

**PUNJAB ENERGY DEVELOPMENT  
AGENCY**

**TENDER DOCUMENT**

*FOR*

**SUPPLY, INSTALLATION AND  
COMMISSIONING OF SOLAR WATER  
HEATING SYSTEM AT PUNJAB  
BHAWAN NEW DELHI**

**SOLAR PASSIVE COMPLEX, PLOT NO. 1 & 2,  
SECTOR-33 D, CHANDIGARH**

**PHONE: 0172-2663328, 2663382, FAX : 0172-2662865**

**PUNJAB ENERGY DEVELOPMENT AGENCY  
SOLAR PASSIVE COMPLEX, PLOT NO. 1 – 2, SECTOR-33/D  
CHANDIGARH**

**SHORT TENDER NOTICE**

Sealed offers are invited from the experienced manufacturers approved by the Ministry of New and Renewable Energy (MNRE), Government of India, for installation of Solar Water Heating Systems of capacity 2x3500 LPD and 1x1000 LPD at Punjab Bhawan, New Delhi along with dismantling of old Solar Water Heating System of 1x7000 LPD. DNIT can be obtained from the PEDDA office on payment of Rs.1000/- in cash or through demand draft in favour of Punjab Energy Development Agency payable at Chandigarh on any working day.

The complete offers along with EMD of Rs.100000/- (Rupees one lac only) in the form of demand draft shall be received by 15.10.2009 (upto 3.00 PM) and will be opened on the same day at 3.30 PM in the presence of the bidders or their representatives. PEDDA reserves the right to accept or reject any or all the tenders without assigning any reason.

**Director**

**PUNJAB ENERGY DEVELOPMENT AGENCY  
SOLAR PASSIVE COMPLEX, PLOT NO.1 – 2, SECTOR-33/D  
CHANDIGARH**

**DETAILED NOTICE INVITING TENDER**

- Scope of work : Supply, installation and commissioning of Solar Water Heating Systems of 2x 3500 LPD and 1x1000 LPD with electrical backup and heat exchanger at Punjab Bhawan New Delhi and dismantling of old solar water heating system of capacity 1x7000 LPD installed there.
- Earnest money deposit : Rs.100000/- (Rupees one lac only) in the shape of demand draft favouring Director, PEDDA payable at Chandigarh.
- Time period : One Month from the date of work order

Date & time of submission of : 15.10.2009 upto 3.00 PM  
technical & Financial bids

Date & time of opening of : 15.10.2009 upto 3.30 PM  
technical & financial bids

**Technical specifications** : As per **Annexure-I** FOR flat plate collector(FPC) based solar water heating system

**Technical Bid** : **As per Annexure-II**

**Financial Bid** : As per **Annexure-III** FOR flat plate collector (FPC) based solar water heating system  
As per **Annexure -IV** for extra items

- i. Tenders from those manufacturers only will be accepted which employ collectors having a valid BIS license or approval as on date of tender or who had applied for the renewable of the same on or before the date of opening of this tender.
- ii. The bidders must have executed work orders of Solar water Heating System valuing Rs.20 lacs or more in the year 2008-09. A certificate indicating name of the customer , No and date of work order , Cost, Date of completion must be enclosed. Tender must produce proof of satisfactory completion from the beneficiary organization.

