensure that the work equipment conforms to the following:

- o A high level of stability.
- o A safe means of access/egress.
- o Suitable and effective service and parking brakes.
- o Windscreens with wipers and external mirrors giving optimum all round visibility.
- o Provision of horn, vehicle lights, reflectors, reversing lights, reversing alarms.
- o Provision of seat belts.
- o Guards on dangerous parts.
- o Driver protection - to prevent injury from overturning and from falling objects/materials.
- o Driver protection from adverse weather.
- o No vehicle shall be parked below HT/LT power lines.
- o Valid Pollution Under Control certification for all vehicles

11.7.4 **DAILY CHECK BY DRIVER**

- There should also be daily safety checks containing below mentioned points by the driver before the vehicle is used.
  - Brakes.
  - Tires.
  - Steering.
  - Mirrors.
  - Windscreen waters.
  - Wipers.
  - Warning signals.
  - Specific safety system i.e. control interlocks
- Management should ensure that drivers carry out these checks.

11.7.5 **TRANSPORTATION OF PERSONNEL AND MATERIALS BY VEHICLES**

- All drivers shall hold a valid driving License for the class of vehicle to be driven and be registered as an authorized BHEL driver with the Administration Department.
- Securing of the load shall be by established and approved methods, i.e. chains with patented tightening equipment for steel/heavy loads. Sharp corners on loads shall be avoided when employing ropes for securing.
- All overhangs shall be made clearly visible and restricted to acceptable limits
- Load shall be checked before moving off and after traveling a suitable distance.
- On no account is construction site to be blocked by parked vehicles Drivers of vehicles shall only stop or park in the areas designate by the stringing foreman.
- Warning signs shall be displayed during transportation of material.
  All vehicles used by BHEL shall be in worthy condition and in conformance to the Land Transport requirement.

11.7.6 **MAINTENANCE**

All Vehicles used for transportation of man and material shall undergo scheduled inspections on frequent intervals to secure safe operation. Such inspections shall be conducted in particular for steering, brakes, lights, horn, doors etc. Site management shall ensure that work equipment is maintained in an efficient, working order and in good repair. Inspections and services carried out at regular intervals of time and or mileage. No maintenance shall be carried below HT/LT power lines.

11.8 EMERGENCY PREPAREDNESS AND RESPONSE

- Emergency preparedness and response capability of site shall be developed as per Emergency Preparedness and Response plan issued by Regional HQ
- Availability of adequate number of first aiders and fire warden shall be ensured with BHEL and its subcontractors
- All the subcontractor'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. Subcontractor should nominate his supervisor to coordinate and implement the safety measures.
- Assembly point shall be earmarked and access to the same from different location shall be shown
- Fire exit shall be identified and pathway shall be clear for emergency escape.

- Appropriate type and number of fire extinguisher shall be deployed as per Fire extinguisher deployment plan and validity shall be ensured periodically through inspection
- Adequate number of first aid boxes shall be strategically placed at different work places to cater emergency need. Holder of the first aid box shall be identified on the box itself who will have the responsibility to maintain the same.
- First aid center shall be developed at site with trained medical personnel and ambulance
- Emergency contact numbers (format given in EPRP) of the site shall be displayed at prominent locations.
- Tie up with fire brigade shall be done in case customer is not having fire station.
- Tie up with hospital shall be done in case customer is not having hospital.
- Disaster Management group shall be formed at site
- Mock drill shall be arranged at regular intervals. Monthly report of the above to be given to BHEL safety Officer as per prescribed BHEL formats
- Mock drill shall be conducted on different emergencies periodically to find out gaps in emergency preparedness and taking necessary corrective action

12.0 HSE INSPECTION

Inspection on HSE for different activities being carried out at site shall be done to ensure compliance to HSEMS requirements. The subcontractor shall maintain and ensure necessary safety measures as required for inspection and tests HV test, Pneumatic test, Hydraulic test, Spring test, Bend testetc 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.

12.1 DAILY HSE CHECKS

Both the Site Supervisors and safety officer of Subcontractor are to conduct daily site Safety inspection around work activities and premises to ensure that work methods and the sites are maintained to an acceptable standard. The following are to form the common subjects of a daily safety inspection:

- Personal Safety wears & gear compliance.
- Complying with site safety rules and permit-to-work (PTW).
- Positions and postures of workers.
- Use of tools and equipment etc. by the workers.

The inspection should be carried out just when work starts in beginning of the day, during peak activities period of the day and just before the day's work ends.

12.2 INSPECTION OF PPE

- PPEs shall be inspected by HSE officer at random once in a week as per format no. HSEP:13-F06 for its compliance to standard and compliance to use and any adverse observation shall be recorded in the PPE register.
- The applicable PPEs for carrying out particular activities are listed below.

12.3 INSPECTION OF T&Ps

- A master list of T&Ps shall be maintained by each subcontractor.
- All T&Ps being used at site shall be inspected by HSE officer once in a month as per format no. HSEP:13-F07 for its healthiness and maintenance.
- The T&Ps which require third party inspection shall be checked for its validity during inspection. The third party test certificate should be accompanied with a copy of the concerned competent person's valid qualification record.
- The validity of T&P shall be monitored as per "Status of T&Ps" format no. HSEP:13-F08

12.4 INSPECTION OF CRANES AND WINCHES

- Cranes and winches shall be inspected by the operator through a daily checklist for its safe condition (as provided by the equipment manufacturer) before first use of the day.
- Cranes and Winches shall be inspected by HSE officer once in a month as per format no. HSEP:13-F09 for healthiness, maintenance and validity of third party inspection.
- The date of third party inspection and next due date shall be painted on cranes and winches.
- The operators/drivers shall be authorized by sub-contractor based on their competency and experience and shall carry the I-card.
- The operator should be above 18 years of age and should be in possession of driving license of HMV man & goods), vision test certificate and should have minimum qualification so that he can read the instructions and check list.

12.5 INSPECTION ON HEIGHT WORKING

- Inspection on height working shall be conducted daily by supervisors before start of work to ensure safe working condition including provision of
    - Fall arrestor
    - Lifelines
    - Safety nets
    - Fencing and barricading
    - Warning signage
    - Covering of opening
    - Proper scaffolding with access and egress.
    - Illumination
- Inspection on height working shall be conducted once in a week by HSE officer as per format no. HSEP:14-F10.
- Medical fitness of height worker shall be ensured.
- Height working shall not be allowed during adverse weather.

12.6 INSPECTION ON WELDING AND GAS CUTTING OPERATION

- Supervisor shall ensure that no flammable items are available in near vicinity during welding and gas cutting activity.
- Gas cylinders shall be kept upright.
- Use of Flash back arrestor shall be ensured at both ends.

- Inspection during welding and gas cutting operations shall be carried out by HSE officer once a month as per format no. HSEP:14-F11.
- Use of fire blanket to be ensured to avoid falling of splatters during welding or gas cutting operation at height.
- Availability of fire extinguisher at vicinity shall be ensured.

12.7 INSPECTION ON ELECTRICAL INSTALLATION / APPLIANCES

- Ensure proper earthing in electrical installation
- Use ELCB at electrical booth
- Electrical installation shall be properly covered at top where required
- Use appropriate PPEs while working
- Use portable electrical light < 24 V in confined space and potentially wet area.
- Monthly inspection shall be carried out as per format no. HSEP:14-F12.

12.8 INSPECTION OF ELEVATOR

- Elevators shall be inspected by concerned supervisors once in a week as per format no. HSEP:14-F13.
- All elevators shall be inspected by competent person and validity shall be ensured.
- The date of third party inspection and next due date shall be painted on elevator.

13.0 HSE PERFORMANCE

HSE performance of the subcontractor shall be monitored as per the following parameters:

Sl. No.	Parameters of measurement
1	Timely deployment of qualified safety officer and cumulative number of days in a month the required no. of qualified safety officer is available
2	Shortfall in number of meetings in the month conducted or attended by the safety officer
3	Level of compliance wrt decisions taken in previous meetings/audit/inspection/as reported.
4	Delay in submission of monthly report on safety in the prescribed format
5	Delay in reporting any incident including near–miss to BHEL /Customer/statutory authority(if required)
6	Degree of PPE non-compliance
7	Non- conducting of health check-up as per BOCW equirements
8	Non availability of proper first-aid facility , ambulance, adequate labour welfare initiatives
9	Non conductance of induction training and tool box meeting
10	Total number of instances in the month, House keeping NOT attended inspite of instructions by BHEL i.e. removal/disposal of surplus earth/ debris/scrap/unused/surplus cable drums/other electrical items/surplus steel items/packing material

- Suitable HSE reward system shall be developed at site level to promote HSE compliance amongst workmen.
- To decide HSE reward performance towards HSE shall be evaluated for workmen and it shall be awarded regularly in public gathering.
- If safety record of the subcontractor 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 subcontractor may be considered by BHEL after completion of the job.

14.0 HSE PENALTIES

- As per contractual provision HSE penalties shall be imposed on subcontractors for non- compliance on HSE requirement as per format no. HSEP:14-F14. The list in the format is only indicative. For any other violation, not listed in the format, the minimum penalty amount is to be decided as per BOCW act.
- If principal customer/statutory and regulatory bodies impose some penalty on HSE due to the non-compliance of the subcontractor the same shall be passed on to them.
- The penalty amount shall be recovered by Site Finance department from subcontractors from the RA/Final bill.

15.0 OTHER REQUIREMENTS

- In case of any delay in completion of a job due to mishaps attributable to lapses by the subcontractor, BHEL shall have the right to recover cost of such delay from the payments due to the subcontractor, after notifying the subcontractor suitably.
- If the subcontractor 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 subcontractor 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 subcontractor after giving a notice of not less than 7 days indicating the steps that would be taken by BHEL.
- If the subcontractor succeeds in carrying out its job in time without any fatal or disabling injury incident and without any damage to property BHEL may, at its sole discretion, favorably consider to reward the subcontractor suitably for the performance.
- In case of any damage to property due to lapses by the subcontractor, BHEL shall have the right to recover the cost of such damages from the subcontractor after holding an appropriate enquiry.
- The subcontractor shall take all measures at the sites of the work to protect all persons from incidents and shall be bound to bear the expenses of defense of every suit, action or other proceeding of 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 subcontractor be paid to compromise any claim by any such person, should such claim proceeding be filed against BHEL, the subcontractor hereby agrees to indemnify BHEL against the same.
- The subcontractor 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, overalls shall be supplied by the subcontractor to the workmen and adequate facilities shall be provided to enable the working painters to wash during the cessation of work.
- The subcontractor 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 subcontractor shall adhere to such instructions.

- BHEL may prohibit the use of any construction machinery, which according to the organization is unsafe. No claim for compensation due to such prohibition will be entertained by BHEL.

16.NON COMPLIANCE

NONCONFORMITY OF SAFETY RULES AND SAFETY APPLIANCES WILL BE VIEWED SERIOUSLY AND BHEL HAS RIGHT TO IMPOSE FINES ON THE SUBCONTRACTOR AS UNDER FOR EVERY INSTANCE OF VIOLATION NOTICED:

SN	Violation of Safety Norms	Fine (in Rs)
01	Not Wearing Safety Helmet	200/- *
02.	Not wearing Safety Belt or not anchoring life line	500/-*
03	Not wearing safety shoe	200/-*
04	Not keeping gas cylinders vertically	200/-
05	Not using flash back arrestors	100/-
06	Not wearing gloves	50/- *
07.	Grinding Without Goggles	50/- *
08.	Not using 24 V Supply For Internal Work	500/-
09.	Electrical Plugs Not used for hand Machine	100/-
10.	Not Slinging properly	200/-
11.	Using Damaged Sling	200/-
12.	Lifting Cylinders Without Cage	500/-
13.	Not Using Proper Welding Cable With Lot of Joints And Not Insulated Property.	200/-
14.	Not Removing Small Scrap From Platforms	500/-
15.	Gas Cutting Without Taking Proper Precaution or Not Using Sheet Below Gas Cutting	500/-
16.	Not Maintaining Electric Winches Which are Operated Dangerously	500/-
17.	Improper Earthing Of Electrical T&P	500/-
18	No or improper barricading	500/-
19.	Activity carried out without Safety work permit (Height work, Lifting activity, Hot work-each person/case)	1000/-
20.	Incident Resulting in Partial Loss in Earning Capacity	25,000/- per victim
21.	Fatal Incident Resulting in total loss in Earning Capacity	1,00,000/- per victim for first instance #

- Legend:-

  *: per head. For repeated violation by the same person, the penalty would be double of the previous penalty. Date of "Repeated violation" will be counted from subsequent days.

  #: or as deducted by customer, whichever is higher. For repeated fatal incident in the same Unit incremental penalty to be imposed. The subcontractor will pay 2 times the penalty compared to previously paid in case there are repeated cases of fatal incidents under the same subcontractor for the same package in the same unit.

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 subcontractor. The amount collected above will be utilized for giving award to the employees who could avoid incident by following safety rules. Also the amount will be spent for purchasing the safety appliances and supporting the safety activity at site.

17.0 HSE AUDIT/INSPECTION

- Regular HSE Audit/inspection shall be carried out by Subcontractor as per Site HSE audit calendar.
- HSE checklist**(Annexure 02)**shall be used for carrying out audit/inspection and report shall be submitted to BHEL sitemangement
- All non-conformities and observations on HSE identified during internal or external HSE audit shall be disposed off by site in a time bound manner and reported back the implementation status
- Corrective action and Preventive action on HSE issues raised by certification body issued by Regional HQs shall be implemented by site and reported to Site management.

18.0 MONTHLY HSE REVIEW MEETING

- Site shall hold HSE review meeting every month to discuss and resolve HSE issues of site and improve HSE performance. It will also discuss the incidents occurred since previous meeting,its root causeand Corrective action and Preventive action.The agenda is given below:
  - Implementation of earlier MOM
  - HSE performance
  - HSE inspection
  - HSE audit and CAPA
  - HSE training
  - Health check-up camp
  - HSE planning for the erection and commissioning and installation activities in the coming month
  - HSE reward and promotional activities
- The meeting shall be chaired by Construction Manager, convened by HSE coordinator and attended by all HOS, Site Incharge of Subcontractors and HSE officer of Subcontractors.
- MOM on the discussion will be circulated to the concerned for implementation.

19.0 FORMATS USED(Details available in Annexure-04)

SL. No.	Format Name	Format No.	Rev No.
01	Inspection of First Aid Box	HSEP:13-F01	00
02	Health Check Up	HSEP:13-F02	00
03	HSE Induction Training	HSEP:13-F03	00
04	Tool Box Talk	HSEP:13-F04	00
05	Monthly Site HSE Report	HSEP:13-F05	00
06	Inspection of PPE	HSEP:13-F06	00

07	Inspection of T&Ps	HSEP:13-F07	00
08	Status of T&Ps	HSEP:13-F08	00
09	Inspection of Cranes and Winches	HSEP:13-F09	00
10	Inspection on Height Working	HSEP:13-F10	00
11	Inspection on Welding & Gas Cutting	HSEP:13-F11	00
12	Inspection on Electrical Installation	HSEP:13-F12	00
13	Inspection on Elevator	HSEP:13-F13	00
14	HSE Penalty	HSEP:13-F14	00
15	Accident /incident / property damage /fire incident report	HSEP:13-F15	00

20.0 ANNEXURES

ANNEXURE 01

As per Contract Labour (Regulation & Abolition Act), Central Rules, 1971,

(1) The first-aid box shall be distinctively marked with a Red Cross on a white background and shall contain the following items, namely:

(a) For establishments in which the number of contract labour employed does not exceed fifty, each first aid box shall contain the following equipment:

(i)	6 small sterilized dressings
(ii)	3 medium size sterilized dressings
(iii)	3 large size sterilized dressings
(iv)	6 pieces of sterilized eye pads in separate sealed packets.
(v)	6 roller bandages 10 cm wide.
(vi)	6 roller bandages 5 cm wide.
(vii)	One tourniquet
(viii)	A supply of suitable splints
(ix)	Three packets of safety pins.
(x)	Kidney tray.
(xi)	3 large sterilized burn dressings.
(xii)	1 (30ml) bottle containing a two percent alcoholic solution of iodine
(xiii)	1 (30 ml) bottle containing Sal volatile having the dose and mode of administration indicated on the label
(xiv)	1 snake bite lancet
(xv)	1 (30gms) bottle of potassium permanganate crystals.
(xvi)	1 pair scissors
(xvii)	1 copy of the First-Aid leaflet issued by the Director General, Factory Advice Service and Labour Institutes, Government of India.
(xviii)	A bottle containing 100 tablets (each of 5 grains) of aspirin
(xix)	Ointment for burns
(xx)	A bottle of suitable surgical anti-septic solution

(b) For establishment in which the number of contract labour exceeds fifty each first-aid box shall contain the following equipment:

(i)	12 small sterilized dressings
(ii)	6 medium size sterilized dressings
(iii)	6 large size sterilized dressings.
(iv)	6 large size sterilized burn dressings
(v)	6 (15 grams) packets sterilized cotton wool
(vi)	12 pieces of sterilized eye pads in separate sealed packets.

