

SUPPLY, INSTALLATION AND MAINTENANCE OF EVACUATED TUBE COLLECTOR SOLAR WATER HEATING SYSTEM AT IDSA , New Delhi

IDSA is in the process of finalizing the work contract relating to supply, installation, testing and commissioning of Solar Water Heating System at Institute for Defence Studies and analyses (IDSA) ,a non commercial institute under Ministry of Defence .

1. The duly filled bid along with the instructions to the tenderers, suppliers/contractors obligations, general terms and conditions with the signature of the tenderer affixed on all the pages and complete in all respects superscribed as "**Supply, Installation and maintenance of solar water heating systems at IDSA, New Delhi**" should reach us in a sealed cover on or before 1500 Hrs , 30th Nov , 2012 through registered / speed post or the same may be dropped in the tender box available in the reception office at the following address :-

**Institute for Defence Studies and analyses (IDSA)
No. 1, Development Enclave, Rao Tula Ram Marg,
(Near USI), Delhi Cantt., New Delhi - 110010**

Hemant Kumar
Estate Manager

TENDER DOCUMENTS

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SPECIFICATIONS

A. SYSTEM CAPACITY

1 x 200 LPD+1X 100 LPD /60 degree C output temp.

The output temperature of 60 degreeC shall be obtainable on year round average basis.

Specifications for Evacuated tube Collector :

Technical Specifications for Solar Water Heating System

<u>SL</u>	<u>ITEM</u>	<u>SPECIFICATION</u>
a)	Solar Evacuated Tubes collector specifications (ETC collectors should be approved from MNRE)	1. Inner Tank Material a) Stainless Steel SS 316 b) SS304-2B (22 SWG)
		2. Hot Water tank insulation density a) High Density injected PUF insulation : 50 mm b) High des PUF (play urethane foam) Installation of 50 mm thickness between inner outer tank ensures maximum heat rotation every season (maximum up to 72 hrs)
		3. Tank Stand and supports a) Mild Steel with suitable anti corrosive coating
		4. Working pressure of the system a) Normal, Gravity Feed, Less than 1 Kg/cm ² . b) Recommended operating pressure : 10 Bars
		5. Tank Test pressure a) Factory Pressure Tested for 2 Kgs / cm ²
		6. Solar Evacuated Tube Dimension a) Double walled glass outer tube Dia 47± 0.7 mm, tube length 1500 ± 5 mm & Inner Diameter : 33.4 mm b) Thickness of tube at least 1.60 mm
		7. Tube assembling frame a) Mild Steel section with PP coating
		8. Tube assembling frame size

		a) Length – 2.10 mtrs. Width – 3.20 mtrs. Height – 1.50 mtrs	
		9. Cold water tank a) 2.4 mtrs. From the terrace level	
		10. Back up provide a) Electrical heaters :- 1.5 KW with thermostat, 2.0 KW with thermostat	
		11. Tube Coating a) Copper coated tubes with selective absorptive coating graded AI-N	
b)	Gasket for Flanges	3 mm thick gasket of Neoprene / synthetic rubber gasket shall be used for sealing the joints between flanges.	
c)	Collector Support Frame	The structure should be in a position of withstand a wind velocity of 100 kms / hr shall be made with angle iron of 35mmX35mmX4mm; will have vertical support at top and bottom edge of the inclined plane of the collector at a distance of 1.5 m or less. The vertical support shall be firmly grouted with the roof.	
d)	Painting of Stands	Proper cleaning and degreasing of the surface should be done with the help of three in one solution before painting. Two coats of Zinc chromate red oxide primer shall be applied followed by two coats of enamel paint of suitable colour .	
e)	Storage Tank (Hot Water)	a) Material – Stainless Steel (SS 316 / IS 1730 grade)	
		b) Thickness	
(f)	Thickness of tank sheet	Minimum Thickness	Tank Capacity
		20 Gauge	(0.91mm) for 100 LPD
		20 Gauge	(0.91mm) for 200 LPD
(g)	Insulation & Installation	All sockets and internal fittings of the tanks should be of stainless steel. 100 mm thick insulation of 48 kg/cu.m density having approx k value_0.03 W/mk and R value 3.34 sqm deg C/W to withstand a temp of 250 deg C. Thin polythene sheet shall be used as covering between the glass wool and the cladding sheet besides the retaining material such as chicken mesh etc. Aluminium sheet of thickness 24 SWG	

