

## Supplying, Installing, Testing and Commissioning of Hot Water Generation System

### SPECIAL CONDITIONS

1. The prices quoted shall be inclusive of excise all taxes, GST, freight, octroi etc.
2. The Owner has the right to delete any item from the scope of this contract.
3. The quantities as given in the Bill of Quantities are tentative. These can be increased or decreased as per the actual requirement at site.
4. Tenderer can quote for any additional item, which he thinks is required for successful operation of the machinery being offered by him
5. The contractor shall submit the **shop drawings** of the complete installation for the Consultant's approval with in 7days of the award of the contract. The shop drawings shall give sufficient information for the required civil work to be done by other agency. The Contractor shall also submit the single line diagram (SLD) and the fabrication drawings of the pump control panels.
6. The contractor shall be responsible for the proper functioning of the **Hot Water Generation System** in terms of its performance.
7. **Statutory Approvals:** The Contractor shall be responsible for obtaining all statutory approval from the concerned department like Municipal Corporation, Pollution Control Board, Irrigation Department etc
8. Any equipment / item having any manufacturing defect shall be replaced free of cost.
9. The Contractor shall handover all the catalogues, performance curves and warranty cards of the equipment supplied to the Owner.
10. The Contractor shall clean the site thoroughly of all rubbish / melba left out of his materials on completion of the work and dress the site to the satisfaction of the Owner at his own cost.
11. **Electricity & Water:** Electricity and water will be provided at site by the Owner. However, the Contractor shall make temporary arrangement on his own for tapping off from the nearest available distribution point.
12. **Site Conditions:** Before submitting the proposal / offer the tenderer must carefully consider the site constraints, as mentioned in the Section-C of Scope of Work.
13. **The offer shall have the following enclosures:**
  - a) List of similar projects under taken in recent past
  - b) A technical note on the proposed system
  - c) System diagram
  - d) Details of the required electric load—installed as well as operational.
  - e) Operational and maintenance cost
  - f) Details of Civil Work required(in terms of sizes and volume)

**SUBHEAD : Supplying, Installing, Testing and Commissioning of Hot  
Water Generation System**

**SCOPE OF WORK**

**SECTION A: TURNKEY NATURE OF PROJECT:**

This Contract is for execution of Hot Water Generation Systems on '**Turnkey Basis**', which shall include but not limited to the following:

**a) Designing**

Designing shall essentially include but not limited to the following :

- i) Preparation of general arrangement drawing with sufficient information for the Structural Engineering Consultant to design the structure of various components.
- ii) Selection of all mechanical and electrical equipment like boilers ,heat exchanger, pumps, pipes, valves and other appurtenances, switchgear, cables etc.
- iii) Preparation of detailed engineering drawings

**b) Supply and Installation of Mechanical & Electrical Equipment** like Hot Water Generators (Heat Pump), Hot Water Storage Tank, Heat Exchanger Hot Water Circulators, Pipes, Valves and other appurtenances, etc. as generally described in Section C and of makes as mentioned in Section B of Scope of Work.

**IMPORTANT NOTES**

- i) It is understood that this Contract includes supply, installation, testing and commissioning of all the equipment, components etc. whether explicitly mentioned above or not for the successful commissioning of the Hot Water Generation System as per the parameters mentioned herein.
- ii) The tenderer must clearly indicate the material of construction, performance parameters, sizes etc of each equipment being offered by him.
- iii) Hot Water Generation is to be placed at terrace
- iv) The Civil Work like construction equipment foundations etc. is not included in the Scope of this work. However, the Contractor will have to provide complete details regarding the requirements of Civil Works, so that these can be executed by a separate agency.

- c) **Pipe work:**
  - (i) All interconnecting pipe work with in the plant room.
  - (ii) Interconnection pipe work with solar heating system
- d) **Electrical Works :** Control panel with starters, all interconnecting power and control cabling for hot water generators, pumps etc .from control panel to respective motors and drives, inter locking of fuel pumps ,feed pumps etc.
- e) **Testing and commissioning of the Hot Water Generation Systems and pipe work.**
- f) **Training the personnel of the Employer for operation and maintenance of the plant.**
- g) **Maintenance of the plant for 12 months commencing immediately after the commissioning.**

**SECTION-B. LIST OF APPROVED MAKES / MANUFACTURES OF MATERIALS****NOTE :**

- i) All Brand Names / Manufacturers are Indian unless specified otherwise.