(vii)	12 roller bandages 10 cm wide.
(viii)	12 roller bandages 5 cm wide.
(ix)	One tourniquet.
(x)	A supply of suitable splints.
(xi)	Three packets of safety pins.
(xii)	Kidney tray.
(xiii)	Sufficient number of eye washes bottles filled with distilled water or suitable liquid clearly indicated by a distinctive sign which shall be visible at all times.
(xiv)	4 per cent Xylocaine eye drops, and boric acid eye drops and soda by carbonate eye drops.
(xv)	1 (60ml) bottle containing a two percent alcoholic solution of iodine
(xvi)	One (two hundred ml) bottle of mercurochrome (2 per cent) solution in water.
(xvii)	1 (120ml) bottle containing Sal volatile having the dose and mode of administration indicated on the label.
(xviii)	1 roll of adhesive plaster (6 cmX1 meter)
(xix)	2 rolls of adhesive plaster (2 cmX1 meter)
(xx)	A snake bite lancet.
(xxi)	1 (30 grams) bottle of potassium permanganate crystals.
(xxii)	1 pair scissors
(xxiii)	1 copy of the First-Aid leaflet issued by the Director-General, Factory Advice service and labour Institutes, Government of India.
(xxiv)	a bottle containing 100 tablets (each of 5 grains) of aspirin
(xxv)	Ointment for burns
(xxvi)	A bottle of a suitable surgical anti septic solution.

(2) Adequate arrangement shall be made for immediate recoupment of the equipment when necessary.

ANNEXURE 02

HSE AUDIT/INSPECTION CHECKLIST CUM COMPLIANCE REPORT

PROJECT:_____ SUBCONTRACTOR:_____

DATE : _____ OWNER :_____

INSPECTION BY:_____

Note : write 'NA' wherever the items is not applicable

Item	Yes	No	Remarks	Action
HOUSEKEEPING				
Waste containers provided and used				
Passageways and walkways clear				
General neatness of working area				
Other				
PERSONNELPROTECTIVEEQUIPTMENTS				
Goggles; shields				
Face protection				
Hearing protection				
Respiratory masks etc.				
Safety belts				
Other				
EXCAVATIONS / OPENINGS				
Openings properly covered or barricaded				
Excavations shored				
Excavations barricaded				
Overnight lighting provided				
Other				
WELDING, CUTTING				
Gas cylinders chained upright				
Cable and hoses not obstructing				
Fire extinguisher (s) accessible				
Others				
SCAFFOLDING				
Fully decked platforms				
Guard and intermediate rails in place				
Toe boards in place				
Adequate shoring				
Adequate access				
Others				
LADDER				
Extension side rails 1 m above				
Top of landing				
Properly secured				

Angle ± 70^0 from horizontal				
Other				
HOISTS, CRANES AND DERRICKS				
Condition of cables and sheaf OK				
Condition of slings, chains, hooks OK				
Inspection & maintenance log maintained				
Outriggers used				
Signals observed and understood				
Qualified operators				
Others				
MACHINERY, TOOLS & EQUIPMENT				
Proper instruction				
Safety devices				
Proper cords				
Inspection and maintenance				
Other				
VEHICLE AND TRAFFIC				
Rules and regulations observed				
Inspection and maintenance				
Licensed drivers				
Other				
TEMPORARY FACILITIES				
Emergency instructions posted				
Fire extinguishers provided				
Fire-aid equipment available				
General neatness				
Others				
FIRE PREVENTION				
Personnel instructed				
Fire extinguishers checked				
No smoking in prohibited areas.				
Hydrants				
Clearance				
Others				
ELECTRICAL				
Proper wiring				
ELCB's provided				
Ground fault circuit interrupters				
Protection against damage				
Prevention of tripping hazards				
Other				
HANDLING & STORAGE OF MATERIALS				
Properly stored or stacked				
Passageways clear				
Other				
FLAMMABLE GASES AND LIQUIDS				
Containers clearly identified				
Proper storage				
Fire extinguisher nearby				

Other				
WORKING AT HEIGHT				
Safety nets				
Safety belts				
Safety helmets				
Anchoring of safety belt to the life line rope				
ENVIRONMENT				
Lubricant waste/engine oils properly dispose.				
Waste from Canteen, offices, sanitation etc. disposed properly.				
Disposal of surplus earth, stripping materials, expired batteries, oily rags and combustible materials done properly.				
HEALTH CHECKS				
Hygienic conditions at labor camps O.K.				
Availability of first-aid facilities				
Proper sanitation at site, office & labor camps.				
Arrangement of medical facilities.				
Measures for dealing with illness.				
Availability of potable drinking water for workmen & staff.				
Provision of crèches for children.				

ANNEXURE 03

REFERENCES

- Contract documents
- Relevant legislations
- HSEMSM
- Relevant Indian standards as listed below (illustrative only):

SL NO	CODE NAME	TITLE
(1)	IS : 818-1888 (Reaffirmed 2003)	Code of Practice for safety and health requirements in Electric and Gas Welding and Cutting operations.
(2)	IS: 1179-1967 (Reaffirmed 2003)	Specification for Equipment for Eye & Face protection during welding.
(3)	IS : 1989 (Part 2):1986 (Reaffirmed 1997)	Specification for Leather Safety Boots & Shoes
(4)	IS:2925 – 1984 (Reaffirmed 2010)	Specification for Industrial Safety Helmets
(5)	IS:3521 : 1999 (Reaffirmed 2002)	Industrial Safety Belts & Harnesses-Specification
(6)	IS:3646(Part II) – 1966 (Reaffirmed 2003)	Code of Practice for Interior Illumination
(7)	IS:3696 (Part I) – 1987 (Reaffirmed 2002)	Safety Code for Scaffolds and Ladders
(8)	IS: 3696(Part 2) : 1991 (Reaffirmed 2002)	Scaffolds and Ladders-Code of Safety
(9)	IS:3786 – 1983 (Reaffirmed 2002)	Method for Computation of Frequency and Severity Rates for Industrial Injuries and Classification of Industrial Incidents
(10)	IS:4770 : 1991 (Reaffirmed 2006)	Rubber Gloves – Electricals purposes-Specification
(11)	IS:4912 : 1978 (Reaffirmed 2002)	Safety Requirements for Floor and Wall Openings, Railings and Toe Boards
(12)	IS: 5983 – 1980 (Reaffirmed 2002)	Specification for Eye-Protectors
(13)	IS:6519 – 1971 (Reaffirmed 1997)	Code of Practice for Selection, Care and Repair of Safety Footwear
(14)	IS:9167:1979	Specification for Ear-Protectors
(15)	IS:6994(Part I)-1973 (Re affirmed 1996)	Specification for Industrial Safety Gloves Leather and Cotton Gloves
(16)	IS:8519 – 1977 (Reaffirmed 1983)	Guide for Selection of Industrial Safety Equipment for Body Protection.
(17)	IS 11006 : 2011	Flash Back(Flame Arrestor) Specification

(18)	IS:8520 – 1977 (Reaffirmed 2002)	Guide for Selection of Industrial Safety Equipment for Eye, Face and Ear Protection.
(19)	IS:9473:2002	Respiratory Protective Devices-Filtering Half Masks to protect against Particles-Specification.
(20)	IS:9944:1992 (Reaffirmed 2003)	Natural and Man-made Fiber Rope Slings-Recommendations on Safe working loads.
(21)	IS:11057 – 1884 (Reaffirmed 2001)	Specification for Industrial Safety Nets
(22)	IS:12254:1993 (Reaffirmed 2002)	Polyvinyl Chloride (PVC) Industrial Boots-Specification
(23)	IS:13367(Part 1):1992 (Reaffirmed 20030	Safe Use of Cranes-Code of Practice
(24)	IS:14166:1994 (Reaffirmed 2002)	Respiratory Protective Devices-Full Face Masks Specification
(25)	IS:14746 : 1999 (Reaffirmed 2003)	Respiratory Protective Devices-Half Masks and Quarter Masks - Specification
(26)	IS : 15397 :2003 (Reaffirmed 2008)	Portable Extinguisher Mechanical Foam Type(Stored Pressure)-Specification
(27)	IS: 19011:2002	Guidelines for Quality and/or Environmental Management Systems Auditing

ANNEXURE 04 : SAFETY FORMATS
&
ANNEXURE 05 : WORK PERMIT FORMATS

	POWER SECTOR **INSPECTION OF FIRST AID BOX**	FORMAT NO: HSEP:13-F01 REV NO.: 00 PAGE NO. 01 OF 02

Name of Site :	
Name of Sub-Contractor :	
Inspected by :	
Date of Inspection :	

Number of employees on the site:-_____

Sl.No.	Item	No. Available	Remarks
1	No. of small sterilized dressings		
2	No of medium sized sterilized dressings		
3	No of large sized sterilized dressings.		
4	No of large sized sterilized burn dressings		
5	No of (15 grams) packets sterilized cotton wool		
6	No of pieces of sterilized eye pads in separate sealed packets.		
7	No of roller bandages 10 cm wide.		
8	No of roller bandages 5 cm wide.		
9	Whether tourniquet available		
10	Whether supply of suitable splints available.		
11	No of packets of safety pins.		
12	Whether kidney tray available		
13	Whether sufficient number of eye wash bottles, filled with distilled water or suitable liquid, clearly indicated by a distinctive sign which shall be visible at all times, available.		
14	Whether 4%-xylocaine eye drops, and boric acid eye drops and soda by carbonate eye drops available.		
15	Whether (60ml) bottle containing a two percent alcoholic solution of iodine available		
16	Whether (two hundred ml) bottle of mercurochrome (2 per cent) solution in water available.		

Sl.No.	Item	No. Available	Remarks
17	Whether 120ml bottle containing Sal volatile having the dose and mode of administration indicated on the label, available.		
18	Whether roll of adhesive plaster (6 cmX1 meter) available		
19	No of rolls of adhesive plaster (2 cmX1 meter)		
20	Whether snake bite lancet available.		
21	Whether (30 grams) bottle of potassium permanganate crystals available.		
22	Whether a pair scissors available		
23	Whether copy of the First-Aid leaflet issued by the Director-General, Factory Advice service and labour Institutes, Government of India available.		
24	Whether bottle containing 100 tablets (each of 5 grains) of aspirin available		
25	Whether Ointment for burns available		
26	Whether bottle of a suitable surgical anti septic solution available		

Signature of Subcontractor's Site I/C::

	POWER SECTOR	FORMAT NO: HSEP:13-F02 REV NO.: 00 PAGE NO. 01 OF 02
	HEALTH CHECK UP	

Name of Site :	
Name of Sub-Contractor :	
Name of Employee :	

NAME:

History Of Past Illness	H/O Epilepsy
	H/O Drug Allergy
	H/O Diabetics/ Hypertension
	H/O Unconsciousness
Personal History	

EXAMINATION		**OBSERVATION**	
General Physical Examination			
Height	:		
Weight	:		
BMI	:		
Built And nourishment	:		
Pallor	:		
Temperature	:		
Chest Expansion	:	Inspiration	Expansion
Lymph Node Enlargement	:		
Ear, Nose, Throat	:		
Ear	:		
Nose	:		
Throat	:		

EXAMINATION		OBSERVATION	
Cardiovascular System Examination :			
Inspection	:		
Palpation	:	Pulse	BP
Auscultation (Heart Sounds)	:		
Respiratory System	:		
Inspection	:	Respiratory Rate	
Palpation:	:		
Percussion	:		
Auscultation (Breath Sounds)	:		
Examination of Abdomen	:		
Inspection	:		
Palpation	:		
Auscultation (Bowel Sounds)	:		
Any Other	:		
Clinical Impression			

Signature of the examining doctor

	POWER SECTOR **HSE INDUCTION TRAINING**	FORMAT NO: HSEP:13-F03 REV NO.: 00 PAGE NO. 01 OF 01

Name of Site :	
Name of Sub-Contractor :	
Date :	
Name of Training Co-ordinator	

Sl No.	**Name**	**Designation**	**Organisation**	**Signature**

Signature of Training co-ordinator :

	POWER SECTOR **TOOL-BOX TALK**	FORMAT NO: HSEP:13-F04 REV NO.: 00 PAGE NO. 01 OF 01

Name of Site :	
Sub-Contractors Name :	
Date :	

Topic	**Name of person delivered Tool Box Talk**	**No. of Participants attended**	**Remarks**

Signature of Site I/C of Subcontractor :

	POWER SECTOR **PERSONAL PROTECTIVE EQUIPMENTS**	FORMAT NO: HSEP:13-F06 REV NO.: 00 PAGE NO. 01 OF 01

Name of Site :	
Name of Sub-Contractor :	
Inspected by :	
Date of Inspection :	

Item	**Issued this Month**	**Nos. Issued up to the Month**	**Percentage of usage at site**
Safety Helmet			
Safety Shoes			
Full Body Harness			
Fall Arrestor			
Safety Nets			
Other PPEs.			

Signature of Site I/C of Subcontractor :

	POWER SECTOR **INSPECTION OF T&Ps**	FORMAT NO: HSEP:13-F07 REV NO.: 00 PAGE NO. 01 OF 01

Name of Site :	
Name of Sub-Contractor :	
Date of Inspection :	

Sl.No.	Description	Remarks	
1.0	Name of equipment		
2.0	Basic Information of equipment		
2.1	Specification		
2.2	Sr. No. of equipment		
2.3	Make		
2.4	Year of manufacture		
3.0	Major repairs / overhauls(Furnish details of work carried out)		Date(s) of major repair/overhaul
3.1			
3.2			
3.3	Repairs carried out at site		
4.0	Any performance test conducted	Yes/No	
5.0	Document Submitted	Yes/No	
6.0	Manufacturer's test / guarantee certificate	Available/ Not available	
7.0	Performance test	Done/ Not Done	
8.0	Acceptance Norms		
9.0	Committee Observations		
10.0	Date of next review (if accepted)		

Signature-Site Safety Officer (BHEL)	**Signature-Subcontractor/ Subcontractor's Safety Officer**

	POWER SECTOR **STATUS OF T&Ps**	FORMAT NO: HSEP:13-F08 REV NO.: 00 PAGE NO. 01 OF 01

Name of Site	
Name of Sub-Contractor	
Date of Inspection	

Item	**Nos. Deployed**	**Identification No.**	**Nos. Tested by competent person**	**Validity of Test Certificate**
Winches				
Chain Blocks				
Wire Rope Slings				
Man Cages				
D-Shackles				
Air Compressors				
Crawler Cranes				
Mobile Cranes				
Hydra Cranes				
Others				

Signature of Site I/C of subcontractor :

	POWER SECTOR **INSPECTION OF CRANES AND WINCHES**	FORMAT NO: HSEP:13-F09 REV NO.: 00 PAGE NO. 01 OF 03

Name of Site :	
Name of Sub-Contractor :	
Inspected by :	
Date of Inspection:	

Crane Reg. No (Make/Model) _____

Name of Driver/Operator _____

Sl.no.	Description	Observation	Measures
1	Valid Driving license		
2	Hook & Hook Latch		
3	Over Hoist limit switch		
4	Boom limit switch		
5	Boom Angle Indicator		
6	Boom limit cutoff switch		
7	Condition of Boom		
8	Condition of ropes		
9	Number of load lines		
10	Size and condition of the slings		
11	Stability of the cranes		
12	Soil Condition		
13	Swing Break And Lock		
14	Proper Break And Lock		
15	Hoist Break And Lock		
16	Boom Break And Lock		
17	Main Clutch		
18	Leakage in Hydraulic Cylinders		
19	Out riggers filly extendable		
20	Tyre pressure		
21	Condition of Battery And Lamps		

Sl.no.	Description	Observation	Measures
22	Guards of moving and rotating parts		
23	Load chart provided		
24	Number and position of pedant ropes		
25	Reverse Horn		
26	Load Test Details		
27	Operator's fitness		
28	Pollution under control certificate		
29	Fire extinguisher of appropriate type.		
30	Training of the operator		

WINCH

Sl. No.	Description	YES	NO	NA	Remarks
1	Has the copy of Third Party Inspection certificate been provided in winch machine shed?				
2	Is winch machine operator experienced enough to operate the winch machine?				
3	Is the winch machine operated by someone other than the winch machine operator?				
4	Is there guard provided in all moving parts like wheel and motor's shaft?				
5	Will it protect against unforeseen operational contingencies?				
6	Are brakes, clutch and locking arrangement working properly?				
7	Has it been ensured that the guard does not constitute a hazard by itself?				
8	Are the cranks and the connecting rods protected by guardrails?				
9	Is there provision for fully covered shed with wooden plank roof?				