- iii The tenderer should not have been blacklisted or debarred by any Central/ State./ Public Agency from carrying out similar business during last three financial years.
- iv Documents in support of eligibility must be enclosed with the tender. Offers without satisfying eligibility conditions will be out rightly rejected and no correspondence in this regard will be entertained.
- v Tenders received late shall not be accepted. No separate receipt will be issued on submission of the tenders.
- vi Tender not accompanied with EMD of Rs.100000/- shall not be accepted.
- vii EMD of unsuccessful tenderer shall be returned after award of the contract/ order . No interest will be paid on the earnest money.
- viii Earnest money may be forfeited if the tenderer fails to execute the contract within the stipulated period, after acceptance of the tender
- ix The bids shall be valid for a period of 90 days from the date of opening of the tender.
- x The Solar water heating system will be warranted for a period of two years . After two years of warranty three years AMC will be done by the manufacturers. The rates should include the three years AMC charges
- xi. The rates quoted should be inclusive of all taxes, octroi, VAT etc. and FOR site. The party will dismantle the old already installed SWHS of capacity 1x7000 LPD and will quote its scrap value. The net cost will be arrived after deducting this value of old SWHS from the cost of New to be installed SWHS.
- xii Only those tenders submitted on the original prescribed tender document shall be considered. Each page of tender document shall be signed and stamped. As far as possible, the tender should be type written and all cuttings should be attested.
- xiii The tenders shall be opened in the presence of the tenderers who wish to be present at the time of opening.
- xiv The material will be dispatched/ installed by the supplier after inspection by the Director, PEDDA or his representative at his premises or at site and acceptance of the same. The supplier shall provide without any extra charge, all materials, tools, testing equipments, labour and assistance of every kind which the inspecting officer may consider necessary for any test or examination which he may require to be made on the supplier premises. PEDDA can also get the systems tested from any Govt. approved test centre/ laboratory and the expenses shall be borne by the supplier. All the expenses for the inspection by the PEDDA's Committee like TA/DA and boarding and lodging charges will be borne by the manufacturer.
- xv. The manufacturers shall give the operation and maintenance manual for the system to the beneficiary and one copy to PEDDA in English/Punjabi.
- xvi The manufacturer shall be responsible for the satisfactory performance of the system for two years from the date of commissioning. Any complaint from the user / nodal agency must be attended within seven days from the receipt of complaint in writing or telephonically, failing which PEDDA will make the system functional and debit the expenditure to the party which will be deducted from the 5% remaining payment due to the manufacturer and the defaulter manufacturer will be blacklisted.
- Xvii Sealed tender should be submitted in two parts i.e. **Part-I (technical) in the format given at Annexure-II** and **Part-II (Financial) in the format given at Annexure-III**. The firm should submit their offers in two separate sealed envelopes, marked on one

envelop as “Part-I “Technical ” and on other envelope as “ Part-II: Financial”. These envelopes should again be sealed in a covering envelope alongwith forwarding letter, superscribed on top with “**Offer for Punjab Bhawan Solar Water Heating Systems**”.

- xviii. General specifications of the material are given on Annexure-I&II. If there is any left out specification that will be as per MNRE/BIS latest specifications and guidelines.
- xix. The parties should also quote the rates for extra items if needed for solar water heating system as given in Annexure- IV
- xx. In case of any dispute, Chief Executive, PEDDA, shall be the sole arbitrator and his decision shall be binding on both the parties.
- xxi. PEDDA, has the right to accept or reject any or all tenders without assigning any reason in the interest of the Agency.

**Payment Terms:**

- 1. 70% of the total cost of the project against supply of material at site.
- 2. 25% of the project cost would be paid after successful installation and commissioning of the systems.
- 3. 5% will be released after five years from the date of commissioning of the system. It can be released against bank guarantee of equal amount valid for five years from the date of commissioning of the system.

**Penalty clause:**

A penalty @ 1% of the contract price for every week of delay or part thereof shall be charged with maximum ceiling of 10% thereafter PEDDA may consider termination of the contract.