S.NO.	MATERIAL	BRANDNAME /MANUFACTURER
<b>A) Plant &amp;Equipment</b>		
1.	Heat Pump	a) Daikin b) Raycold c) Smith
3.	Hot Water Recirculation Pumps	a) Grundfos b) ITT-lowara c) Wilo
4.	Plate Type Heat Exchanger	a) Alfa Laval b) GEA Ecoflux
5.	Mixing Tank	Custom Built fabricated as per IS:2828
6.	Solar Water Heating System	a) Solahart b) Honeywell
<b>B) Pipes and Fittings</b>		
1.	CPVC Pipes	a) Astral b) Birla
2.	G.I. Pipes	a) Tata b) Jindal, Hissar
3.	S. S. Pipes	a) Chockesy b) Décora b) Rattan Mani
4.	Standard M.S. Fittings	a) VSEngineering b) TrueForge

c) Sant

S.NO.	MATERIAL	BRANDNAME / MANUFACTURER
5.	Forged Steel Fittings	a) VS Engineering b) JK Forging c) True Forge
6.	S. S. Fittings (Investment Casting)	a) H.S. b) Interfeed
7.	Galvanized Malleable Cast Iron Fittings	a) Unik Brand/Zoloto
<b>C)</b>	<b>Valves &amp; Other Appurtenances</b>	
1.	Butterfly Valves	a) Audco b) KSB c) Danfoss
2.	Cast Steel Ball Valves	a) Zoloto, b) RB, Italy c) CIM, Italy
3.	Cast Steel Globe Valves	a) Sant b) Zoloto
4.	Globe Valves	a) Audco
5.	Dual Plate Check Valves	a) Advance
6.	T/Y Strainer	a) Leader b) Sant c) Zoloto
7.	Plug Valve	a) Audco
8.	Solenoid Valves	a) Rotex b) Festo c) Asco
9.	3WayValve	a)RapidCool b) Honeywell c) Danfoss d) Siemens

S.NO.	MATERIAL	BRANDNAME /MANUFACTURER
9.	Balancing Valve	a) Sant b) Advanc
10.	Temperature Controller	a) VamaTafag
11.	Pressure Gauges	a) H.Guru b) Fiebig
12.	Temperature Gauges	a) H.Guru b) Fiebig
<b>D)</b>	<b>Insulation</b>	
1.	Liquid Resin Bonded Glass Wool	a) Lloyd Insulation
2.	Synthetic Polymeric Nitrile Rubber Compound Insulation	a)Armaflex b)Kaiflex
<b>E)</b>	<b>Electric Switch Gear and Starters</b>	
1.	Electric Switch Gear	a) Siemens b) L &T c) GE d) ABB e) MerlinGerin f) Legrand
2.	PVC Insulated Armoured Power and Control Cables	a) Gloster b) Polycab d) Havell's
3.	MCCB	a) L &T b) MerlinGerin c) ABB d) Legrand
4.	MCB	a)ABB b) MerlinGerin c) Legrand-LexicSeries

S.NO.	MATERIAL	BRANDNAME /MANUFACTURER
5.	Starters, Relays etc.	a) L & T b) ABB c) Control & Switch Gear
6.	Push button and indication lights	a) L & T b) Siemens c) Telemaque d) Vaishno e) BCH
7.	Digital Voltmeter &Ammeter	a) AE b) Cadel c) Enercon
8.	Selector Switches	a) L & T b) Keycell c) Salzar
9.	HRC Control Fuses	a) L & T b) GE c) Siemens

**HOT WATER GENERATION – CLARKS-JAWAI, PALI, RAJASTHAN**

The hot water shall be generated according to the following calculations:

**Hot water requirement, storage and generation capacity:**

S. No	Usage	Average Consumption (Liters /day)
1.	Guest rooms with showers -per guest- <u>Hot water requirement for guest rooms considered as 90 ltrs.per guest per day..(2 guest per room)</u>  <b>for 8 Guests</b>	90  720
2.	Kitchen -per meal- <u>Hot Water Requirement for Kitchen considered as 6 litres permeal.</u>  <b>For 8 x 3 + 6 x 1.5 = 28.5 meals</b>	6 171
3.	Staff -per member- <u>Hot Water Requirement for Staff considered as 9 liters per staff member per.</u>  <b>for 6 staff members</b>	9 54
<b>TOTAL</b>		<b>945</b> <b>Say 1000 liters per day</b>

**Hot Water Generation Rate:**

Temperature of inlet water (assumed)	=	10° C
Temperature of hot water required	=	60°C
Average hot water requirement	=	1000 / 20
	=	<b>50 liters / hour</b>
Peak hourly hot water requirement	=	1/4 <sup>th</sup> of daily requirement
	=	1/4 x 1000
	=	<b>250 liters / hour</b>

Hot water generation capacity to raise the temperature of 250 liters of water by 50 °C in one hour

$$= 250 \times 50$$

$$= \mathbf{12500 \text{ K.Cal /hour}}$$

**Requirement of Hot Water For Space Heating:**

Not Considered

**Total heating requirement = 12500 K.cal/Hr.**

It is proposed to install two nos. of mixing tanks so that if one goes under maintenance, then 75% load shall be catered by the other.



<b>PROJECT : CLARKS-JAWAI, PALI, RAJASTHAN</b>						
<b>SUBHEAD : SUPPLYING, INSTALLING, TESTING AND COMMISSIONING OF HOT WATER</b>						
<b>GENERATION SYSTEM</b>						
<b>BILL OF QUANTITIES</b>						
<b>S.NO.</b>		<b>DESCRIPTION</b>	<b>QTY</b>	<b>UNIT</b>	<b>RATE</b>	<b>AMOUNT</b>
<b>1.0</b>		<b>HOT WATER GENERATORS AND OTHER ALLIED EQUIPMENTS.</b>				
<b>1.1</b>						
		Supplying, Installing, testing and commissioning of air cooled type Heat Pump System capable of operation on a multimode basis; i.e. on air to water basis and ambient air to water basis. The switch over from one mode to other should be on auto basis. The Heat Pump System should be based on a closed circuit primary hot water flow of 60°C out of the unit with 55°C return for normal operation pattern. The Heat Pump System should how ever be designed for a limit of 65°C out and 60°C return. A suitable expansion vessel arrangement should be provided for based on primary flow hold up capacity and free cooling shall be dispose off in plant room, compressor having scrol type including grundfoss make circular pump.				
		<b>Refrigerant</b>				
		R-134a/417a				
		<b>Output Heating capacity –12 KW</b>				
		(Input KW not more than 3KW)				
		Heat Pump(air cooled type) as described above	2	Nos.		
<b>1.2</b>		Supplying, installing, testing & commissioning of <b>Hot Water Mixing Tank</b> , fabricated as per IS:2825 — Code for Unfired Pressure Vessels and as per the following requirements :				
	i)	<b>Shell:</b> Shell fabricated with Boiler Grade Mild Steel sheet epoxy coated 8 mm thick and 10mm dish ends, having storage capacity and working pressure as specified below: The shall have 550 mm dia manhole cover.				
	ii)	Nozzles for Inlet, outlet, drain and other accessories shall be fabricated from MS Heavy duty ERW pipes, All connections shall be flanged type				
	iii)	<b>Fittings and Instruments:</b> Dial Type Pressure gauge- 100 mm dia 0 to 14 kg/cm <sup>2</sup> with syphon and isolation valve, thermo well, safety relief valve etc.				

