

Details of Empanelled Vendors & Prices for Solar Water Heaters (for Govt./Semi Govt. Buildings) 2022-23

Sno	Discription	Total Payable Amount inclusive of Centage & GST per kW (in ₹)	Empanelled Vendors	Address	Email	Contact	Validity of Agreement
1	1000 LPD	362390	M/s Skylark Thermal Energy Systems	172, Shaniwar Peth, Trimbakeshwar Soc. Opp, Shaniwar Wada, Pune 411028	-/-	8756666099	01-07-2022
2	500 LPD	203973.8					

SCOPE OF WORK

The firms which qualified the technical as well as financial bids will be selected to execute the work with on Secondary School Buildings. These Water Heaters are to be installed with minimum technical specifications mentioned in the tender document a brief of the same are in the following pages.

Following work shall have to be carried out by the contractor in the prices/rates offered by him:

- A. All the work related to the proper installation and functioning of the systems shall have to be carried out by the contractor. Transportation, storage, safety and security of the supplied material, issuance of road permit etc shall be the sole responsibility of the contractor.
- B. Civil works/welding work related to the foundation of mounting structure of the system shall be done by the contractor.
- C. The contractor shall have to provide Hot water pipe lines of appropriate size as per requirement and as required by the user.
- D. The contractor shall have to connect the solar water heating system to the source of cold water available in the building and lay the required cold water pipe line of appropriate size as per requirement and as required by the user.
- E. The complete Solar Water Heater shall be warranted by the contractor against any manufacturing/design/installation defects for a minimum period of 5 YEARS from the date of commissioning.
- F. The contractor will be responsible for satisfactory performance, operation and regular maintenance of the solar water heaters for a period of 5 YEARS from the date of commissioning. All the necessary arrangements required in this regards during 5 YEARS period shall be made by the contractor.
- G. Comprehensive warranty will include rectification/replacement of all the defective components/items during warranty period, all the arrangements for keeping the solar water heater functional shall be sole responsibility of the contractor.
- H. After completion of the proposed work, clearances of all temporary work/materials shall be the sole responsibility of the contractor and this shall be removed immediately after the requirement of such temporary work is completed.

- I. Supply and installation of display road showing all technical information of Solar Water Heater.
- J. All the non functional parts/materials/items replaced during the comprehensive warrantee/maintenance period shall be the property of the contractor.
- K. After proper installation, the commissioning of the system shall be carried out by contractor in presence of concerned districts project officer of UPNEDA and user and accordingly Joint commissioning/handing over report shall be signed on prescribed format.
- L. The contractor shall conduct training to user regarding assembly, startup, operation, maintenance and repairs of system installed.
- M. During comprehensive warranty period the contractor shall have to submit annual performance report from user regarding functionality of system.
- N. Bidders are encouraged to perform due diligence and inform themselves fully about the scope of work.

GENERAL TECHNICAL SPECIFICATION:

**COLLECTORS SPECIFICATIONS OF SOLAR WATER HEATING SYSTEMS
FLAT PLATE COLLECTORS**

The main component of solar flat plate collector cover plate made of toughened glass, Sheet for absorber made of copper and Absorber made of copper sheet and copper tube.

1-FLAT PLATE COLLECTORS: BIS (LATEST REVISION) APPROVED ONLY

-As per IS12933(part-1&II):2003 Typical shape and dimension of the flat plate collector (SIZE A, B, C) may be as given in table below. Any other size and shape not mentioned in the below table may also be used provided other components are made in consonance.