**DIRECTOR**

**3**

## Annexure-I

## DETAILED TECHNICAL SPECIFICATIONS OF VARIOUS COMPONENTS OF SOLAR WATER HEATING SYSTEMS

<b>1. ABSORBER MATERIAL</b>	Absorber shall be of copper sheet and copper tube.								
Thickness of sheet Riser	34 SWG (191) Diameter : 12.7 $\pm$ 0.5mm <b>Thickness : 0.56 mm (IS 2501)</b> Number : 10								
Header	Diameter : Minimum 25 $\pm$ 0.5 mm Thickness : 0.71 mm Number : 2 Projection out side: 40 mm $\pm$ 0.5 mm Including flanges of the collector box.								
Space between Riser Tubes	120 mm maximum from centre to centre of the riser. The free edges at the sides not to exceed 60 mm from the centre of the extreme end riser tube. For independent fins or joints in the sheet an overlap of minimum 2 mm shall be provided.								
Bonding between Riser & Sheet	Full length of all risers shall be welded with the absorber sheet. In case of brazing/soldering/tig welding of continuous nature, un-brazed/un-soldered portion should not exceed more than 10% of the length of the riser. For brazing/soldering, minimum 60% tin solder or suitable brazing material shall be used.  The flux used in soldering shall be mechanically removed and neutralised with the solution of sodium carbonate to avoid corrosion after installation. The flux used should be non greasy and non corrosive.								
Coating	Selective coating with absorbitivity >0.92 and emmissivity<0.2								
<b>2. FLAT PLATE COLLECTOR</b> Overall Dimensions(mm)	<table border="1"> <thead> <tr> <th>Size</th> <th>Length</th> <th>Width</th> <th>Height</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>1860<math>\pm</math>10</td> <td>1240<math>\pm</math>10</td> <td>100<math>\pm</math>10</td> </tr> </tbody> </table>	Size	Length	Width	Height	A	1860 $\pm$ 10	1240 $\pm$ 10	100 $\pm$ 10
Size	Length	Width	Height						
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	<p>be used:</p> <table border="1"> <thead> <tr> <th>K</th> <th>R</th> <th>Thickness</th> <th>density</th> </tr> <tr> <th>W/MK</th> <th>sq.mC/W</th> <th>(MM)</th> <th>(KG/Cum)</th> </tr> </thead> <tbody> <tr> <td>0.029</td> <td>1.67</td> <td>50</td> <td>48</td> </tr> <tr> <td>0.03</td> <td>1.67</td> <td>65</td> <td>24</td> </tr> <tr> <td>0.028</td> <td>1.67</td> <td>50</td> <td>48</td> </tr> </tbody> </table> <p>The insulation must with stand a temperature of 250 deg. C. Aluminium foil of thickness 0.015mm to 0.021mm shall be used for covering the back insulation</p> <p>25 mm thick insulation of specification as mentioned above.</p> <p>Aluminium foil of thickness 0.015 mm to 0.021mm shall be used of covering the side insulation.</p> <p>Glass wool Resin Bonded/Rockwool/Rigid Polyurethane of Thickness 25mm, minimum shall be used so as to achieve R value=0.08 as per IS 3346:1980.</p>	K	R	Thickness	density	W/MK	sq.mC/W	(MM)	(KG/Cum)	0.029	1.67	50	48	0.03	1.67	65	24	0.028	1.67	50	48
K	R	Thickness	density																		
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0.029	1.67	50	48																		
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0.028	1.67	50	48																		
<p><b>6. FRONT GLAZING</b></p> <p>Material thickness Transmittance General appearance of glass Aperture area Spacing between cover plate and Absorber surface</p>	<p>Single piece glass Toughened -4.0<math>\pm</math>0.2 mm (IS 2553(Part-I) 82% (Minimum)</p> <p>Free from bubbles/rough surface 2.30sq.mt.(approx.)for size A collector 20 to 40 mm</p>																				
<p><b>7. HEADER FLANGES</b></p>	<p>Brass flanges of 62<math>\pm</math>3 mm diameter and minimum thickness of 4 mm with provision of four number of GI plated nuts bolts with diameter of 6mm-8mm shall be used. Flanges shall be brazed to the header and brazing tested for leakage at the test pressure of 10kg/sq.cm. In no case crude soldered flanges shall be used. The assembly of the flanges should be at right angle to the header area to ensure proper assembly at the site of installation.</p>																				
<p><b>8. GROMMET</b></p>	<p>Suitable sealing between the inlet and outlet of header and casing of the following materials shall be provided. Neoprene, EPDM, Silicon rubber or butyle rubber etc.</p> <p>The grommet shall be suitable for a temp. upto 125 deg. C and mechanical loading during transportation of collectors.</p> <p>Typical size of grommet may be 40 mm outer dia and 25mm inner dia.</p>																				

<p><b>9. ASSEMBLY OF COLLECTORS</b></p>	<p>The load of the absorber should not be on the insulation. It should be taken by the collector box.</p> <p>The air gap between the glazing and the absorber should be 25mm (<math>\pm 5</math>mm). Insulation should not be allowed to slide.</p> <p>Glazing shall be fixed on the collector box by using EPDM/Neoprene/Synthetic rubber channels.</p> <p>The glass should be firmly held, without strain taking into account the expansions of glass. A typical example is by retaining the glazing with the help of self tapping screws and aluminium angle retainer of dimensions 25 mmx25mmx1.5mm fixed on the top of the box it shall be ensured that the screws are not touching the glass edge.</p> <p>Top surface along the edge between the glass and the aluminium angle shall be caulked with suitable sealants such as zinc oxide based/rubber based/silicon rubber based or polysulphide rubber sealants.</p>			
<p><b>10. GASKET FOR FLANGES</b></p>	<p>3 mm thick gasket of Neoprene/synthetic rubber gasket shall be used for sealing the joints between flanges.</p>			
<p><b>11. COLLECTOR SUPPORT FRAME</b></p>	<p>The structure should be in a position of withstand a wind velocity of 100 kms/hr. shall be made with angle iron of 35 mmx35mmx4mm; 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.</p>			
<p><b>12. PAINTING OF STANDS</b></p>	<p>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 as per NIT.</p>			
<p><b>13. STORAGE TANK(HOT WATER)</b> a)Material  b) Thickness</p>	<p>Stainless Steel (SS 304/ IS 1730 grade)</p>	<table border="1"> <tr> <td data-bbox="1112 1751 1112 1795"></td> <td data-bbox="1112 1751 1451 1795"><b>Tank capacity</b></td> </tr> </table>		<b>Tank capacity</b>
	<b>Tank capacity</b>			