S.NO.		DESCRIPTION	QTY	UNIT	RATE	AMOUNT
	iv)	<b>Insulation:</b> The mixing tank shall be externally insulated with 50 mm thick mineral wool, covered with chicken wire mesh and cladded with 24 SWG. Aluminum sheet				
		<b>Storage capacity : 200litres</b> Working pressure: 6.5kg/cm2	1	No.		
	a	Cold Water inlet/ Hot Out Let PN 16 Butter fly Valve 32mm dia.	2	Nos.		
	b	Secondary Cold Water inlet line Butterfly Valve.32 mm dia.	2	Nos.		
	c	Cold Water inlet line Check Valve. 32 mm dia.	1	Nos.		
	d	Hot water inlet / outlet - secondary system				
		Ball Valve 32 mm dia.	4	Nos.		
	e	Hot water outlet connection to system				
		Butterfly Valve 32 mm dia.	2	No.		
		Check valve 32 mm dia.	2	No.		
	f	Hot water return water connection system				
		Butter fly valve 32mm dia.	2	Nos.		
		Check valve 32 mm dia.	2	Nos.		
	g	Inter connection to Mixing tank 32 mm dia. Butter fly valve	2	Nos.		
	h	Tank Drain connection ball Valve 32mm dia.	2	Nos.		
	i	spare Point in Mixing Tank - 32 mm	2	Nos.		
	j	Temperature sensor at mixing tank suitable for differential temperature setting shall be made for Solenoid Valve on/off. The control / system shall be complete with necessary cabling / wiring along with support.	1	Nos.		
	k	Pressure Release Valve 25mm dia.	4	Nos.		
	L	Air Release Valve 15mm dia.	4	Nos.		
	M	Temperature Gauge	2	Nos.		
	N	Pressure Gauge	2	Nos.		
	b)	<b>Hot Water Pumps (Return Circuit from Hot Water Distribution System- suitable for up to 90°C ( 1 working + 1 standby)</b>				
		<b>Duty:</b>				
		Discharge : 100 LPH				
		Head :20M	1	Set		
<b>1.3.1</b>		<b>Valves / Fittings :</b>				
	a	Butterfly Valve 25mm dia.	4	Nos		
	b	Check Valve 25mm dia.	2	Nos		
	c	Y-Strainer 25mm dia.	2	Nos		
	d	Dial type pressure gauge	2	Nos		
	e	Dial type thermometer	2	Nos		

S.NO.	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
1.4	Providing and fixing M.S. structural work fabricated from standard sections i.e. rounds, solid angles, slotted angles, channels including cutting to size, drilling, welding, fixing and welding to insert plates in RCC structural members as directed by Engineer-in-charge including cutting and making good the walls and floors (for staging of the equipment, supports, suspended floors, walk ways, ladders etc.)	100	Kg.		
	<b>TOTAL for 'HOT WATER GENERATORS AND OTHER ALLIED EQUIPMENTS' carried over to SUMMARY</b>			Rs.	
2.0	<b>PIPEWORK FOR HOT WATER GENERATION SYSTEM</b>				
2.1	Supply, installation, testing and commissioning of CPVC pipes, SDR-11, suitable for hot water system including 19mm thick nitrile rubber insulation with protective cloth and uv paint including all marking etc.	LOT	01		
	<b>TOTAL for 'PIPE WORK FOR HOT WATER GENERATION SYSTEM' carried over to SUMMARY</b>			Rs.	
3.0	<b>ELECTRICAL WORKS</b>				
	<b><u>ELECTRICAL INSTALLATION FOR HWG SYSTEM</u></b>				
3.1	Design, fabrication, assembling, wiring, supply, installation, testing and commissioning of motor control centre shall be fabricated out of 14 gauge CRCA sheet steel in form in 3b formation with reinforcement of suitable size angle iron, channel 'T' sections iron sand / or flats wherever necessary. Cableg and plates shall be provided on to pas well as at the bottom of the panels. Panels shall be treated with all anti corrosive process be fore painting as per specifications with 2 coats of red oxide primer and final approved shade of powder coated paint. 2 Nos. earthing terminals shall be provided for 3 phase, 4 wire, 50 Hz supply system. Lifting hooks shall also be provided in case of large panels. Approval shall be taken for each panel before fabrication. Cadmium Plated hardware shall be used in fabrication of panels.				
	<b><u>MCC – 1 (HWG)</u></b>				
	Suitable for above system with spare feeder including SITC of all cables(Copper), termination, earthing etc,	LOT	01		
	<b>TOTAL for 'ELECTRICAL WORKS' carried over to SUMMARY</b>			Rs.	
	<b>GRAND TOTAL</b>			RS.	