Sl. No.	Description	YES	NO	NA	Remarks
10	Is wire rope free from any kind of damage or wear and tear?				
11	Is split pin provided for the protection of clutch and brake locking arrangement?				
12	Is pulley inspected by competent person and certified before use?				
13	Is pulley free from any wear and tear visually?				
14	Is winch rope barricaded with clipsheet for the protection of rope and person?				
15	Is the wire rope lubricated by cardium oil?				
16	Is there any friction in wire rope which may damage the wire rope rather than the rolling parts?				
17	Is there any oil leakage in the hydraulic system of the winch machine?				
18	Has it been ensured that the guard will not cause discomfort or inconvenience to operator?				
	Total Number of NO:				
	Total Number of NA:				
	% Compliance :				

Signature of Site I/C of subcontractor :

	POWER SECTOR	FORMAT NO: HSEP:13-F10 REV NO.: 00 PAGE NO. 01 OF 02
	INSPECTION OF HEIGHT WORKING	

Name of Site :	
Name of Sub-Contractor :	
Inspected by :	
Date of Inspection:	

Sl. No.	**Descriptions**	**Observation (Yes/No)**	**Remarks**
1	All the workers have been explained safe work method?		
2	An established communication system has been established and explained to the workers.		
3	Adequate illumination has been ensured.		
4	Work area inspected prior to the start of the work.		
5	Area below the work place barricaded, particularly below hot work.		
6	Workers provided with bags /box to carry bolts, nuts and hand tools		
7	Arrangement for fastening hand tools made.		
8	All work platforms ensured to be of adequate strength and ergonomically suitable.		
9	Fabricated makeshift arrangements are checked for quality and type of material welding, anchoring etc.		
10.	Work at more than one elevation at the same segment is restricted.		
	ACCESS/EGRESS		
1	Walkways provided with handrail, mid-rail and toe guard?		
2	All checkered plates, gratings properly welded/ bolted?		
3	Are ladders inspected and they are in good condition?		
4	Are ladders spliced?		
5	Are ladders properly secured to prevent slipping, sliding or falling?		
6	Do side rails extend 36” above top landing?		
7	Are built up ladders constructed of sound materials?		

Sl. No.	Descriptions	Observation (Yes/No)	Remarks
8	Are rugs and cleats not over 12" on center?		
9	Metal ladders not used around electrical hazards.		
10	Proper maintenance and storage.		
11	Ladders placed at right slope.		
12	Ladders / staircases welded/ bolted properly.		
13	Any obstruction in the stairs.		
14	Are landing provided with handrails, knee rails, toe boards etc.?		
15	Whether ramp is provided with proper slope.		
16	Proper hand rails / guards provided in ramps.		
	Housekeeping		
1	Walkways, aisles & all overhead workplaces cleared of loose material.		
2	Flammable materials, if any, are cleared.		
3	All the de shuttering materials are removed after de shuttering is done.		
4	Platforms and walkways free from oil/grease or other slippery material.		
5	Collected scrap are brought down or lowered down and not dropped from height.		
	PPE And Safety Devices		
1	Use of safety helmet, safety belts ensured for all workers		
2	Anchoring points provided at all places of work.		
3	Common lifeline provided wherever linear movement at height is required.		
4	Safety nets are use wherever required.		
5	Proper fall arrest system is deployed at critical workplaces.		
6	Crawler boards/Safety system or works on fragile roof are used.		

Signature of Site I/C of subcontractor :

	POWER SECTOR **INSPECTION OF WELDING AND GAS CUTTING**	FORMAT NO: HSEP:13-F11 REV NO.: 00 PAGE NO. 01 OF 02

Name of Site	
Name of Sub-Contractor	
Inspected by	
Date of Inspection	

Welding				
Sl.no.	Description	Yes	No	Remarks
1	Is electric connection given through 30 mA ELCB/RCCB to welding m/c?			
2	Is electric cable fitted properly in junction box on m/c?			
3	Is electrical cable free from joints?			
4	Are the joints attached firmly & insulated with tape?			
5	Is double earthing given to body of m/c?			
6	Is the physical condition of the m/c good?			
7	Is ON/OFF switch connected to the m/c is working and in good condition?			
8	Are indication lamps on m/c working?			
9	Is the electrode holder in good condition?			
10	Are the cables of the welding m/c lugged & tight properly?			
11	Are return lead connected properly (Rod, Angle, Channels shall not be used)			
	Total No of NO			
	Total No of YES			

	POWER SECTOR **INSPECTION OF WELDING AND GAS CUTTING**	FORMAT NO: HSEP:13-F11 REV NO.: 00 PAGE NO. 02 OF 02

Gas Cutting				
Sl. no	Description	Yes	No	Remarks
1	Are Cylinders kept on trolleys?			
2	Physical condition of Gas cylinders Good?			
3	Is there Oil/Grease on valve of the cylinder?			
4	Are pressure regulators in good condition?			
5	Condition of hose pipe OK?			
6	Are hose pipe clamped with hose clip?			
7	Is flash back arrestor & NRV fitted on torch both for O2 and LPG cylinder?			
8	Is nozzle of the torch cleaned?			
	Total Number of NO			
	Total No of YES			
	% Compliance			

Signature of Site I/C of subcontractor :

	POWER SECTOR **INSPECTION OF ELECTRICAL INSTALLATION**	FORMAT NO: HSEP:13-F12 REV NO.: 00 PAGE NO. 01 OF 02

Name of Site	
Name of Sub-Contractor	
Inspected by	
Date of Inspection:	

Sr. No.	**Contents**	**Yes/No**	**Remarks**
A	**Cable**		
1.	Whether the condition of cable is checked?		
2.	Are cables received from other sites checked for insulation resistance before putting them into use?		
3.	Are all main cables taken either underground / overhead?		
4.	Are welding cables routed properly above the ground?		
5.	Are welding and electrical cables overlapping?		
6.	Is any improper joining of cables/wires prevailing at site?		
B	**DBs/SDBs**		
1.	Is earth conductor continued upto DB / SDB?		
2.	Whether DBs and extension boards are protected from rain / water?		
3.	Is there any overloading of DBs / SDBs?		
4.	Are correct / proper fuses & CBs provided at main boards and sub-boards?		
5.	Is energized wiring in junction boxes, CB panels & similar places covered all times?		
C	**ELCB**		
1.	Whether the connections are routed through ELCB?		
2.	Is ELCB sensitivity maintained at 30 mA?		

Sr. No.	**Contents**	**Yes/No**	**Remarks**
3.	Are the ELCB numbered and tested periodically & test results recorded in a logbook countersigned by a competent person?		
D	**Grounding**		
1.	Is natural earthing ensured at the source of power (main DB at Generator or Transformer)?		
2.	Whether the continuity and tightness of the earth conductor are checked?		
3.	Mention the gauge of the earth conductor used at the site.		
4.	Mention the value of Earth Resistance.		
E	**Electrically operated Machines or Accessories**.		
1.	Whether the plug top is provided everywhere.		
2.	Are all metal parts of electrical equipment and light fittings / accessories grounded?		
3.	Is there any shed or cover for welding machines?		
4.	Are halogen lamps fixed at proper places?		
5.	Are portable power tools maintained as per norms?		
6.	Any other information:		

Signature of Site I/C of subcontractor :

	POWER SECTOR **INSPECTION OF ELEVATOR**	FORMAT NO: HSEP:13-F13 REV NO.: 00 PAGE NO. 01 OF 01

Name of Site	
Name of Sub-Contractor	
Inspected by	
Date of Inspection	

Sr. No.	**Description**	**Remarks**
1.0	Name of equipment	
2.0	Basic Information of equipment	
2.1	Specification	
2.2	Sr. No. of equipment	
2.3	Make	
2.4	Year of manufacture	
3.0	Major repairs/overhauls(Furnish details of work carried out)	Date(s) of major repair/overhaul
3.1		
3.2		
3.3	Repairs carried out at site	
4.0	Any performance test conducted	Yes/No
5.0	Document Submitted	Yes/No
6.0	Manufacturer's test / guarantee certificate	Available/ Not available
7.0	Performance test	Done/ Not Done
8.0	Acceptance Norms	
9.0	Committee Observations	
10.0	Date of next review (if accepted)	

Signature-Subcontractor/ Subcontractor's Safety Officer	**Signature-Site Safety Officer (BHEL)**

Sub: MEMO for Penalty for non compliances in Safety

Following lapse (tick marked) was observed and penalty is imposed as stated at the bottom of this memo. It is requested that such occurrences be please avoided in future.

Safety Area

SN	Violation of Safety Norms	Fine (in Rs)
01	Not Wearing Safety Helmet	200/- *
02.	Not wearing Safety Belt or not anchoring life line	500/-*
03	Not wearing safety shoe	200/-*
04	Not keeping gas cylinders vertically	200/-
05	Not using flash back arrestors	100/-
06	Not wearing gloves	50/- *
07.	Grinding Without Goggles	50/- *
08.	Not using 24 V Supply For Internal Work	500/-
09.	Electrical Plugs Not used for hand Machine	100/-
10.	Not Slinging properly	200/-
11.	Using Damaged Sling	200/-
12.	Lifting Cylinders Without Cage	500/-
13.	Not Using Proper Welding Cable With Lot of Joints And Not Insulated Property.	200/-
14.	Not Removing Small Scrap From Platforms	500/-
15.	Gas Cutting Without Taking Proper Precaution or Not Using Sheet Below Gas Cutting	500/-
16.	Not Maintaining Electric Winches Which are Operated Dangerously	500/-
17.	Improper Earthing Of Electrical T&P	500/-
18	No or improper barricading	500/-
19.	Activity carried out without Safety work permit (Height work, Lifting activity, Hot work-each person/case)	1000/-
20.	Incident Resulting in Partial Loss in Earning Capacity	25,000/- per victim
21.	Fatal Incident Resulting in total loss in Earning Capacity	1,00,000/- per victim for first instance #

Legend:-

*: per head. For repeated violation by the same person, the penalty would be double of the previous penalty. Date of "Repeated violation" will be counted from subsequent days.

#: or as deducted by customer, whichever is higher. For repeated fatal incident in the same Unit incremental penalty to be imposed. The subcontractor will pay 2 times the penalty compared to previously paid in case there are repeated cases of fatal incidents under the same subcontractor for the same package in the same unit.

Details (if any) related to non- compliance (Name of persons, Nature of deficiency, etc.)

_____

Penalty imposed:

1, Rate as per above chart_____

2. No. of Persons/ machine/ event/ labour _____

3. Total Penalty= 1. X 2. =_____

Signature :

Witnessed by: (Sub- Contractor representative) (BHEL Personnel)

Name_____ Name_____

Distribution: 1 Copy: to Sub- contractor,
1 Copy to Site Construction Manager(BHEL)

बीएचईएल BHEL	**POWER SECTOR- HQ** **Incident Report** (To be submitted within 24 hours of time of incident)	FORMAT NO: HSEP:13-F15 REV NO.: 00 PAGE NO. 01 OF 01

Type of incident: Fatal/Major/ Minor/Fire/Property Damage/Near-miss

1	NAME OF SITE		3	ACTIVITY AREA	
2	SCOPE OF WORK		4	NAME OF CONTRACTOR	
			5	NAME & DESIGNATION OF BHEL ACTIVITY I/C	
6	DATE & TIME OF ACCIDENT		7	DATE RESUMED	
8	NO. OF WORK-DAYS LOST BY VICTIM (If duty not resumed, give estimated figure)				
9	NO. OF MANHOURS LOST BY OTHERS				
10	PERSONAL DETAILS OF INJURED AND / OR DETAILS OF MATERIALS / EQUIPMENT / PROPERTY DAMAGED				

NAME				NAME OF MATERIAL / EQUIPMENT / PROPERTY	
PERIOD OF EMPLOYMENT					
AGE	YRS	SEX	MALE/ FEMALE	ESTIMATED COST	ACTUAL COST
MARITAL STATUS		SINGLE / MARRIED			
OCCUPATION				NATURE OF DAMAGE	
PART OF BODY INJURED					
NATURE OF INJURY					
AGENCY (OBJECT / EQUIPMENT / SUBSTANCE) MOST RESPONSIBLE FOR CAUSING ACCIDENT / INJURY / DAMAGE					
12	PERSON (NAME & DESIGNATION) WITH MOST CONTROL OVER AGENCY (OBJECT / EQUIPMENT / SUBSTANCE) CAUSING ACCIDENT INJURY / DAMAGE				
13	DESCRIBE CLEARLY HOW THE ACCIDENT OCCURRED (USE ADDITIONAL SHEET, IF REQUIRED				
ANALYSIS					
14	WHAT ACTS AND / OR CONDITIONS CONTRIBUTED MOST DIRECTLY TO THIS ACCIDENT				
15	WHAT ARE THE BASIC REASON FOR THE EXISTENCE OF THESE ACTS AND / OR CONDITION ?				
16	WHAT CORRECTIVE ACTIONS HAVE BEEN TAKEN TO PREVENT ACCIDENT RECURRENCE ?				
	DATE :			SIGNATURE OF SITE HSE COORDINATOR	
17	COMMENTS OF HEAD / SOX				
	DATE:			SIGNATURE OF HEAD/SOX	

	SAFETY WORK CLEARANCE	**Permit no.**
	Project:	**Emergency Contact Nos:**
	Subcontractor:	

BURNING/WELDING /HOT WORK PERMIT

Area : _____ Date: _____ Time: _____

Name of Site Engineer (Permit Requesting Authority): _____ Sign: _____

Name of Work Performing Contractor: _____

Name of Package In charge: _____ Sign: _____ Date: _____

Description of Work: _____

_____

Work Execution Date: _____ Time Valid from: _____ to _____

The above signing person(s) will be responsible to ensure that the above described work will be done under all the safety precautions mentioned on the permit to work.

The following precautions are to be taken:

No.	Item	Yes	Not required
1.	Proper Access/Exit available		
2.	Proper ventilation and /or lighting provided.		
3.	Proper and safe scaffolding, platform, ladder provided.		
4.	Welding machine located in a clean and dry area.		
5.	Welding machine grounded at the equipment and proper leakage current protection device (ELCB) provided for welding machine.		
6.	Emergency STOP buttons are in working condition. Welder /Helper knows how to operate it.		
7.	Welding machine input/output cables, welding holder and weld return clamp (Holder) are insulated and in good condition.		
8.	Welder & Fitter trained to connect ground/work return clamps (Holder) to work place prior to energization of welding machine.		
9.	Gas cylinders are stacked vertically and not below the welding / cutting area. Regulator key is available with cylinder.		
10.	Pressure gauges/Flash back arrestor provided and in working condition.		
11.	Personal Protective equipment Minimum applicable: safety helmet, safety goggles, welding helmet, safety shoes, leather gloves, long sleeve and nose mask -provided		
12.	In case of pits, water removed from the pit and wood/rubber insulation provided.		
13.	Safety signboards are in place.		
14.	Adequate and Suitable nos. of fire fighting extinguisher provided.		
15.	Nearby combustible material removed. Housekeeping done.		
16.	Other		

Name of Contractor Safety Officer: _____ Sign: _____ Date: _____ Time: _____

Reviewed and approved by BHEL Site Engineer (Permit Issuing Authority):

Name: _____ Sign: _____ Date: _____ Time: _____

Name of BHEL Safety Representative: _____ Sign: _____

I understand the precaution to be taken as described above and as per project requirement and hereby confirm that work will be executed under my supervision by following all precaution and Safety Rules.