	<p>20 gauge 20 gauge 20 gauge 18 gauge 18 gauge 18 gauge 16 gauge 16 gauge 16 gauge</p>	<p>(0.91mm)for 100 lpd (0.91mm) for 200 lpd (0.91mm)for 500 lpd (1.2mm)for 1000lpd (1.2mm)for 1500 lpd (1.2mm)for 2000 lpd (1.6mm)for 3000 lpd (1.6mm) for 4000 lpd (1.6mm)for 5000 lpd</p>
c) Insulation and installation	<p>All sockets and internal fittings of the tanks should 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 sq.m 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.</p> <p>Aluminium sheet of thickness 24 SWG 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.</p>	
	<p>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>	
<b>14. PIPING</b>		
Material	<p>1" to 2" dia Medium class (B class) GI as per IS 1239 shall be used for piping.</p>	
Insulation	<p>25mm thick insulation of 48kg/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.</p> <p>Thin plastic sheet shall be used as covering between glass wool and aluminium cladding besides other retaining material like chicken mesh etc.</p> <p>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</p>	

	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/
<b>15. VALVES/NIPPLE/TESS/BENDS</b>	Gun metal valve ISI marked shall be used. Nipple/tees and bends of ISI marked of medium class GI (B class) shall be used. Air vents in each row are to be provided.
<b>16. INSTRUMENTATION</b>	Temperature gauge: 1 No. (for Hot Water Storage Tank/Outlet)  Gun metal stainer: 1 No. (at Cold Water inlet)  Water meter -1 at the inlet of cold water tank. Maximum 2 nos. of chrome plated brass taps for systems upto 200 lpd and thereafter 1 tap per 200 lpd of superior quality for distribution line.
<b>17. COLD WATER TANK</b>	HDPE/LDPE material with Gun metal float valve (ISI marked) equal to the capacity of Hot water storage tank.
<b>18. STANDS &amp; PEDESTALS FOR THE TANKS</b> (hot water tank/ cold water tank)	The tanks will be mounted on stands made out of angle iron frame of 35x35x4mm up to 2000 liters and 65x65x6mm for capacity above 2000 liters 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 5mm thick MS sheet for full bottom support fixed of 4 horizontal members based on the size of the cold water tanks.
<b>19. SYSTEM LAYOUT &amp; DESIGN</b>	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

	<p>tank at a high point in the system to ensure that collectors run full all the times. Capacity of this expansion/make up tank should be 1.5% of the system capacity for all systems.</p>
<b>20. PUMP</b>	<p>In case of forced system, pump of suitable size with DTC/FTC control has to be provided as per site requirements.</p>
<p><b>21. HEAT EXCHANGER</b>  (a) Shell-in-Tube Type  (i) Material</p> <p>(ii) Tube Thickness</p> <p>(b) Coil-type Heat Exchanger</p> <p>(i) Material  (ii) Thickness  (iii) No. of coils and flow Pattern</p>	<p>Copper for forced systems only</p> <p>Shell in tube type heat exchanger may be used if U-type construction is not employed and if V-type construction is employed, then minimum 4 Nos. of heat exchangers will be used in series.</p> <p>Shell shall be designed for 1.5 times of the designed operating pressure and shall be tested for two times the operating pressure. In case of mild steel shell, corrosion allowance of 1.6 mm shall be provided.</p> <p>Shell shall be designed as per the BIS-2825. All the elements of heat exchanger shall be as per relevant Indian Standard or as per TEMA Class C construction.</p> <p>Minimum 22 SWG, but may be higher depending upon the designed pressure requirements.</p> <p>For thermosyphen systems only. May be used by incorporating Cu/SS coils/retender inside the storage tank</p> <p>Copper/SS tube of 3/4" dia  Minimum 22 SWG. May be higher depending upon the pressure requirements.  Shall be so designed to ensure the pressure drop less than 0.3 kg/cm. The surface area of the heat exchanger should not be less than 0.2 m<sup>2</sup> per sq.m of the absorber area of the system (for 100 lpd system, the copper tube length of 7 meter is required).</p>
<b>22. ELECTRICAL BACK UP</b> (only upto 1000 lpd)	<p>For 100 lpd - 2 KW  For 200 lpd- 2 KW  For 300 lpd- 2x2 KW  For 400 lpd- 2x2 KW  For 500 lpd- 2x2 KW  Electrical wiring of 2:5 mm sq. 2 core unarmoured cable, thermostat of Radsson /Bajaj  Make with MCB of 16 amp.</p>