(a) Overall Dimensions of Collector for
100 LPD (in mm)
Size Length (L) Width (W) Height (H)

A-	1860+/-10	1240+/-10	100+/-10
B-	2120+/-10	1030+/-10	100+/-10
C-	2050+/-10	930+/-10	100+/-10

or equivalent

All dimensions in millimeters

1.1. COLLECTER BOX :

- a) **Material:** Aluminum extruded sections of size approximately 100 mm x 25 mm channel section (within the tolerance given above) and of thickness 16 SWG for the sides.
22 SWG Aluminum sheet for the bottom.
16 SWG Aluminum angles (dimensions 25 mm x 25 mm for retaining glass)
Material used shall be as per section-2 of IS: 12933(pt-2)/2003
- b) **Fabrication:** For aluminum box, the side channels may be welded at the corners by inert arc welding or gas brazing. Bottom sheet may be joint with spot welding or self-threaded nickel-plated screws. In case of screw joints wooden battens shall be provided to secure the screws. The screwed/riveted joints shall be made leak proof by sealing paste of zinc oxide base or rubber based or silicon rubber based or epoxy based compound.
- c) **Cover Plate: Shall be toughened glass and thickness of 4.0mm (Min) confirming to section-1 of IS: 12933(PT-2)/2003. The solar transmittance of the cover plate shall be minimum 82% at near normal incidence.**

1.2. ABSORBER:

- a) **Material:** Copper sheet and copper tubes 2 sqm. (+0.01 m²) including the projected area of the header.
- b) **Thickness:** 34 SWG (IS- 191)
- c) **Copper Tubes (Risers):** Diameter = 12.7 (+0. 5mm)
Thickness = 24 SWG (IS- 2501)
- d) **Header :** Diameter = 25.4 mm (+0. 5mm)
Thickness = 22 SWG
Projection= 40mm (+5mm)
outside the collector box including the flanges.
- e) **Space between riser tube:** maximum 12 cm form center to center of the riser. Distance of extreme most riser center from the sides of the collector box not to exceed 6cm from the center of the extreme and riser tube. For independent fins or joints in the sheet an overlap of minimum 2 cm shall be provided.
- f) **Bonding between Riser and Sheet:** Full length of all risers shall be welded with absorber sheet in case of brazing /soldering/tig welding of continuous nature unbrazed/unsoldered 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 for soldering /brazing shall be non greasy.
- g) **Header- riser joints:** The assembly of riser with the header shall ensure the tube protrusion inside the header not exceeding 3mm. The riser shall be brazed/welded with header.
- h) **Absorber coating:** In all systems selective coating shall be used. The selective coating shall have Emissive less than .20 stable up to 2000C and deterioration in

these values should not be greater than 10 % in a year. Absorptive should be greater than 0.92.

Absorber Area: Minimum 2 sqm. Per 100 lpd. At 60 0c as follows:-

CapacityNo.of collectors (min 2sq.mt.each)

500 Lpd 05

1000Lpd 10

1.3. Testing of Riser-Header:

Riser and header assembly designed for working pressure up to 245 kPa (2.5 Kg/cm²) shall be tested for leakage at a minimum hydraulic pressure of 490 kPa (5 kg/cm²). The system designed for higher pressure than 245 Kpa. The assembling shall be tested at a pressure twice the design pressure.

1.4. Collector Box Insulation:

- a) Back insulation: Minimum 50 mm thick insulation of rock wool/glass wool/mineral wool shall be provided. Thermal conductivity (K) of the insulation material shall be maximum 0.52 W/Mk at 100 degree centigrade mean temperature and thermal resistance @ shall be 1.67 M2 0C/W) when tested in accordance with IS 3346: 1980.
- b) Side Insulation: Minimum 15 mm thick insulation of glass wool/resin bonded/ rigid polyurethane shall be provided. Thermal conductivity (K) of the insulation material shall be maximum 0.52 W/mk at 100 degree centigrade mean temperature and thermal resistance @ shall be 0.5 m2 0 C/W when tested in accordance with IS 3346: 1980.
- c) Aluminum foil of thickness 0.016 mm +0.005 mm shall be used for covering the back as well as side insulation.
- d) Back and side insulation shall confirm to section-4 of IS 12933(pt.2)/2003, shall withstand at 175 degree Celsius.

1.5. Front Glazing:

Toughened/Tempered glass of thickness 4 mm+/- 0.2 mm having minimum transmissivity of 80% at near normal incidence. Glass should be free from bubbles and rough surface. Minimum aperture of the cover plate shall be 2.12 m² for size A and 1.95 m² for size B collector.