Name of Work Performing Authority: _____**Sign:** _____ **Date:** _____ **Time:** _____

Permit Cancellation:

I hereby declare that the work is complete, all workers under my control have been withdrawn and the site restored to safe tidy condition.

Name of Work performing Authority: _____ Sign: _____ Date: _____ Time: _____

Name of Site Engr. (Permit Requesting Authority): _____ Sign: _____ Date: _____ Time: _____

Name of BHEL Site Engr. (Permit Issuing Authority): _____ Sign: _____ Date: _____ Time: _____

(This permit is valid only for the date it is issued)

Original at BHEL site **Second Copy – BHEL SAFETY** **Third Copy : Contractor**

SAFETY WORK CLEARANCE	Permit no.
Project:	**Emergency Contact Nos:**
Subcontractor:	

LIFTING ACTIVITY PERMIT

Area : _____ Date: _____ Time: _____

Name of Site Engineer (Permit Requesting Authority): _____ Sign: _____

Name of Work Performing Contractor: _____

Name of Package In charge: _____ Sign: _____ Date: _____

Description of Work: _____

_____

Work Execution Date: _____ Time Valid from: _____ to _____

The above signing person(s) will be responsible to ensure that the above described work will be done under all the safety precautions mentioned on the permit to work.

The following precautions are to be taken:

No.	Item	Yes	Not required
1.	Crane used for lifting activity tested, certified and approved for rated lifting		
2.	All lifting tackles, gears/appliances are tested and certified for lifting works.		
3.	Crane operator is trained and competent for lifting operation.		
4.	Lifting sling/ belt is protected against sharp edge of the jobs to be lifted.		
5.	Access and exit marked and without obstruction.		
6.	Lifting arrangement adequate.		
7.	Uwanted rubbish material removed from work platform.		
8.	Minimum 2 guidelines have been provided for balancing and guiding jobs to be lifted.		
9.	Periphery area of crane booms as well as lifting job is barricaded and unauthorised/no-entry sign board posted.		
10.	Rigger and signal man is trained and competent for lifting work.		
11.	No lifting activity to be carried out during lightening, heavy wind/rain.		
12.	If scaffolding to be used during lift, scaffolding with valid tag available for use.		
13.	Double lanyards safety harness/belt checked an in working condition.		
14.	Safety shoes (non-slip), helmet with chin strap available with employees.		
15.	Others.		

Name of Contractor Safety Officer: _____ Sign: _____ Date: _____ Time: _____

Reviewed and approved by BHEL Site Engineer (Permit Issuing Authority):

Name: _____ Sign: _____ Date: _____ Time: _____

Name of BHEL Safety Representative: _____ Sign: _____

I understand the precaution to be taken as described above and as per project requirement and hereby confirm that work will be executed under my supervision by following all precaution and Safety Rules.

Name of Work Performing Authority: _____**Sign:** _____ **Date:** _____ **Time:** _____

Permit Cancellation:

I hereby declare that the work is complete, all workers under my control have been withdrawn and the site restored to safe tidy condition.

Name of Work performing Authority: _____ Sign: _____ Date: _____ Time: ____

Name of Site Engr. (Permit Requesting Authority): _____ Sign: _____ Date: _____ Time: ____

Name of BHEL Site Engr. (Permit Issuing Authority): _____ Sign: _____ Date: _____ Time: ____

(This permit is valid only for the date it is issued)

Original at BHEL site **Second Copy – BHEL SAFETY** **Third Copy : Contractor**

SAFETY WORK CLEARANCE	Permit no.
Project:	**Emergency Contact Nos:**
Subcontractor:	

WORKING AT HEIGHT PERMIT

Area : _____ Date: _____ Time: _____

Name of Site Engineer (Permit Requesting Authority): _____ Sign: _____

Name of Work Performing Contractor: _____

Name of Package In charge: _____ Sign: _____ Date: _____

Description of Work: _____

_____

Work Execution Date: _____ Time Valid from: _____ to _____

The above signing person(s) will be responsible to ensure that the above described work will be done under all the safety precautions mentioned on the permit to work.

The following precautions are to be taken:

No.	Item	Yes	Not required
1.	All workers on job are medically fit for working at height (Person should not have vertigo)		
2.	Scaffolding with valid tag available for use		
3.	Safety harness with life line support/ fall arrester are checked and in working condition		
4.	Safety shoes (non-slip), Helmet with chin strip available with employees		
5.	Safety nets are provided as per design and provided 25 ft. below working area & extending 8 ft beyond.		
6.	Horizontal life lines are provided to cater to design specification of 2300kg per person.		
7.	Ladders have been inspected and provided as per BHEL standard/contract.		
8.	All lifting / tightening tools, hand tools/equipment checked and in good condition		
9.	Access and exit marked and without obstruction.		
10.	Lighting arrangement adequate.		
11.	Unwanted and rubbish material removed from working platform.		
12.	Electrical cable, welding Hose/Compressed air hose properly secured and lay down without obstruction.		
13.	Signboards provided on working platforms		
14.	Hazards in the vicinity are identified and communicated to the worker.		
15.	Other		

Name of Contractor Safety Officer: _____ Sign: _____ Date: _____ Time: _____

Reviewed and approved by BHEL Site Engineer (Permit Issuing Authority):

Name: _____ Sign: _____ Date: _____ Time: _____

Name of BHEL Safety Representative: _____ Sign: _____

I understand the precaution to be taken as described above and as per project requirement and hereby confirm that work will be executed under my supervision by following all precaution and Safety Rules.

Name of Work Performing Authority: _____**Sign:** _____ **Date:** _____ **Time:** _____

Permit Cancellation:

I hereby declare that the work is complete, all workers under my control have been withdrawn and the site restored to safe tidy condition.

Name of Work performing Authority: _____ Sign: _____ Date: _____ Time: ____

Name of Site Engr. (Permit Requesting Authority): _____ Sign: _____ Date: _____ Time: ____

Name of BHEL Site Engr. (Permit Issuing Authority): _____ Sign: _____ Date: _____ Time: ____

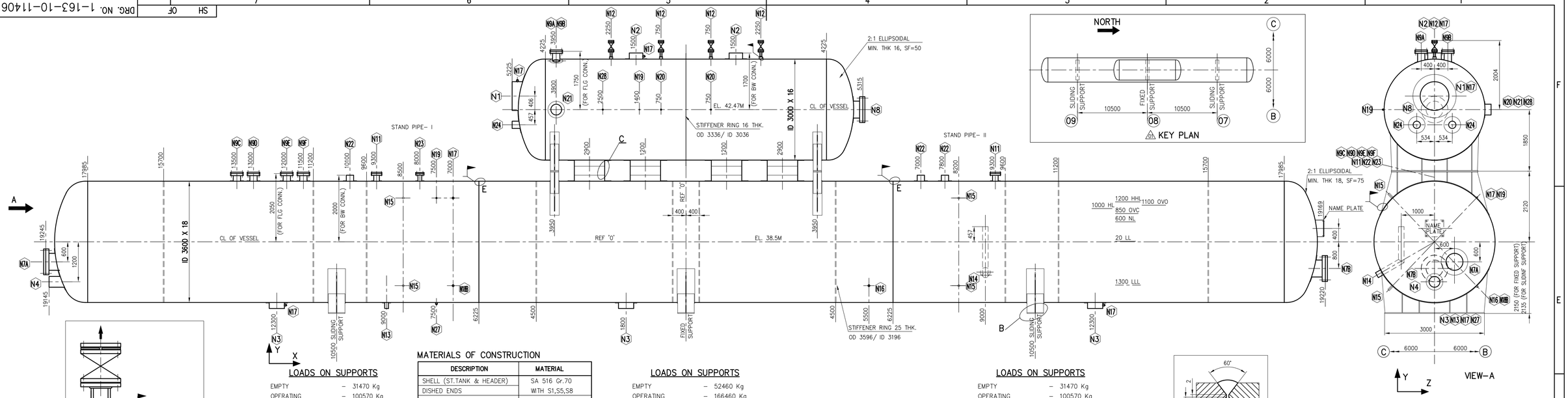
(This permit is valid only for the date it is issued)

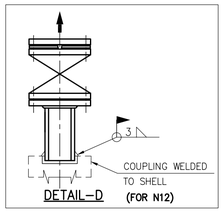
Original at BHEL site **Second Copy – BHEL SAFETY** **Third Copy : Contractor**

FIRST ANGLE PROJECTION

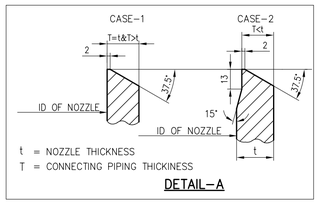
(ALL DIMENSIONS ARE IN mm)

DRG. NO. 1-163-10-11406 SH OF

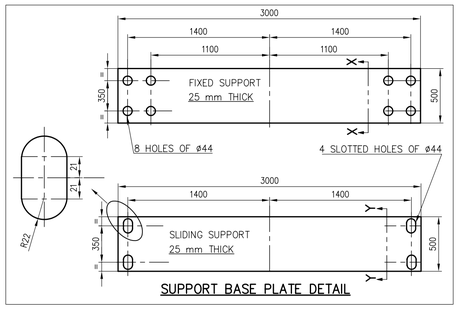




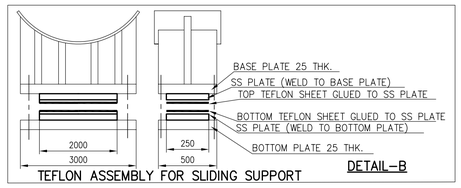
DETAIL-D



DETAIL-A

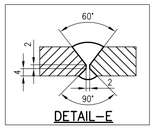


SUPPORT BASE PLATE DETAIL

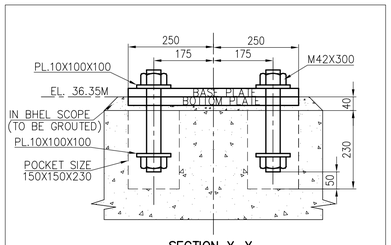


TEFLON ASSEMBLY FOR SLIDING SUPPORT

DETAIL-B

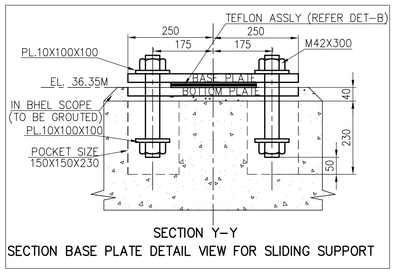


DETAIL-E



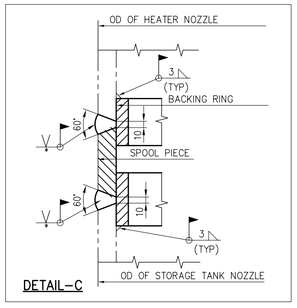
SECTION X-X

SECTION BASE PLATE DETAIL VIEW FOR FIXED SUPPORT



SECTION Y-Y

SECTION BASE PLATE DETAIL VIEW FOR SLIDING SUPPORT



DETAIL-C

MATERIALS OF CONSTRUCTION

DESCRIPTION	MATERIAL
SHELL (ST.TANK & HEADER)	SA 516 Gr.70
DISHED ENDS	WITH S1,S5,S8
NOZZLE STUBS	SA 106 GR.B
TRAYS	SA 240 TP 304
COVERS FOR MAN HOLES	SA 105
TRAY REMOVAL OPENINGS	SA 106 Gr.B
SPRAY VALVE	SS TP 316
IMPINGEMENT PLATE	SA 240 TP 304L
FOUNDATION BOLTS	SA 193 B7/ 2H

LOADS ON SUPPORTS

EMPTY – 31470 Kg
OPERATING – 100570 Kg
FLOODED – 158360 Kg
HORIZONTAL – 6334 Kg

LOADS ON SUPPORTS

EMPTY – 52460 Kg
OPERATING – 166460 Kg
FLOODED – 241980 Kg
HORIZONTAL – 0 Kg

LOADS ON SUPPORTS

EMPTY – 31470 Kg
OPERATING – 100570 Kg
FLOODED – 158360 Kg
HORIZONTAL – 6334 Kg

DESIGN DATA

DESCRIPTION			
DESIGN PRESSURE		(atg)	9 & FULL VACUUM
HYDROTEST PRESSURE		(atg)	11.7
STORAGE TANK DESIGN TEMPERATURE (MAX/MIN)		°C	360/0
HEATER DESIGN TEMPERATURE (MAX/MIN)		°C	360/0
HYDROTEST TEMPERATURE (MAX/MIN)		°C	AMBIENT/17
RADIOGRAPHY			FULL
CORROSION ALLOWANCE	SHELLS/ HEADS	mm	3.2
	RF PADS/ NOZZLES/ FLANGES	mm	1.6
OXYGEN CONTENT AT OUTLET		(cc/lit)	0.005
STORAGE TANK CAPACITY (BETWEEN NL & LLL FOR 6 MINUTES CAPACITY)		(cu.m)	226
OPERATING PRESSURE		(ata)	6.61
OPERATING TEMP.		°C	161.9
NO OF TRAYS			576
NO OF SPRAY NOZZLES			108
WEIGHTS	DRY	(kgs)	115400
	OPERATING	(kgs)	367600
	FLOODED	(kgs)	558700
INSPECTION			AS PER APPROVED QUALITY PLAN
JOINT EFFICIENCY			1

ALLOWABLE RESULTANT FORCES, MOMENTS & THERMAL MOVEMANTS AT DESIGN CONDITION

REF.	F(Kg)	M(Kg-M)	△X(MM)	△Y(MM)	△Z(MM)
N1	158606	32354	−24.47	31.95	0
N2	11442	4715	±7.34	37.31	0
N3	13285	6245	±60.22, −8.81	1.71	0
N4	43865	5215	−91.71	4.65	0
N13	6907	1259	−44.06	1.71	0
N14	7763	1853	44.06	6.12	−7.63
N21	9598	3300	−19.09	29.96	7.34
N22	8583	2413	−49.45, 34.27, 38.19	19.34	0
N23	6907	1259	−39.17	19.34	0
N24	34654	3084	−24.43	27.73	±2.61