	For 600 lpd- 6 KW For 800 lpd-9 KW For 1000 lpd-9 KW For 1500 lpd-9KW For 2000 lpd 12KW For 2500 lpd 15 KW For 3000 lpd 20 KW For 3500 lpd 25 KW For 4000 lpd 25KW For 5000 lpd 30 KW
<b>Electrical back up control panel for 6 KW</b> 1. DP sw itch 20 Amp. 2. MCCB 4 pole 10 Amp. 3. contactor 16 Amp. 4. Amp. Meter 1x30Amps. 5. Volt meter 0-500V 6. Amp. Selector Switch 7. Voltage Selector Sw itch 8. Thermostat for auto cut	Anchor make or equivalent ABB/Siemens /Havel make L&T make Rishop -do- AE/KAAYCEE -do- -do-
<b>Electrical back-up control panel for 9 KW</b> 1. DP sw itch 1x32 Amp. 2. Amp.mtr. 1x30 Amp. 3. Volt mtr. 0-500 volts 4. Amp. Selector swtich 5. Voltage Selector switch 6. MCCB 4 pole 20 Amp. 7. Thermostat for auto cut 8. Contactor 16 Amp.	Anchor make or equivalent Rishop make -do- AE/KAAYCEE -do- -do- ABB/Sieman/Havel L&T make Wire should be of not less than 4mm s. 3 core, Cu, armoured type

**Annexure-II****TECHNICAL & COMMERCIAL BID  
PART-I COMMERCIAL INFORMATION**

1.	<b>Category of the tenderer</b>	Manufacturer/ authorised dealer/ New Supplier
2.	<b>Name &amp; address of the firm/supplier complete with telephone, MOBILE, fax nos. &amp; E-mail etc.</b>	
3.	Name & designation of the authorized signatory to whom reference shall be made	
4.	Present activities/business of the firm i. Solar Water Heating ii. SPV –BOS Manufacturer iii. other activities	
5.	Type of organization - Sole proprietor - Partnership firm - Private Ltd. Company - Public Ltd. Company - Any others	
6.	Name & address of subsidiaries, if any, with details of board of directors	
7.	Vat/ Sale tax registration number(attach copy)	
8.	Detail of any existing service network in Punjab (name & address of service centres, year of opening)	
9.	EMD of Rs. 1,00,000/-	Attached/ not attached DD No. _____ dated _____ Bank _____ Payble at _____
10.	Attested copy of valid BIS Certificate attached or not?	Attached / not attached
11.	List of SWHS projects executed in 2008-09 attached or not.( the value should be Rs.20 lacs or more)	Attached / not attached
12.	Literature/ leaflets on products	Attached / not attached
13.	Authority letter from company for signing the papers on behalf of company with seal	Attached / not attached
14.	Copies of RCs of other States to which the applicant is a party	

**Annexure-III**

**FINANCIAL BID FOR THE SUPPLY, INSTALLATION AND COMMISSIONING OF  
SOLAR WATER HEATING SYSTEMS OF 2x 3500 LPD + 1x 1000 LPD CAPACITY WITH  
ELECTRICAL BACKUP AND HEAT EXCHANGER.**

A.

S.No	Item	Rate per system (Rs)	Cost of the systems (Rs)	AMC charges for three years (Rs)	Total Cost (Rs)
1	2x 3500 LPD				
2	1x1000 LPD				
	Grand Total				

All the rates should be inclusive of two years warranty period plus three years AMC period and should include all the taxes , VAT etc and FOR site.

B. Dismantling of old SWHS of 1x7000 LPD and its scrap value to be quoted by the party – Rs. \_\_\_\_\_

C. Net Cost A-B = Rs. \_\_\_\_\_

Note: The cost of cold/ hot water pipeline , civil works etc. will be paid as per the actual measurement at the site and on the basis of rates of extra items as in Annexure-

IV

**ANNEXURE –IV**

**The cost of Extra Items**

S.No	Size	Cold water pipe line (Rs)	Hot Water pipe line (Rs)
A	1/2"		
B	3/4"		
C	1"		
D	1.5"		
E	2"		

2. Civil Works Rs. \_\_\_\_\_ per cubic feet

3. Angel Iron Rs. \_\_\_\_\_ per KG