1.6. Header Flanges:

Copper/Brass flanges of 62 mm+3 mm diameter and minimum thickness of 4 mm with provision for four numbers of brass nut and bolts with diameter of 5 mm-6mm

shall be used. Flanges shall be brazed to the header and brazing tested for leakage to test pressure. In no case crude soldered flanges shall be used. Assembly of the flanges should be at right angle to the header area to ensure proper assembly at the site of the insulation.

1.7. Gasket & Grommets:

- a) Gaskets used for sealing the glass with collector box may be poly-chloroprene /silicon/EPDM/PVC channel section.
- b) Grommets for sealing the collector box and header joint may be one of the following type and shall fit properly so that no dust can pass through the joints:
 - i. Neoprene rubber
 - ii. EPDM
 - iii. Silicon rubber
 - iv. PVC

Grommets and gaskets shall be capable of withstanding temperature up to 125 °c and shall conform to thermal shock test.

1.8. Assembly of Collectors:

- i. The collector shall be assembled in such a way that the weight of the absorber is distributed uniformly on the sidewalls of the collector box and it shall not be on the insulation.
- ii. The entire assembly shall be free from surface defects. All sharp edges and corners shall be rounded off. The exposed surfaces shall be properly made corrosion resistant.
- iii. The air gap between the cover plate bottom and the absorber surface shall be within 20mm to 40 mm.
- iv. The insulation shall be provided in such a way that no slippage occurs from anywhere. Providing additional insulation under the header may do this.
- v. The cover plate shall be fixed with the collector box through neoprene /silicon/ethylene/propylene diene monomer (EPDM) rubber channels in order to protect the cover plate from damage. Provision shall be also made for expansion of glass.
- vi. The solar collector shall be assembled so that replaceable components are accessible for repair or replacement at site in accordance with the manufacturer instructions.

1.9. Gasket for Flanges:

3 mm thick compressed asbestos fibre gasket or Neoprene rubber gasket shall be used for sealing the joints between flanges.

1.10. Collector support Frame:

The structure shall be in a position to withstand wind velocity of 100 Km/hr. The structure shall be made with angle iron stronger than 35mmx35mmx3mm and shall have

vertical support at the top and bottom edge of the inclined plane of the collector at a distance of 2.5 m or less. The vertical support shall be firmly grouted to the ground of the roof in case of ground-mounted systems. The grouting block shall be minimum of equal to 25cmx25cmx15cm and finished properly. In case the grouting is carried out at the roof already waterproofed with asphalt, the back support of the collectors may be anchored to the parapet or the size of the back support of the collectors may be anchored to the parapet or size of the grouting block shall be increased to provide for dead weight anchoring of 75 kg per leg of vertical stand. The collector frame shall be rectangular shape i.e. having all four sides touching the collector edge.

The cement pedestals should be made after chipping of the existing rooftop to provide proper gripping and strength.

Structures should have the collector's bottom side at least 30cm above the ground/roof level.

Case of inclined roof the collector-housing frame along with the vertical angle shall be mounted fixed using suitable necessary structure keeping in view the load bearing capacity of the roof to ensure stability against heavy storm.

The collector should be properly clamped and tightened with frame and supporting structure at both the by 20mm x 20mm size M.S strip consisting of rubber packing to avoid chemical reactions between collector body and clamps. Last row of collector-supported structure should be grouted throughout its length opposite to collector facing with c.c. work ratio 1:2:4 of size 250mm x 300mm (w x h)

1.11. Painting of Stands:

Cleaning and degreasing of the surface should be done before painting. Two coats of zinc chromate red oxide primer shall be applied followed by one coat of enamel paint of suitable colour for coastal area and areas of sulphuric fumes and chlorides. Suitable anti corrosion paints should be applied after proper treatment in the shop.

2. Hot Water Storage tank:

Hot Water Storage tank:

- a) **Material:** (As per MNRE specifications) The Storage (inner) tank shall be of Stainless steel (S.S 304 or 316 grade min/MS or any other material with anti corrosive coating for hard water with chlorine contents) up to 5000 liters. Adequate protection is to be provided.