LIST OF NOZZLE CONNECTIONS

REF.	DESCRIPTION	SIZE	ODxthk/CONNECTING PIPE THK	QTY	END CONN.	REMARKS	REF.
N1	EXTRACTION STEAM INLET CONN.	34"	864x16/10	1	BW		N1
N2	CONDENSATE INLET	16"	406.4x16/9.53	2	BW		N2
N3	FEED WATER OUTLET	18"	457x16/12.7	3	BW	WITH VORTEX BREAKER	N3
N4	START UP HEATING STEAM INLET CONN.	12"	323.9x17.48/9.53	1	BW		N4
N7A,B	MAN HOLE	20"	508x16	2	FL 300# RF		N7
N8	TRAY REMOVAL OPENING	20"	508x16	1	FL 300# RF		N8
N9A TO F	SAFETY RELIEF VALVE CONN.	8"	219.1x12.7	6	FL 300# RF	8"−300#/10"−150#	N9A TO F
N11	VENTILATOR	6"	168.3x10.97	2	FL 300# RF	REFER NOTE−11	N11
N12	VENT CONN.	2"	COUPLING 6000#	4	SW	REFER NOTE−13	N12
N13	DRAIN	4"	114.3x11.13/6.02	1	BW		N13
N14	OVER FLOW CONN.	6"	168.3x10.97/7.11	1	BW		N14
N15	STAND PIPE	2"	60.3x8.74	4	BW		N15
N16	SAMPLING CONNECTION	1"	COUPLING 6000#	1	SW		N16
N17	THERMOMETRER CONN. (THERMOWELL)	M33X2	SPECIAL COUPLING	5	SCREWED		N17
N18B	CONN. FOR RTD	M33X2	SPECIAL COUPLING	1	SCREWED		N18B
N19	PRESSURE GAUGE CONN.	1/2"	COUPLING 6000#	2	SW		N19
N20	PRESSURE TRANSMITTER CONN.	1/2"	COUPLING 6000#	2	SW		N20
N21	CBD TANK VENT	12"	323.9x17.48/9.53	1	BW		N21
N22	RECIRCULATION CONN. (BFP)	8"	219.1x12.7/30	3	BW	WITH DISPERSER	N22
N23	INITIAL FILLING CONN.	4"	114.3x11.13/4.0	1	FL 300# RF		N23
N24	HPH−5 DRIP CONN.	8"	219.1x12.7/6.35	2	BW	WITH DISPERSER	N24
N27	PG TEST THERMOWELL CONN.	M33X2	SPECIAL COUPLING	1	SCREWED		N27
N28	PG TEST PRESSURE TAP POINT CONN.	1/2"	COUPLING 6000#	1	SCREWED		N28

LIST OF FITTINGS & VALVES

REF.	DESCRIPTION	QTY	REMARKS
F1	COMPOUND PRESSURE GAUGE Kg/sq.cm.(g)	2	−1 to +10
F2	VENT ORIFICE PLATE	4	
F3	PG TEST THERMOWELL	1	
F4	LEVEL GAUGE (CC=2000)	4	1" SW
F5	LEVEL SWITCH (CC=350)	4	1" SW
F6	TEMPERATURE GAUGE	5	0−300°C
F7	THERMOWELL	6	
V1	STAND PIPE ISOLATION VALVE	4	2" 800# SW
V2	SAMPLING VALVE	1	1" SW
V3	SAFETY RELIEF VALVE (SET PRESS. ✳ REL.CAP. 60 T/hr/EACH)	6	8" 300# RF/10" 150# RF
V4	VENT VALVE	4	2" 300# RF
V5	ISOLATION VALVE FOR PRESSURE GAUGE CONN	2	1/2" 800# SW
V6	ISOLATION VALVE FOR LG CONN	8	1" 800# SW
V7	ISOLATION VALVE FOR LT CONN	6	1" 800# SW
V8	VENT & DRAIN VALVES FOR STAND PIPE	4	1" 800# SW
V9	ISOLATION VALVE FOR PRESSURE TRANSMITTER	2	1/2" 800# SW
V10	ISOLATION VALVE FOR PG PRESSURE TEST CONN	1	1/2" 800# SW
V11	VENT & DRAIN VALVE FOR LG	8 **	1/2" 800# SW
V12	ISOLATION VALVE FOR LEVEL SWITCHES	6	1" 800# SW
V13	VENT & DRAIN VALVE FOR LS	6 **	1/2" 800# SW

**= THESE ARE BUILT IN PARTS OF LEVEL GAUGE & LEVEL SWITCH AND NEED NOT BE SUPPLIED SEPERATELY

✳ 2 VALVE− SET PR 9.0 KG/CM^2(g)
✳ 2 VALVE− SET PR 8.5 KG/CM^2(g)
✳ 2 VALVE− SET PR 8.0 KG/CM^2(g)

NOTES:−

1, HYDRO TEST BLANKING PLATE OF NOZZLES SHALL BE CUT AT SITE AND EDGE PREPARED AS PER DET−A.

2, SPOOL PIECES CONSTRUCTED OF SA516/70 WILL BE SUPPLIED TO AID IN PROPER FIT UP OF DOWN COMMERS AND EQUALIZERS. 2 BACKING RINGS WILL BE SUPPLIED WITH EACH SPOOL PIECE (REFER DET−C).

3, PAINTING
EXTERNAL: STORAGE TANK AND HEATER− TWO COATS OF HEAT RESISTANT ALUMINIUM PAINT.
DFT/COAT= 20 MICRONS (TOTAL DFT= 40 MICRONS)
INTERNAL: HEATER: NIL, STORAGE TANK: TEMPRORY RUST PREVENTIVE PAINT.

4, SHIPPING
HEATER: WILL BE DESPATCHED IN ONE ASSEMBLY.
STORAGE TANK: WILL BE DESPATCHED IN THREE SECTIONS.

5, FOUNDATION BOLTS
M42X300 FOUNDATION BOLT 16 NO'S WITH WASHER WILL BE SUPPLIED.

6, DESIGN CODE ASME SEC VIII DIV 1, 2010 ADD NIL.

7, COUNTER FLANGES ALONG WITH BOLTS NUTS AND GASKETS WILL BE SUPPLIED FOR FLANGED CONNECTIONS.

8, MOVEMENT OF SLIDING SUPPORT FORM COLD TO OPERATING CONDITION IS= ±21.58mm & AT DESIGN CONDITION= ±51.41mm

9, ▶ INDICATES SITE WELDING.

10, VENTILATOR CONN. IS A SPARE CONN. PROVIDED WITH BLIND FLANGE, WHICH CAN BE OPENED FOR VENTILATION INSIDE THE STORAGE TANK DURING MAINTAINANCE OPERATION.

11, HEATER SUPPORTS (2 NOS.) ON STORAGE TANK ARE DESPATCHED LOOSE FOR FINAL WELDING AT SITE.

12, ORIFICE ASSLY. AS PER DET−D SHALL BE WELDED TO COUPLING (N12) AT SITE.

13, HEAVIEST PIECE TO BE HANDLED DURING ERECTION= 40 TONNES.

14, FOR STANDPIPE DETAILS REF. DREG. 2−163−19−11629.

15, NOZZLE N3 PROVIDED WITH VORTEX BREAKER.

GENERAL DIMENSIONAL LIMITS,FITS & TOLERANCES AS PER HY0230261

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

REV.	DATE	ALTERED	CHECKED	APPD
01	10.04.13			

REVISED IN−LINE WITH COMMENTS FROM CONSULTANT.

PROJECT: 1X600MW, RAYALASEEMA TPP, STAGE−IV, UNIT−6

CUSTOMER: ANDHRA PRADESH POWER GENERATION CORPORATION LIMITED

CONSULTANT: DESEIN PRIVATE LTD., NEW DELHI

BHARAT HEAVY ELECTRICALS LTD. HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN.	AL RAJAM		24.03.12	
CHD.	UMESH MENON		24.03.12	N.A
APPD.	TSN BHARGAV		24.03.12	

DEPT.	GRADE OF TOL.DIM. C/M/F	SCALE	WEIGHT (KG)	REF. TO ASSY DRG.	ITEM NO.	NO.OF ITEMS
HEE		NTS	NA	NA	N.A	N.A
CODE 405						

TITLE: GA OF SPRAY CUM TRAY DEAERATOR

CARD CODE

DRAWING NO. 1−163−10−11406 REV. 01

SHEET No. 1 NO OF SHEETS 1

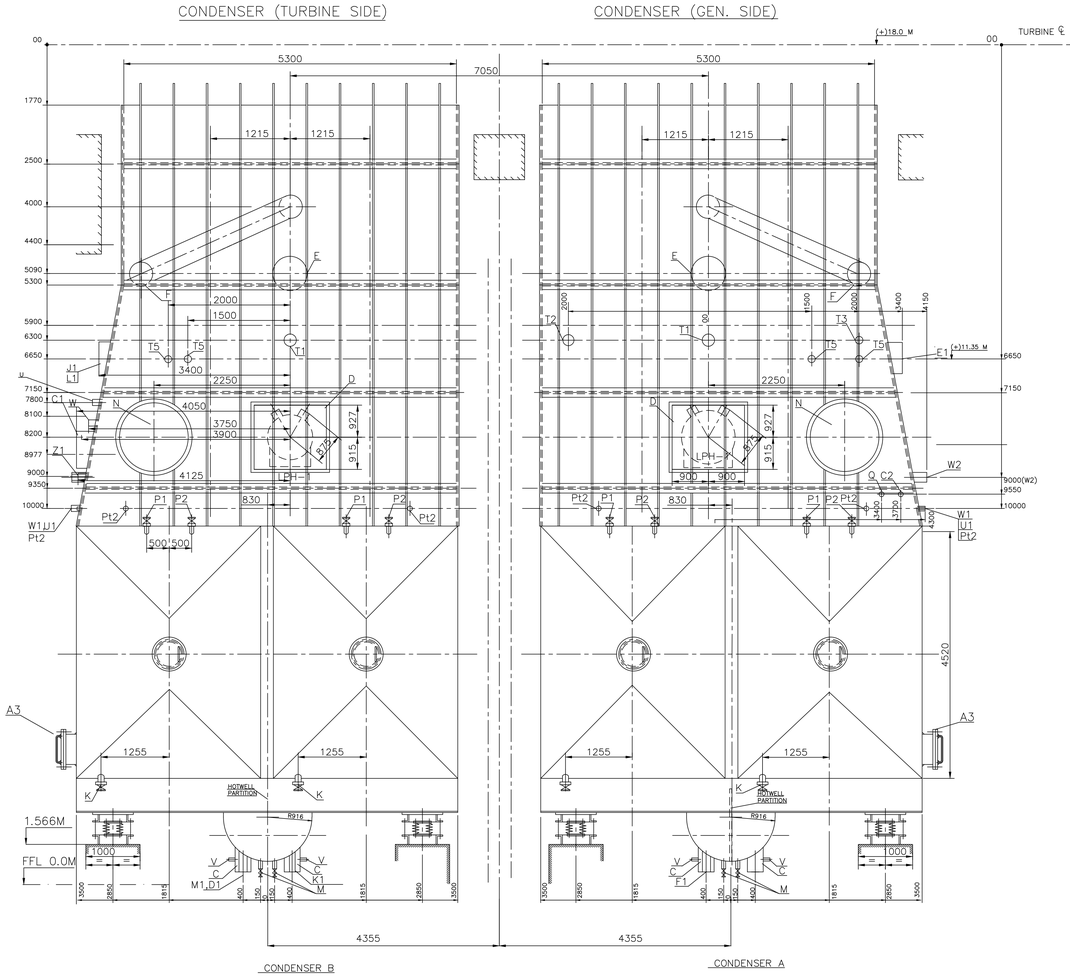
13-04-2013 13:46:15

REAR WATER BOX SIDE VIEW

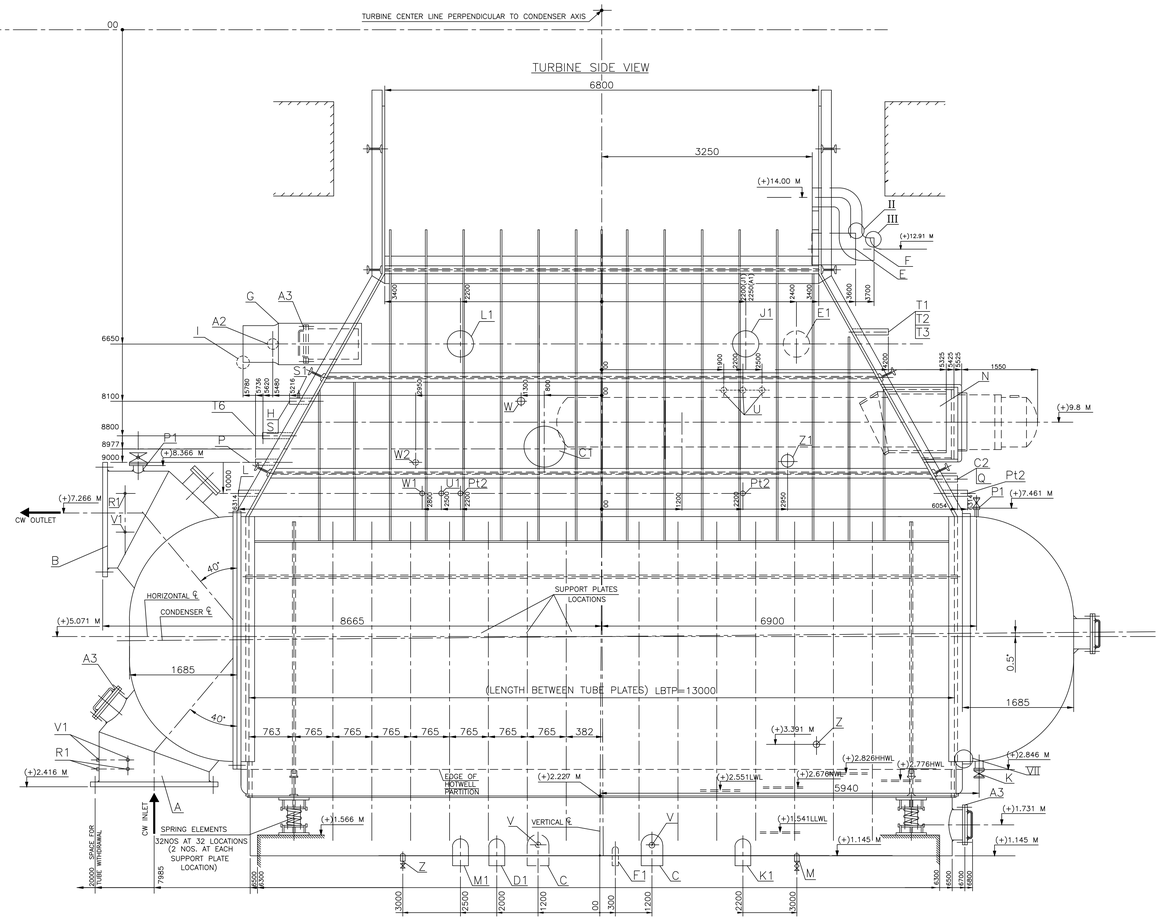
N

CONDENSER (TURBINE SIDE)

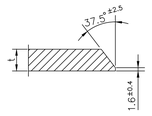
CONDENSER (GEN. SIDE)



TURBINE SIDE VIEW



UNLESS OTHERWISE STATED WELD EDGE PREPARATION OF BUTT WELD PIPE CONNECTIONS



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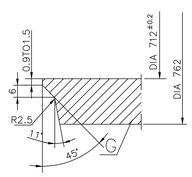

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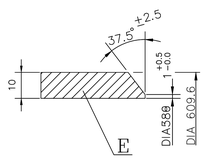

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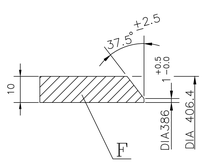

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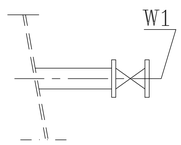

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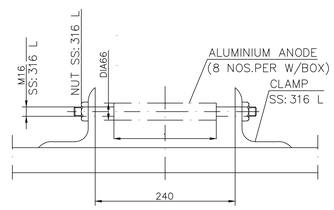

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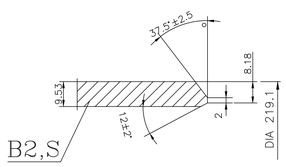
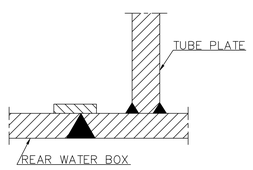


VII



GRADE OF UNTOL. DIM.:–	GRADE OF UNTOL. DIM.:–
M/CG– V/C/M/F AA 0230208	M/CG– V/C/M/F AA 0230208
WELDING–A/B/C/D–AA621104	WELDING–A/B/C/D–AA621104
GAS CUTTING–T3'AA0621101	GAS CUTTING–T3'AA0621101
REV. DATE ALTERED CHECKED	REV. DATE ALTERED CHECKED

CBOM NO. –

AGREED DEPT.	NAME	SIGN	DATE

STATUS OF DRG.