		<p>shall be used for cladding the tank insulation.</p> <p>The storage tank shall be properly installed at site using enameled coated appropriate size angle iron stands, girder, cement concrete pedestals of 1:2:3 ratio or any other specific provision suitable to site. To ensure the stability against heavy storm etc but not less than 1'x1'x6" dimensions. External of the tank should be properly insulated so that hot water temperature does not decrease by more than 5 deg C in about 16 hrs times.</p>
(h)	Piping	<p>a) Material. Medium class (B class) GI as per IS 1239 shall be used for piping</p>
		<p>b) Insulation. 25 mm thick insulation of 48 kg/cu.m density and K value+0.03 W/MK R value + 1.67 sq.m. C/W to withstand and temp of 250 deg C be used. Thin plastic sheet shall be used as covering between glass wool and aluminium cladding besides other retaining material like chicken mesh etc. 26 SWG thick aluminium sheet shall be used for cladding the insulated pipe. The pipe line should be properly supported and fixed with clamp with the help of suitable size stand / civil structure (cement concrete ratio 1:4) ISI mark strainer of standard make should be fitted in the main cold water supply line before the system.</p>
i)	Valves / Nipple / Tees / Bends	<p>Gun metal valve ISI marked shall be used. Nipple / Tees and bends of ISI mark of medium class GI (B class) shall be used. Air vents in each row are to be provided.</p>
J)	Instrumentation	<p>Temperature gauge : 1 No (for Hot water Storage Tank / outlet) Gun metal Strainer : 1 No (at Cold water inlet) Water meter – 1 at the inlet of cold water tank. Maximum 2 nos of chrome</p>

		plated brass taps for systems upto 200 LPD thereafter 1 tap per 200 LPD superior qualities for distribution line.
k)	Cold Water Tank	HDPE / LDPE material with Gun metal float valve (ISI marked) equal to the capacity of HOT water storage tank.
l)	Stands & Pedestals for the Tanks	The tanks will be mounted on stands made out of angle iron frame of 35x35x4 mm upto 2000 ltrs with each leg duly grouted with PCC 1: 2:4 of 1'x1'x1' size. The cold water tanks will be placed over angle iron frame having 4 cross members in 4 legs with 5 mm thick MS sheet for full bottom support fixed of 4 horizontal members based on the size of the cold water tank.
m)	System Layout & Design	Maximum number of collectors in series should not be more than ten. Maximum number of collectors in parallel in one row without the use of any piping connections should not be more than six. Air venting at appropriate places without hindrance of a spring leaded valve to prevent air locking in the system should be provided. For this purpose, the system shall have, at a suitable point, atmospheric pressure conditions preferably in the high temperature zone. System shall have a suitable expansion / make up tank at a high point in the system to ensure that collectors run full at the times. Capacity of this expansion / make up tank should be 1.5 % of the system capacity for all systems.
n	Electrical Back up	For 100 LPD & 200 LPD 2 KW each Electrical wiring of 2.5 Mmsq 3core unarmored cable , thermostat of simens /Danfoss/Honeywell make with MCB of 16 Amp.

Annexure-C

TERMS AND CONDITIONS

1. The manufacturer shall supply all technical literature and drawing considered necessary for the installation, operation and maintenance of the equipment and its fittings. These shall essentially include :-
 - a) Drawing showing over all dimensions and all other details including sectional view of the equipments.
 - b) List of parts with reference to nos.
 - c) Manual of instructions for the operation, maintenance and repairs / equipment and special fittings, if any.
 - d) Checking methods and schedule for cleaning the system.
 - e) Any other relevant technical data which would be of assistance for efficient operation and maintenance of the system including energy savings etc.
2. The supplier shall train IDSA's personnel for the operation and maintenance of the equipment for a particular period, mutually agreed between the supplier and the IDSA.
3. The suppliers will have to undertake repair of the system installed by them, in case of any defect arising out of any point of time. Supplier will attend the minor complaints within 48 hours of receiving the complaint otherwise a minimum penalty to be recovered @ Rs 200per day or as decided by Estate Manager.
4. The system and the solar collectors should be guaranteed for six years after the day of handing over. This include first three year with spare parts and next three year without spare parts. He / She shall submit list for recommended spares to be required in maintenance with price along with their offer. Manufacturer or their authority / accredited dealer shall be considered for eligibility to participate in tenders.
5. The supplier shall guarantee the performance of the system for the rated output of 60 deg C in terms of quantity of hot water and the temperature in peak winter for which the system is designed. If it is not achieved, the necessary additions / modifications including installation of extra collectors shall be done by the supplier without charging any extra price. However, the IDSA reserves the right to have this job completed for achieving the rated output by other

manufacturers / after serving 15 days notice to the original manufacturers / contracts at his cost & risk.

7. All the elements of the system which fail due to manufacturing defect within the period of guarantee shall be replaced by the tenderer free of cost.
8. An amount of 10% of the total cost of the system will have to be deposited by contractor, as security which will be reimbursable after 6 years i.e. completion of warranty period.