- b) **Thickness**

Minimum thickness for SS Tank capacity
18 gauge (1.2 mm) 1000 LPD

No leakage under any kind of negative or positive pressure of water will be ensured. For M.S. minimum thickness will be 1.5 mm. No leakage under any kind of negative or positive pressure of water will be ensured.

c) Insulation

Thermal insulation of tank should be minimum 50 mm thick with CFC free PUF having density of 28-32Kg/cu. mtr for domestic systems and 150mm thick rockwool of 48 kg. per cum. for other systems. In case of higher density insulation, the thickness may reduce proportionatly. Al sheet of thickness 22 SWG/GI powder coated sheet of minimum 24 SWG shall be used for cladding of tank insulation. MS may also be used with special anti corrosive protective coatings as per MNRE. The storage tank shall be properly installed at site using enameled coat appropriate size angle iron stands, girder cement concrete pedestals of 1:2:4 ratio or any other specific provision suitable to site to ensure the stability against heavy storm etc. but not less than 1'x1'x1'dimensions. External of the tank should be properly insulated so that H.W. temperature does not decrease by more than 5 0c in about 16 hrs times.

2. PIPING:

- a. Material Medium class (B class) G.I. as per IS 1239 shall be used for piping. Thermal Insulation of hot water pipes should be Minimum 75 mm thick rockwool on G.I. pipes For higher density insulations, the thickness may reduce proportionately Specification of PUF insulated HDPE pipe for insulation of G.I. Pipe.

PUF Insulated HDPE Pipe	O.D.	PUF Thick
To be used for insulation of 1/2 " G.I.pipe	50 mm	12 mm
To be used for insulation of 1" GI pipe	90 mm	25 mm
To be used for insulation of 1½" GI pipe	110 mm	26 mm

- b. Thin plastic shall be used as covering between glass wool and Al cladding besides other retaining material like chicken mesh. 26 SWG Al sheet shall be used for cladding material or PE pipe of suitable dia may be used for cladding over PUF insulation.
- c. Installation: The pipeline should be properly supported and fixed with clamp with the help of suitable size stand/civil structure (cement concrete ratio 1:4) ISI mark strain of standard make should be fitted in the main cold water supply line/ over head tank before the system. The Hot water pipe line should be provided up to the point required by the user.

3. Valves/Nipples/Tees/Bends:

Gunmetal valve as per ISI specifications shall be used. Nipples/ Tees and bends shall be of medium class GI (B class)/brass or Cu. Air vent in each row shall be provided.

4. Instrumentation:

Temperature Gauge 2 No's for non heat exchanger systems and 4 No's for Heat exchanger systems are to be installed.

Water meter 1 No. at the inlet of cold water tank should be installed

5. System layout & Design:

- a) Maximum no of collectors in series should not be more than ten.
- b) Maximum no of collectors in parallel in a row with header-to header connection should not be more than six.
- c) Air vent at appropriate places should be installed to prevent air locking. Air vents must be incorporated in designs.
- d) Make up Water tank capacity should be equivalent to 2% of the system capacity to be installed. Its make may be syntax or equivalent.

Note: The quality of water should be such that there is no possibility of corrosion. This is especially important for flash type boilers where water needs to be closed after de-ionizing so that Ph is greater than 8.5. It is desirable that maintenance Manual for heat exchanger be provided by the manufacturer. The maintenance manual should include decaling frequency calibration checks, for instruments, replacement schedule for valves cleaning procedure and recommendations for various qualities of water for use in the installation.

Proper required insulation with Aluminium cladding should be provided. Specifications of this cladding will be the same as that prescribed for hot water storage tank.