REV. DATE ALTERED JITENDRA
0 1/26/02/13 CHECKED R.BANSAL

CHANGES DONE AS MARKED (01)

CONSULTANT: DESEIN PRIVATE LIMITED, NEW DELHI

TYPE OF PRODUCT A.P. POWER GENERATION CORPORATION LIMITED
OR
NAME OF CUSTOMER/PROJECT RAYALSEEMA THERMAL POWER PROJECT
STAGE-IV UNIT #6

BHARAT HEAVY ELECTRICAL LIMITED (01)
HEEP RANIPUR, HARIDWAR

	NAME	SIGNATURE	DATE
DRN by	A.VINASH	Sd–	11.08.11
CHD by	R.BANSAL	Sd–	11.08.11
APPD by	M.K.LAHOTI	Sd–	11.08.11

ALL DIMENSION IN MILIMETRE

PROJECTION

SCALE N.T.S

DRAWING TITLE: CONDENSER ASSEMBLY

DRAWING NUMBER: 01601070058C192

SHEET NO. 01 SHEET NO. 02

SIZE A0

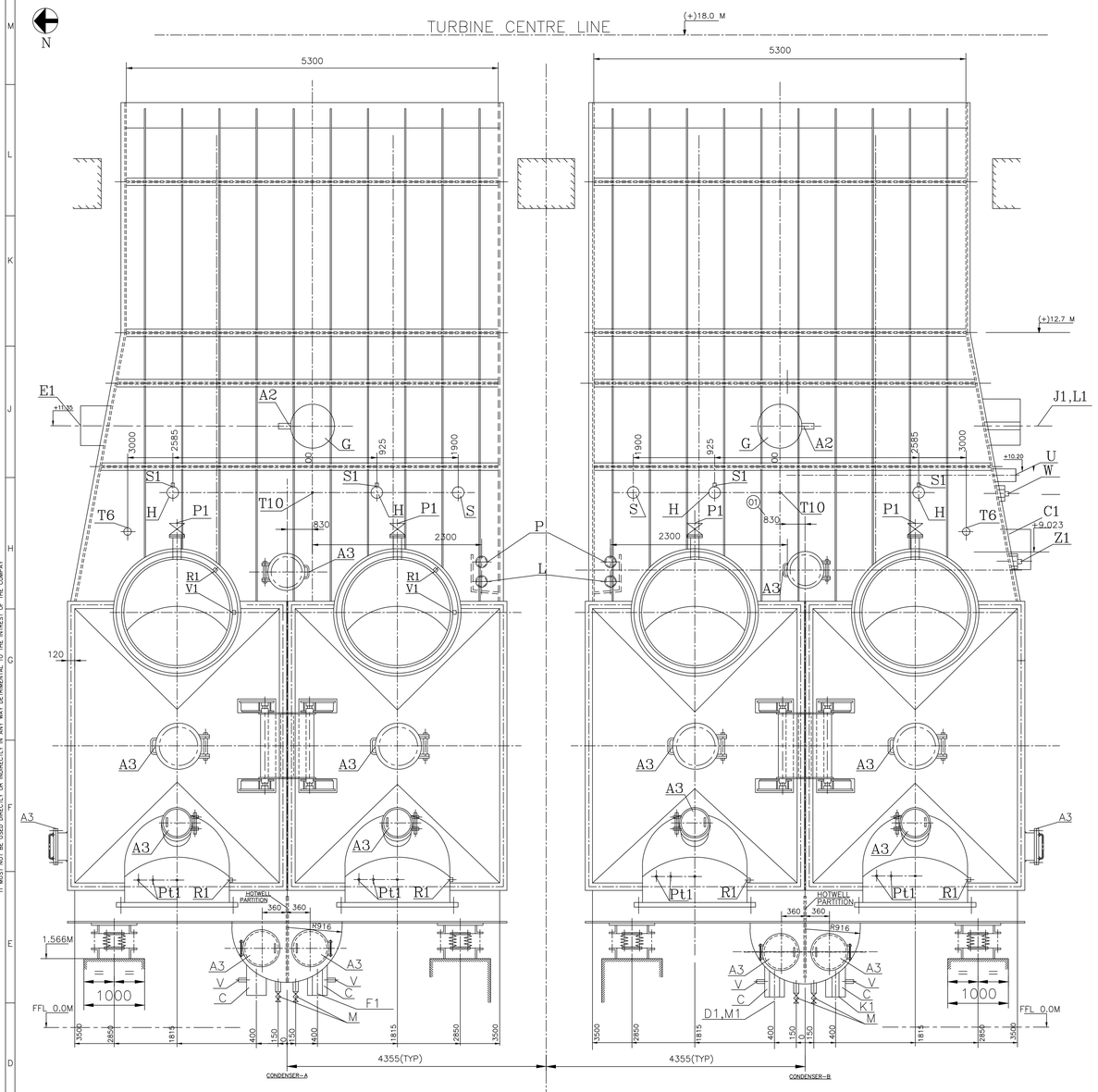
REF. DRG NO.

INVENTORY NO. SIGN & DATE

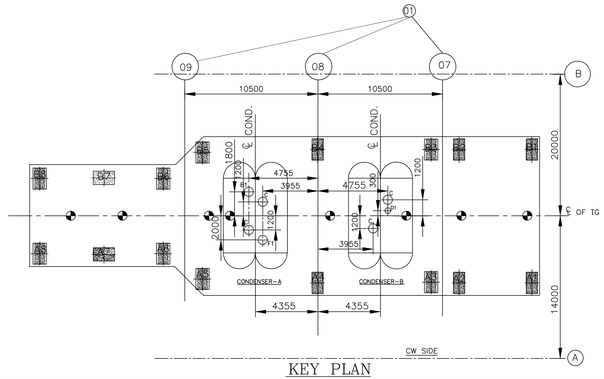
FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN mm)

DRG. NO. 01601070058C192

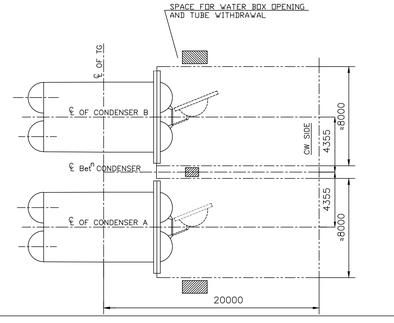
FRONT WATER BOX SIDE VIEW



KEY PLAN



SPACE REQUIREMENT FOR WATER BOX OPENING AND TUBE WITHDRAWAL



LIST OF CONNECTIONS:–

REF	SIZE OF (ODXTK.)	TYPE	FLANGE DETAIL OD	PCD	R.FACE DIA	R.FACE PRO	FLG THK	NO/BOLT SIZE	DESCRIPTION	QTY.	ZONE	REMARKS
A	DIA 1880x40	FLG.	2115	2020	–	–	65	44/ D48 •	CW INLET	4		* HOLE SIZE
B	DIA 1880x40	FLG.	2115	2020	–	–	65	44/ D48 •	CW OUTLET	4		* HOLE SIZE
C	DIA 355.6x9.53	BW							CONDENSATE OUTLET	4		
D	□1800x1844								LP HEATER NO.1	2		
E	DIA 610x10	BW							EXTRACTION PIPE LPH–2	2		
F	DIA 508x12.7	BW							EXTRACTION PIPE LPH–3	2		
G	DIA 762X21	BW							LP BYPASS STEAM INLET	2		
H	DIA 168.3X7.11	BW							AIR EXTRACTION	4		
K	DIA 114.3X5	FLG.	210	170	148	3	18	4/M12	WATER BOX DRAIN WITH VALVE	4		
N	DIA 1829x10	BW							BFPT EXHAUST CONNECTION	2		
Q	DIA 219.1x6.35	BW							MIN. FLOW RECIRCULATION OF GSC	1		DISPERSER FITTED
S	DIA 168.3x7.11	BW							VACUUM BREAKER CONNECTION	2		
T1	DIA 168.3x7.11	BW							LPH–1 VENT	2		
T2	DIA 114.3x6.02	BW							LPH–2 VENT	1		
T3	DIA 88.9x5.49	BW							LPH–3 VENT	1		
U	DIA 60.3x5.54	SW							VENT FROM CONDENSATE EXTRACTION PUMPS (SUCTION SIDE)	3		
V	DIA 60.3x5.54	BW							CONDUCTIVITY MEASUREMENT CONNCTION	4		PLUG FITTED
W	DIA 168.3x5.6	BW							LEAKAGES FROM U–RING AND HPT INLET AND EXHAUST	1		
C1	DIA 1270x10	BW							FLASH TANK–B VENT	1		
D1	DIA 457x12.7	BW							FLASH TANK–B DRAIN	1		
E1	DIA 1270x10	BW							FLASH TANK–A VENT	1		
F1	DIA 457x12.7	BW							FLASH TANK–A DRAIN	1		
J1	DIA 813x7.53	BW							TURBINE FLASH BOX I VENT	1		
K1	DIA 323.2x7.1	BW							TURBINE FLASH BOX I DRAIN	1		
L1	DIA 813x7.53	BW							TURBINE FLASH BOX II VENT	1		
M1	DIA 323.9x7.1	BW							TURBINE FLASH BOX II DRAIN	1		
P1	DIA 114.3x5	FLG.	140	110	90	3	16	4/M12	WATER BOX STARTING VENT WITH VALVE	4		BLIND FLANGE FITTED
T6	DIA 88.9x5.49	BW							HEADER FOR CONDENSER INSTRUMENTS RACK	2		
R1	M33x2	SCR							CW TEMPERATURE CONNECTION	8		PLUG FITTED
S1	M33x2	SCR							AIR OUTLET TEMPERATURE CONNECTION	4		PLUG FITTED
U1	M33x2	SCR							CONDENSER SHELL TEMP. CONNECTION	2		PLUG FITTED
V1	NB 15	SW							CW PRESSURE GAUGE CONNECTION	8		VALVE FITTED
W1	NB 15	SW							VACUUM GAUGE CONNECTION WITH VALVE	2		VALVE FITTED
Z1	DIA 323.9x7.14	BW							EXCESS STEAM FROM SEAL STEAM HEADER	1		
A2	DIA 219x8.18	BW							LP BYPASS CONDENSATE SPRAY INLET	2		
A3	DIA 508x10	FLG	670	620	585	7	38	20/M24	MAN HOLES WITH HINGED COVERS	14		
C2	DIA 168.3x7.11	BW							RINSE WATER FROM POLISHER UNIT	1		DISPERSER FITTED
T5	M14x1	SCR							REMOTE TEMP MEASUREMENT FOR LP BY PASS SPRAY CONTROL	4		PLUG FITTED
Pt1	M33x2	SCR							CW INLET TEMP. CONN. FOR PERF TEST	8		PLUG FITTED
Pt2	NB 15	SW							COND. VACUUM MEASUREMENT CONN. FOR PERF. TEST	16		VALVE FITTED
Z	NB 50	SW							CONNECTION FOR STAND PIPES	8		STAND PIPE ERECTION
M	DIA 114.3x6.02	SW							HOT WELL DRAIN WITH VALVE	4		
P	DIA 88.9x3.05	FLG.	200	160	138	3	20	8/M16	NORMAL CONDENSATE MAKE–UP	2		DISPERSER FITTED
L	DIA 168.3x3.4	FLG.	285	240	212	3	22	8/M20	EMERGENCY MAKE–UP CONNECTION	2		DISPERSER FITTED
T10	DIA 48.3x3.68	BW							EXCESS WATER FROM STEAM THROW OFF DEVICE	2		
W2	DIA 273x6.35	BW							STEAM EVACUATION FROM HPT/CRH	1		
P2	DN 100	FLG.	220	180	158	3	20	8/M16	WATER BOX PRIMING WITH VALVE	4		BLIND FLANGE FITTED

LIST OF FITTINGS / INSTRUMENTS:–

SL. NO.	SIZE	DESCRIPTION	QTY.	TYPE	REMARKS
01	NB 100	WATER BOX DRAIN VALVE	4	FLG. SW	
02	NB 100	HOT WELL DRAIN VALVE	8	SW	
03	NB 100	WATER BOX VENT VALVE	8	FLG.	
04	NB 50	ISOLATING VALVES FOR LEVEL SWITCHES	18	SW	
05	NB 25	HOT WELL LEVEL GAUGE, L=1000	8	SW	LEVEL GAUGES ARE PROVIDED WITH NB25 INTEGRAL ISOLATING VALVE FOR LEVEL GAUGE ISOLATION
06	NB 75	STAND PIPE ISOLATING VALVE	8	SW	
07	NB 50	ONE NO. VALVE ON EQUALISING LINE + ONE VALVE ON EQUALISING LINE OF 2 CONDENSERS	2+1	SW	
07	NB 25	STAND PIPE VENT VALVE	4	SW	
08	NB 25	STAND PIPE DRAIN VALVE	4	SW	
09	M 33x2	THERMOWELL M20X1.5 (FEMALE) IN WATER BOX	16	SCR	IMMERSION LENGTH L=325 mm
10	M 33x2	THERMOWELL M20X1.5 (FEMALE) IN AIR OUTLET PIPE	4	SCR	L=125 mm
11	M 33x2	THERMOWELL M20X1.5 (FEMALE) IN CONDENSER SHELL	2	SCR	L=325 mm
12	NB 50	LEVEL SWITCHES (MAGNETIC FLOAT TYPE)	6	SW	
13	NB 15	ISOLATING VALVE FOR CONDENSER VACUUM GAUGE	2	SW	
14	M20X1.5	DIAL THERMOMETERS FOR CW SIDE RANGE 0–80 °C	8	SCP	
15	–	STAND PIPES (NB150)	4	–	
16	NB 50	ISOLATING VALVE FOR TRANSMITTERS	12	SW	
17	M 33X2	THERMOWELL M20X1.5 (F) IN WATER BOX (FOR PERFORMANCE TEST)	8	SCR	L=125 & 325 mm (4Nos. EACH) 1 No. EACH PER CW INLET CONN.
18	NB 15	ISOLATING VALVE FOR CONDENSER VACUUM MEASUREMENT (FOR PERF. TEST)	16	SW	
19	NB 25	ISOLATING VALVE FOR LEVEL GAUGE	16	SW	
20	NB 15	ISOLATING VALVE FOR CW PRESSURE GAUGE	8	SW	

LIST OF MATERIALS:– (MAJOR PARTS)

SL.NO.	DESCRIPTION	MATERIAL
1	BOTTOM PLATE, SUPPORT PLATES, DOME WALLS, WATER BOX,SHELL	IS: 2062, Gr: B
2	MAIN TUBE PLATES	IS:2062, Gr: B
3	BAFFLES IN A.C. ZONE	SSTP 304
4	PIPES	IS:1239, Gr.: ERW
5	TIE ROD	IS:1570, Gr20 C8
6	STEAM THROW DEVICE	B.Q.STEEL (IS:2002.Gr.2)

DESIGN DATA:–

1. COOLING WATER FLOW	=71000 M^3/Hr(TOTAL FOR TWO CONDENSERS)
2. COOLING SURFACE AREA (DESIGN)	= 2x17682.M ^{2}
3. COOLING WATER INLET TEMPERATURE (DESIGN)	= 33 °C
4. COOLING WATER TEMPERATURE RISE	= 9.35°C
5. NUMBER OF TUBE PASSES	= 2
6. TUBE CLEANLINESS FACTOR	= 0.9
8. COOLING WATER SIDE PRESSURE DROP (PRESSURE DROP INDICATED ABOVE IS BETWEEN C.W. INLET AND OUTLET FLANGES OF CONDENSER.	= 4.9 MWC
9. NO. OF COOLING TUBES (TOTAL)	= 2X13636 NOS.
8.1 CONDENSING ZONE	= 2X12686 NOS.
8.2 AIR COOLING ZONE	= 2X950 NOS.
10. SIZE OF COOLING TUBE	= DIA 31.75X 0.7112 mm; DIA 31.75X 0.889 (FOR TOP TWO ROWS)
11. MATERIAL OF COOLING TUBES	
– CONDENSING ZONE	= SA249 WELDED SS304
– AIR COOLING ZONE AND TOP TWO ROWS	
12. INCLINATION OF TUBES FOR SELF DRAINING	= 0.5°
13. TUBE PITCH (TRIANGULAR)	= 39mm
14. CORROSION ALLOWANCE	= 3.2mm

DESIGN CONDITION	STEAM SIDE	WATER SIDE
1. DESIGN PRESSURE	FULL VACUUM & 1.08Kg/cm² (g)	FULL VACUUM & 5 Kg/cm^{2}g
2. TEST PRESSURE	FILLING WATER UP TO LP TURBINE BLADE TIP.	6.5 Kg/cm^{2}g
3. DURATION OF TEST	24 HOURS (MIN.)	30 MINUTES (MIN.)
4. DESIGN TEMPERATURE	120 °C	60°C

WEIGHTS:– (APPROX. / PER CONDENSER)

1. EMPTY CONDENSER (WITHOUT SPRINGS) WITH LP HEATER NO.1	=	435000 KG
2. OPERATING WEIGHT (CONDENSER + LP HEATER NO.1)	=	720000 KG
3. FLOODED WEIGHT (WATER FILLED UP TO LP TURBINE BLADE TIP OF LAST STAGE OF LPT) WITH CW SIDE & LP HEATER–1 EMPTY.	=	1400000 KG
4. WEIGHT OF COOLING WATER	=	288000 KG
5. WEIGHT OF SPRING ELEMENTS	=	15000 KG

NOTES:–

1. CONDENSER IS TO BE DESPATCHED IN LOOSE PARTS MAINLY COMPRISING, OF THE FOLLOWING.
   i) BOTTOM PLATE
   ii) TURBINE AND GENERATOR SIDE WALL PLATES.
   iii) DOME WALLS
   iv) FRONT WATER CHAMBERS AND REAR WATER CHAMBERS WITH TUBE PLATES
   v) TUBE SUPPORT PLATES : 2 X (2 X 16) = 64 NOS.
   vi) HOT WELL
   vii) SPRING ELEMENTS 2X32 NOS.
   viii) STEAM THROW DEVICE 2 NOS.
   ix) AIR EXTRACTION PIPE AND BAFFLE
   x) STIFFENING PIPES, RODS AND SLABES
   xi) OTHER LOOSE PARTS INCLUDING INSTRUMENTS AND FITTINGS.
2. FOR INSTRUMENTATION & FITTING FOR CONDENSER LEVEL CONTROL REF. DRG. NO. 21600070001C192
3. PRESERVATION & CONSERVATION OF CONDENSER TO BE DONE AT SITE AS PER HXE PRODUCT STANDARD NO. HE–77005
4. CONDENSER IS DESIGNED MANUFACTURED AND TESTED AS PER HEI STANDARD.