QUALIFYING REQUIREMENTS

1. Tenderer should have MNRE and/or DGS&D empanelled solar water heating system manufacturer or Authorised dealer of MNRE approved solar water heating system manufacturer/Supplier .
2. Should have at least 3 years experience in executing similar work in reputed organization/ institutions and he should have service network in Delhi/NCR
3. Supplier / contractor should have regular employees for carrying out the work of supply, installation and maintenance of solar water heating system.
4. Income Tax Returns for last three years.
5. Should have Service Tax number. (Copy to be enclosed)

Tender Documents

SUPPLIER / CONTRACTOR'S OBLIGATIONS

A) CONTRACTUAL

Towards Selections, control and supervision of employees

- a) Supplier/Contractor shall decide the number of employees to be deployed of executive of the work awarded to him and he or his authorized representative will be solely entitled to dictate such workers about the manner of carrying out the work as per the prescribed specifications.
- b) Supplier / Contractor shall supervise the work allotted to him and to be carried out by his employees.
- c) Supplier / Contractor to ensure that the employees deployed in the premises of IDSA are physically and mentally fit and do not have nay criminal record. Such employees should possess requisite skill, proficiency, qualification, experience etc.
- d) Supplier / Contractor to maintain appropriate records of his employees deployed to carry out the job(s).
- e) Supplier / Contractor will keep watch on his employees and he will be liable for any pilferage / loss to IDSA due to acts of omission and commission by his employees. Similarly, liability for any compensation to outsiders on account of any act of commission by the employees deployed by the contractor shall lie exclusively with him.
- f) Contractor to ensure that all precautions are taken for safety of his employees and equipments.

B)

- a) Supplier / contractor shall indemnify IDSA against all claims by statutory authorities and loses under various Labour Laws, statues or any civil or criminal law in connection with employees deployed by him
- b) The supplier / Contractor shall have to furnish the warranty / guarantee certificate for the equipment supplied for the system.
- c) The supplier / contractor shall have to replace at his own cost the equipment if the same is found defective during the warrantee/ guarantee period.

C) Towards Finance

Supplier / Contractor to arrange his own finance for carrying out the job including supply of tools, tackles and equipments to his employees, materials, payment of wages to his employees etc. **Rates quoted shall be net and inclusive of all the capital cost,** material cost, taxes and levies which might be applicable to this type of job including the subsidy as given by the MNRE and NCT Delhi which is to be claimed by the contractor at their own cost .

D) Measurement of work and payments thereof:

1. The designated officer of the IDSA will inspect the product / services being provided by the contractor and find our deficiencies. The contractor shall rectify the same immediately to the satisfaction of the designated officer.
2. Payment towards work satisfactorily installation of the Solar water Heating System at "IDSA" in line with the specifications.
3. All payments will be subject to deduction of income tax at source as per Income Tax and Service Tax as per the applicable Rules.

FINANCIAL BID
(A) SOLAR WATER HEATING SYSTEMS
(The Amount Quoted should be Inclusive of all Taxes, duty, Transportation etc .)

SL	ITEM / DESCRIPTION	QTY	RATE	AMOUNT
1.	*Solar Water Heating System of 100 LPD , ETC Type with Electrical back up excluding subsidies , as applicable for non commercial Institute	01 No		
2.	*Solar Water Heating System of 200 LPD , ETC Type with Electrical back up Excluding Subsidies as applicable for non commercial Institute	01 No		
3	Total amount for both the systems excluding subsidies in figures and words			

The cost of the system shall include the cost of collectors , Insulated hot water storage tank , system piping Electrical Back up , Installation Etc .

(B) INSTALLATION OF SOLAR WATER HEATING SYSTEMS as per the specifications at Annexure B

SL	ITEM / DESCRIPTION	QTY	RATE	AMOUNT
1.	Cold Water supply tank 500 LPD (Sintex)	1 No		
2.	MS Stand for Cold Water Tank	1 No		
3.	Cold Water pipeline 1" with other plumbing accessories like Bend , Union, Tee , Reducer, Socket, Etc .	10 Mtr		
4.	Hot Water pipeline ¾" with Other plumbing accessories like bend , Tee, union , reducer etc .	20 Mtr		
5.	Insulation of pipe .	50 Mtr		
6.	NRV 1"	2 Nos		
7.	Bib Cock ¾"	5 Nos		
8.	Gate Valve ¾" Gun metal	3 Nos		
10	Wiring work for electrical back up	35 Mtr		
B	Total Amount for installation			

The total amount (A + B) for supply and installation of Solar water heating systems is Rs. _____

Signature of Tenderer with Seal .