6. Cold Water tank:

- a) Material: Only syntax or equivalent (HDPE/LDPE material) with gun metal float valve (ISI mark) equal to the capacity of hot water storage tank should be installed with the facility for maintenance .
- b) Installation- The tanks will be mounted on stands made out of angle iron frame of 35x35x5 mm. upto 1000 ltrs with each leg duly grouted with PCC 1:2:4 of 1'x1'x1' size . The cold water tank will be placed over angle iron frame having 4 cross members in 4 legs with 5 mm. thick M.S. Sheet for full bottom support fixed of 4 horizontal members based on the size of the cold water tank. The upper side of the tank should be clamped with stand to ensure the stability during sto.

In addition to the technical conditions mentioned in the tender, other technical specifications will also be accepted as per latest revision in B.I.S./MNRE modification.

Concerned Project Office mobile number, toll free number (i.e. 1800 180 0005) of IVRS of UPNEDA and 14 digit UID number of minimum computer font size 72 or 13 mm (issued/provided by UPNEDA) is to be painted on Hot Water storage Tank by contractor/bidder, which in case of non-working/ operational problems etc of system will be dialed by the beneficiary etc to lodge a complaint in respect of system problems. The IVRS will divert the complaint to Contractor/ bidder through E mail, SMS etc. The contractor/ bidder will have to rectify the same to make/ restore the system to working position within 72 hours in the warrantee period of 5 years, failing which the system may be get rectified on contractor/ bidder cost and the cost will be recovered by contractor/ bidders pending claims what so ever and appropriate action as per non compliance etc of agreement will be considered/taken

Traceability of the product to be supplied

In order to prevent the misuse of the product such as unauthorized sale or diversion to the open market, the following incorporation shall be made in the product.

- a) Engraving (or) Screen printing of “UPNEDA” at a suitable place on the main components viz hot Water Storage Tank to be used in the installation of Solar Water Heating System.
- b) The unique system ID number as provided by UPNEDA shall be embossed or punch or permanently riveted on each system.

PART 5

WARRANTY AND MAINTENANCE

It is an essential part of the contract that the Bidder shall provide warranty of the system for 5 YEARS from the date of handing over of the system. During the warranty following maintenance will required to be carried out by the contractor.

- 1 Quarterly checking up keeping and replacement of defective component of the Solar Water Heating systems for proper operation of the system. In case of any damage or breakage of the component due to negligence or fault of beneficiary or theft etc, the same shall be replaced at users cost. In case of Solar Water Heating systems damaged due to natural calamity, contractor shall replace the same at his own cost, if required during warranty period.
- 2 The scope of work includes repairing/replacement of part(s)/system to make the system functional within warranty period whenever a complaint is lodged by the user at site. The contractor shall attend the same within a week.
- 3 The safety and security of the system shall be sole responsibility of the user.

- 4 It is mandatory for the contractor to submit a quarterly performance/ maintenance report for each system to the concerned project officer UPNEDA.
- 5 The Comprehensive Maintenance (within warranty period) shall be executed by the firm himself or the authorized dealer/ service center of the firm in the concerned district. The Comprehensive Maintenance (within warranty period) will include the total system whatsoever at site. It is mandatory for the contractor to open an authorized service center in the concerned district before the supply/installation of the system.
- 6 It is mandatory for the contractor to make a stock of almost 5% of spare parts at it service center which is to verified by the concerned project of UPNEDA.
- 7 Notice statement and other communication send by UPNEDA through registered post or telegram or fax or Email to the contractor at his specified addresses shall be deemed to have been delivered to the contractor.
- 8 Any work which is not covered under this contract but is essentially required for the completion of job (to the satisfaction of UPNEDA) shall be carried out by the contractor as extra item for which payment shall be made separately at the rates decided by UPNEDA.
- 9 The work shall be carried out by the contractor as per design and drawings/ samples approved by UPNEDA, wherever, necessary, the contractor shall submit relevant designs and drawings/samples for approval in UPNEDA, well in advance. Work carried out without UPNEDA's approval shall not be accepted and the UPNEDA shall have right to get it removed and to recover the cost so incurred from the contractor.
- 10 The contractor shall not display the photographs of the work and not take advantage through publicity of the work without written permission of UPNEDA.