PAINTING:–

1. THE CONDENSER IS PAINTED AT WORKS AS FOLLWS: –
   STEAM SIDE SURFACES – STEAM WASHABLE PAINT
   CW SIDE SURFACES EPOXY BASE ZINC RICH PRIMER PAINT
   OUTSIDE SURFACES EPOXY BASE ZINC RICH PRIMER AND INTERMEDIATE PAINT
2. THE CONDENSER IS TO BE PAINTED AT SITE AS FOLLOWS: –
   EXTERNAL SURFACE: – TO BE PANTED WITH 2 COATS OF POLYURETHANE FINISH PAINTS. TOTAL DFT (FINAL) – 180 MICRONS
3. INTERIOR OF THE WATER BOXES AND WATER SIDE SURFACE OF TUBE PLATES TO BE PAINTED WITH EPOXY BASED ZINC RICH PRIMER AND HIGH BUILD BLACK COALTAR EPOXIDE PAINT. THE TOTAL MIN. DRY FILM THICKNESS AFTER PAINTING SHALL BE 250 MICRONS.
4. DECONSERVATION: –
   STEAM SIDE SURFACES OF THE CONDENSER SHOULD BE THROUGHLY CLEANED WITH THE APPLICATION OF STEAM. SINCE THEY HAVE BEEN SUPPLIED COATED WITH STEAM WASHABLE RUST PREVENTIVE PAINT.

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

REV.	DATE	ALTERED	CHECKED

REV.	DATE	ALTERED	CHECKED

REV.	DATE	ALTERED	CHECKED
0	26/02/13	JITENDRA	R.BANSAL

CHANGES DONE AS MARKED 01

GRADE OF UNTOL. DIM:–
M/CG– V/C/M/F AA 0230208
WELDING–A/B/C/D–AA621104
GAS CUTTING–TJ"AA0621101

GMS NO./GR.SP.NO.			STATUS OF DRG.
AGENCY	NAME	SIGN	DATE

CONSULTANT: DESEIN PRIVATE LIMITED, NEW DELHI

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: A.P. POWER GENERATION CORPORATION LIMITED, RAYALSEEMA THERMAL POWER PROJECT STAGE–IV UNIT #6

BHARAT HEAVY ELECTRICAL LIMITED
HEEP RANIPUR, HARIDWAR

	NAME	SIGNATURE	DATE
DRN by	AVINASH	Sd–	11.08.11
CHD by	R.BANSAL	Sd–	11.08.11
APPD by	M.K.LAHOTI	Sd–	11.08.11

ALL DIMENSION IN MILIMETRE

DRAWING TITLE: CONDENSER ASSEMBLY

DRAWING NUMBER: 01601070058C192

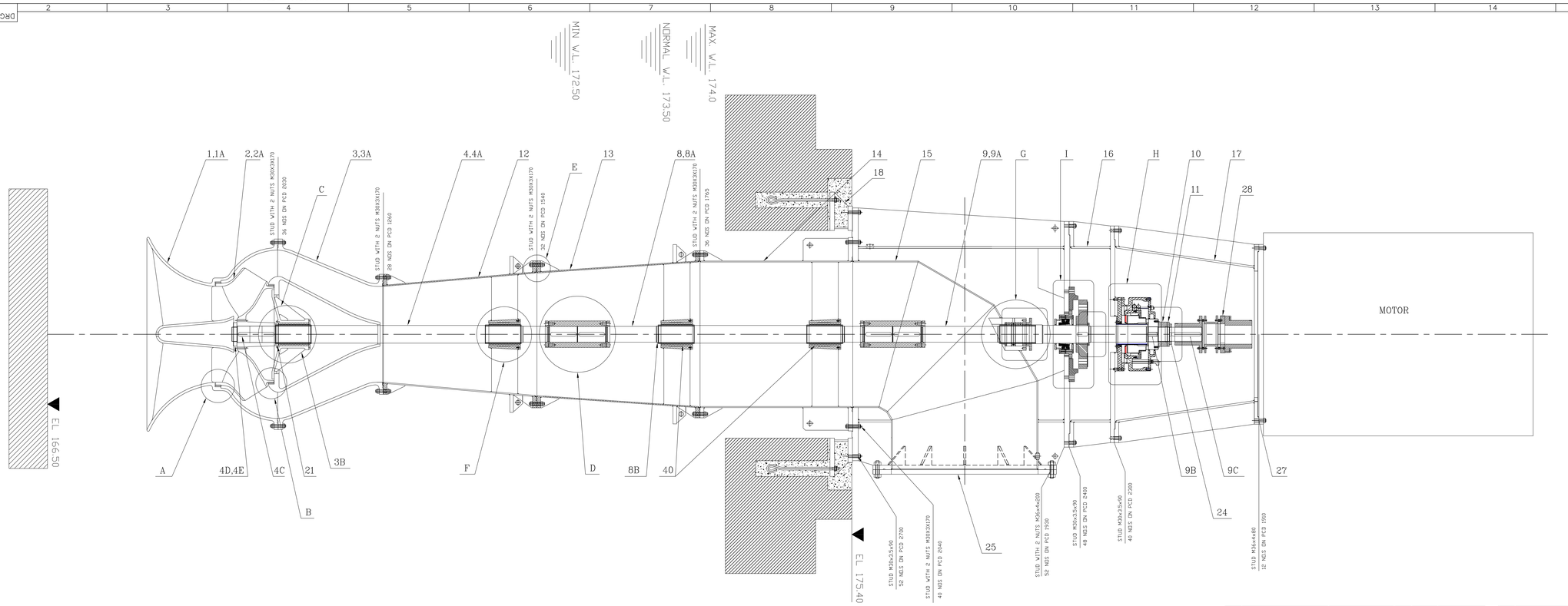
PROJECTION | SCALE N.T.S | SHEET NO. 02 | SHEET NO. 02

SIZE A0

FIRST ANGLE PROJECTION

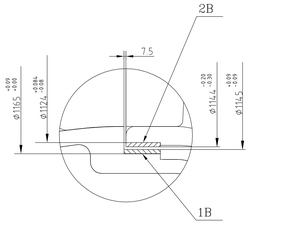
(ALL DIMENSIONS ARE IN mm)

ORG. NO. 0 182 00 5 4619

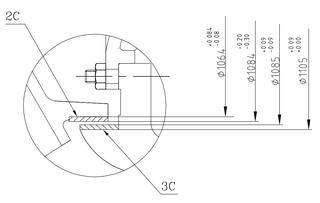


12	Element-I	FAB M SIS 2062	1		FP9712031683
13	Element-II	FAB M SIS 2062	1		FP9712031691
14	Element-III	FAB M SIS 2062	1		FP9712031705
15	Discharge elbow	FAB M SIS 2062	1		FP9712011046
16	M otor support frame	FAB M SIS 2062	1		FP9712391000
17	M otor stool	FAB M SIS 2062	1		FP9717701091
18	Inter foundation ring	FAB M SIS 2062	1		FP9716611080
19	Anti extrusion ring	Bronze	1	3	FP9716614225
20	Lantern ring	BS 1400 LB 2	1	4	FP9716614233
21	Restriction bush	Bronze	1	3	FP9710703064
22	Stuffing box cover	IS210 FG 260 (AA19703)	1	16.5	FP9110306170
23	Spacer ring	Carbon steel	1	4.5	41823519094-00
24	coupling spacer	Carbon steel	1	5	41823519093-00
3D	Line shaft bearing (below min. w.l.)	Cutless rubber in bronze retainer	1	30	FP9750095242
25	Counter flange	Carbon steel	1	425	SC31823514999-00
26	Thrust bearing	13 SNT	1	770	FP9750122259
27	External threaded taper pin	IS 3524	4	0.25	HY7171152170
28	Connecting coupling	SS forging (M fg standard)	1	300	FP9750266226
29	Gland packing	PTFE	1	7.6	FP9850265051
30	Dia 14 rubber round	Neoprene	2	5	HY5980295135
31	Spherical roller brg with sleeve	SKF23044 CCK/ W 33 H3044	1	30	AA7212302333
32	Non reversible ratchet	Carbon steel	1	355	FP9211150027
33	Roller housing	Carbon steel	1	365	FP9712933024
34	Spherical roller brg housing	Carbon steel	1	76	FP9712933032
35	Felt ring	IS 1719	1	1	HY2311821644-00
36	Pin	AA10208	6	2.5	41823516639-00
37	Roller bearing upper cover	Carbon steel	1	23	41823519417-00
38	Roller bearing bottom cover	Carbon steel	1	23	31823515572-00
39	Plate for roller housing	Carbon steel	1	10	41821214467-00
40	Line shaft bearing (above min. w.l.)	Elastomeric polymer alloy in bronze retainer	2	30	FP9750551036
41	Fasteners in contact with water	ASTM A 473-S41000	1set		
42	Fasteners not in contact with water	Carbon steel	1set		

S no	Description	M aterial Spec.	Qty	Net Wt.	Desno.
1	**Suction bell mouth assembly**		1	2105	**21823614985-00**
A	Suction bell mouth	IS210 FG 260 (AA19703) +2%Ni	1	2080	FP9110339035
B	Bell mouth wear ring	BS3468 Gr. F1	1	25	31823615358-00
2	**Impeller assembly**		1	717	**21823614987-00**
A	Impeller	ASTM A 743 CF 8M	1	675	11823616440-00
B	Impeller eye wear ring	BS EN 10213-4	1	22	31823615359-00
C	Impeller discharge wear ring	BS EN 10213-4	1	20	31823615360-00
3	**Pump casing assembly**		1	2929	**21823618533-00**
A	Pump casing	IS210 FG 260 (AA19703) +2%Ni	1	2680	FP9110306919
B	Bearing housing	IS210 FG 260 (AA19703)	1	203	FP9712933016
C	Pump casing wear ring	BS3468 Gr. F1	1	16	31823615361-00
D	Line shaft bearing	Cutless rubber in bronze retainer	1	30	FP9750098242
4	**Pump shaft assembly**		1	808	**11823617045-00**
A	Pump shaft	X12 Cr13 (AA19320), SS forgings (H& T)	1	760	**11823617045-00**
B	Shaft sleeves	ASTM A 743 CA 15	2	30	41823719609-00
C	Impeller key	SS410	1	3.5	41823619097-00
D	Impeller Nut	SS410	1	10	FP90114-13
E	Lock washer for impeller nut	SS410	1	0.5	41823619256-00
F	Sleeve nut (LH)	SS410	1	1.5	FP90114-14
G	M uff coupling key	SS410	1	3	41823719099-00
5	**M uff coupling**	**SS 410**	2	250	**31823515437-00**
6	**Coupling support**	**SS 410**	4	12	**41823519091-00**
7	**Abutment ring**	**SS 410**	4	1.5	**41823519092-00**
8	**Intermediate shaft-I assembly**		1	695	**11823717036-00**
A	Intermediate shaft-I	X12 Cr13 (AA19320), SS forgings (H& T)	1	630	**11823717036-00**
4B	Shaft sleeves	ASTM A 743 CA 15	2	30	41823719609-00
4G	M uff coupling key	SS410	2	3	41823719099-00
4F	Sleeve nut (LH)	SS410	1	1.5	FP90114-14
B	Sleeve nut (RH)	SS410	1	1.5	FP90114-19
9	**Drive shaft assembly**		1	845	**11823817025-00**
A	Drive shaft	X12 Cr13 (AA19320), SS forgings (H& T)	1	805	**11823817025-00**
4B	Shaft sleeve	ASTM A 743 CA 15	1	30	41823719609-00
4G	M uff coupling key	SS410	1	3	41823719099-00
B	Thrust collar key	SS410	1	1.2	41823819101-00
C	Connecting coupling key	SS410	1	2.5	41823819104-00
10	**Thrust collar nut**	**SS 410**	1	26	**31823515434-00**
11	**Lock nut for TC nut**	**SS 410**	1	6.5	**41823519090-00**

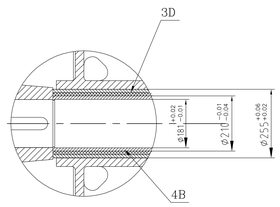


DETAIL–'A'



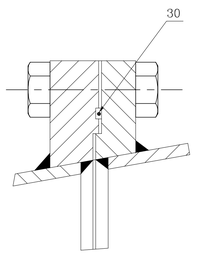
Running radial clearance between wearing ring = 0.6 to 0.7 mm

DETAIL–'B'

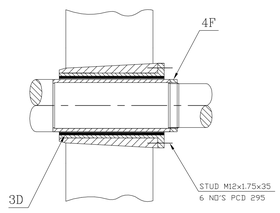


Running radial clearance between cutless rubber lined bearing and sleeve = 0.30 to 0.47

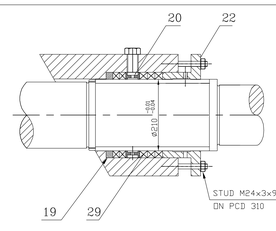
Detail–'C'



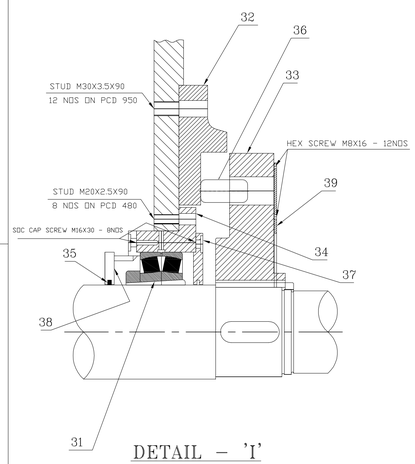
DETAIL – E



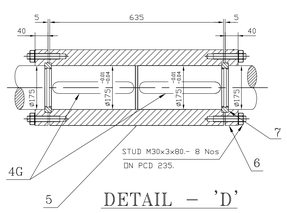
DETAIL – 'F'



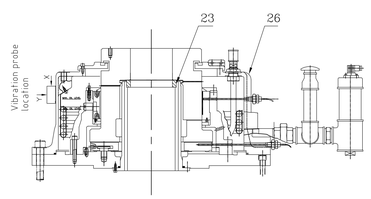
DETAIL – 'G'



DETAIL – 'I'



DETAIL – 'D'



DETAIL – 'H'

NOTE:

1. RANGE OF TOTAL FLOAT IS 9mm TO 13 mm.
2. SPACER RING (POS. NO. 23) THICKNESS OF 42mm, INCLUDES 17mm M/C ALLOWANCE FOR AXIAL POSITIONING OF ROTOR AS PER DETAIL – 'B'
3. COUPLING SPACER (POS. NO. 24) THICKNESS OF 55mm, INCLUDES 15mm M/C ALLOWANCE FOR SETTING DBCF = 253mm.
4. COLUMN PIPE THICKNESS = 12 mm

IMPORTANT FOR SAFE OPERATION

1. ENSURE FULL TIGHTENING AND LOCKING OF IMPELLER NUT (POS NO. 4D).
2. ENSURE FULL TIGHTENING OF THRUST COLLAR NUT (POS NO. 10).
3. ENSURE FULL TIGHTENING OF ALL FASTENERS.
4. ENSURE FULL TIGHTENING OF LOCK NUT FOR THRUST COLLAR NUT (POS NO. 11).
5. ENSURE FREE ROTATION OF ROTOR, AT EACH STAGE OF ASSEMBLY.

THE FOLLOWING CONDITIONS APPLY EXCEPT OTHERWISE STATED...

1. REF.TO HY0230261 FOR UNSPECIFIED TOLERANCES.
2. CHAMFER M/CD SHARP EDGES 1.2 TO 1.0 AT 45°.
3. INTERNAL M/CD CORNER RADII 1 TO 0.7.
4. THE SURFACE ROUGHNESS WHEREVER NOT SHOWN SHALL BE TAKEN FROM THE SURFACE ROUGHNESS SHOWN OUT SIDE BACK SLASHES GIVEN AT THE TOP MOST RIGHT CORNER OF THE DRG.

CUSTOMER	ANDHRA PRADESH POWER GENERATION CORPORATION LTD.
CONSULTANT	DESEIN CONSULTING ENGINEERS
PROJECT	1 X 600 MW RAYALASEEMA TPP
PUMP	CW PUMP (CW1O)

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

BHARAT HEAVY ELECTRICALS LTD. HYDERABAD

	NAME	SIGN.	DATE
DRN.	SATISH		15.05.13
CHD.	SATISH		15.05.13
APPD.	K.H.R.K		15.05.13

NO.OF VAR. –NA–

DEPT.	SCALE	WEIGHT (KG)	REF. TO ASSY DRG.	ITEM NO.	NO.OF ITEMS
PUMPS					
CODE 410	N.T.S	–NA–	–NA–	–NA–	–NA–

TITLE

CROSS SECTIONAL ASSEMBLY OF COOLING WATER PUMP

DRAWING NO. 0 182 00 5 4619 REV. 00

SHEET NO. NO OF SHEETS

REV.	DATE	ALTERED	CHECKED	APPD.
00	15.05.13	FIRST ISSUE	SATISH	K.H.R.K

ZONE

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

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

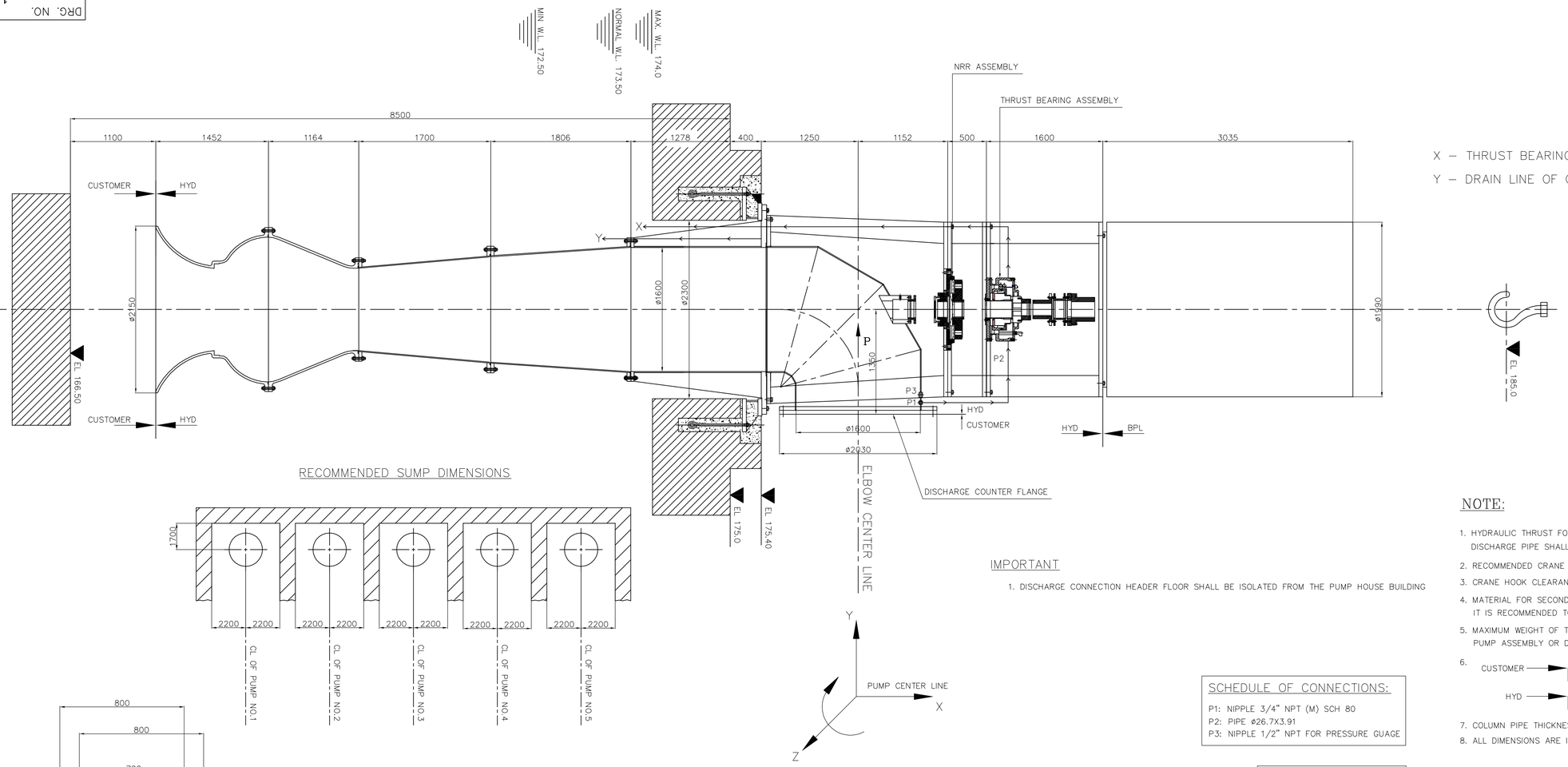
DRG. NO. 1 182 005 7072

COMPUTER FILE NAME :

REF. DRG. NO.

SIGN. AND DATE

INVENTORY NO



X – THRUST BEARING COOLING LINE

Y – DRAIN LINE OF GLAND LEAKAGE

RECOMMENDED SUMP DIMENSIONS

IMPORTANT

1. DISCHARGE CONNECTION HEADER FLOOR SHALL BE ISOLATED FROM THE PUMP HOUSE BUILDING

NOTE:

1. HYDRAULIC THRUST FORCE (P) IN HORIZONTAL DIRECTION = 1,00,500 KG
   DISCHARGE PIPE SHALL BE RIGIDLY SUPPORTED
2. RECOMMENDED CRANE CAPACITY = 35 TONNES
3. CRANE HOOK CLEARANCE FROM OPERATING FLOOR (EL 175.0 M) = 10.0 M
4. MATERIAL FOR SECONDARY GROUTING IS IN ERECTION CONTRACTOR'S SCOPE
   IT IS RECOMMENDED TO USE "CONBEXTRA GP2" FOR SECONDARY GROUTING
5. MAXIMUM WEIGHT OF THE SINGLE COMPONENT TO BE HANDLED DURING
   PUMP ASSEMBLY OR DISASSEMBLY = 23,000 KG
6. CUSTOMER — HYD — HYD – BHEL HYDERABAD SCOPE
   CUSTOMER – CUSTOMER SCOPE
   HYD — BPL — BPL – BHEL BHOPAL SCOPE
7. COLUMN PIPE THICKNESS = 12 MM
8. ALL DIMENSIONS ARE IN MM

SCHEDULE OF CONNECTIONS:

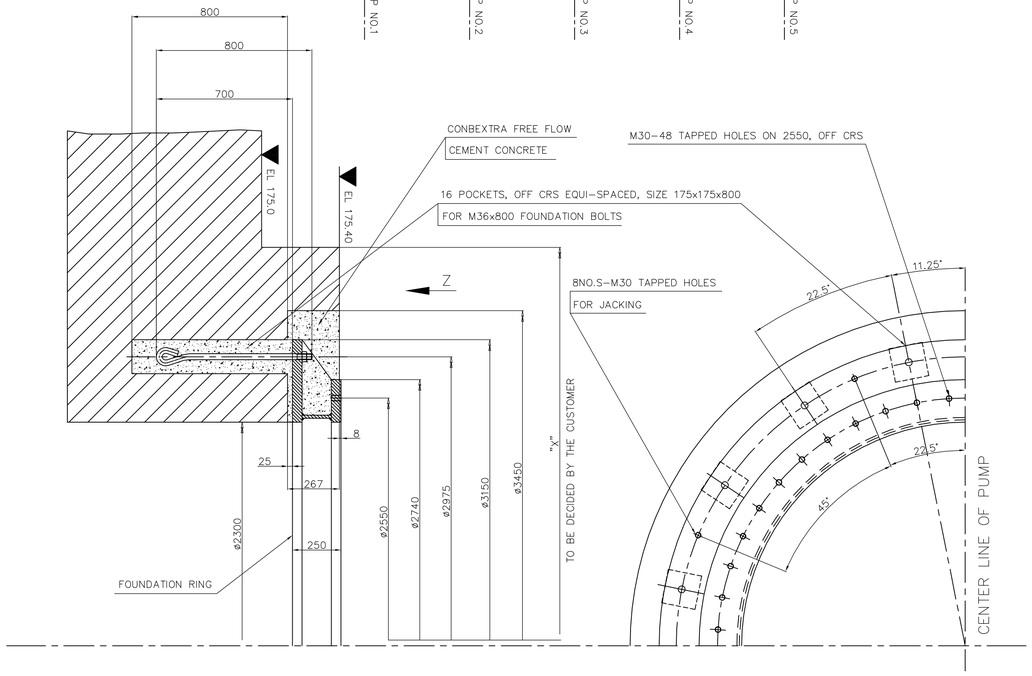
P1: NIPPLE 3/4" NPT (M) SCH 80
P2: PIPE ø26.7X3.91
P3: NIPPLE 1/2" NPT FOR PRESSURE GUAGE

ALLOWABLE FORCES & MOMENTS ON DISCHARGE NOZZLE
Fx = Fy = Fz = 2950 kg
Mx = Mz = 9285 kg.m
My = 11720 kg.m

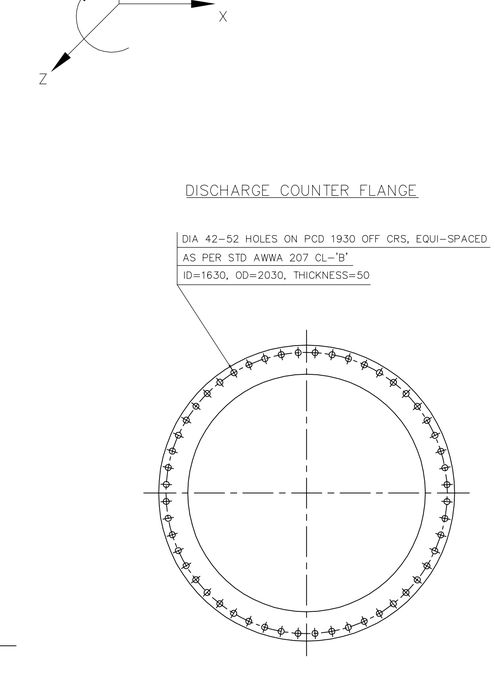
APPROX. MASS ON FOUNDATION		
PUMP	DRY	24,500 Kg
	WET	34,500 Kg
FOUNDATION RING		2,000 Kg
MOTOR		21,000 Kg
TOTAL	DRY	45,500 Kg
	WET	55,500 Kg
PUMP THRUST	DOWN WARD	NOR: 13,507 Kg
		MAX: 22,090 Kg

PUMP			MOTOR		
CAPACITY	:	18800 m^3/hr	RATING	:	2200 kW
HEAD (BOWL)	:	27.5 mlc	SPEED	:	420 rpm
POWER INPUT (BOWL):		1656.4 kW	MAKE	:	BHEL, BHOPAL
EFFICIENCY (BOWL)	:	85 %	WEIGHT	:	21,000 KG
DENSITY OF WATER	:	1000 kg–m^3	FOR REMAINING DATA , REFER MOTOR OGA AND DATA SHEET		
GD^2	:	850 kg–m^2			
SPEED	:	420 rpm			
NO. OF STAGES	:	ONE			
SHUT OFF HEAD	:	50 mlc			
DESIGN STANDARD.	:	HIS			
DIRECTION OF ROTATION : CLOCKWISE PUMP (VIEWED FROM MOTOR NDE)					

FOUNDATION DETAILS AT FLOOR EL 175.0



VIEW–"Z"



DISCHARGE COUNTER FLANGE

DISCHARGE COUNTER FLANGE DETAILS

1. NOMINAL BORE = ø1600
2. OD = ø2030
3. NO OF BOLTS = 52
4. PCD OF BOLTS = ø1930
5. BOLT SIZE = M36
6. FLANGE THICKNESS = 50
7. FLANGE RATING = 86 PSI

THE FOLLOWING CONDITIONS APPLY EXCEPT OTHERWISE STATED...

1. REF.TO HY0230261 FOR UNSPECIFIED TOLERANCES.
2. CHAMFER M/CD SHARP EDGES 1.2 TO 1.0 AT 45°.
3. INTERNAL M/CD CORNER RADII 1 TO 0.7.
4. THE SURFACE ROUGHNESS WHEREVER NOT SHOWN SHALL BE TAKEN FROM THE SURFACE ROUGHNESS SHOWN OUT SIDE BACK SLASHES GIVEN AT THE TOP MOST RIGHT CORNER OF THE DRG.

REV.	DATE	ALTERED	CHECKED	APPD.	ZONE
03	03.04.13	REVISED BASED ON CONSULTANT COMMENTS			
02	14.11.12	REVISED BASED ON REVISED PUMP HOUSE DRAWING			
01	14.11.12	REVISED BASED ON CONSULTANT COMMENTS			

CUSTOMER	ANDHRA PRADESH POWER GENERATION CORPORATION LTD.
CONSULTANT	DESEIN CONSULTING ENGINEERS
TYPE OF PUMP	CW PUMP (CW1O)
PROJECT	1 X 600 MW RAYALASEEMA TPP

भारत हेवी इलेक्ट्रिकल्स लिमिटेड हैदराबाद
BHARAT HEAVY ELECTRICALS LTD. HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN.	SATISH		24.08.12	
CHD.	SATISH		24.08.12	
APPD.	K.H.R.K		24.08.12	

DEPT.	SCALE	WEIGHT (KG)	REF. TO ASSY DRG.	ITEM NO.	NO.OF ITEMS
PUMPS ENGG.	N.T.S				
CODE 410					

TITLE
GENERAL ARRANGEMENT & FOUNDATION DETAILS OF CWP+MOTOR

DRAWING NO. 1 182 005 7072 REV. 03

SHEET NO. NO OF SHEETS