AKSON'S SOLAR EQUIPMENTS PVT.LTD.
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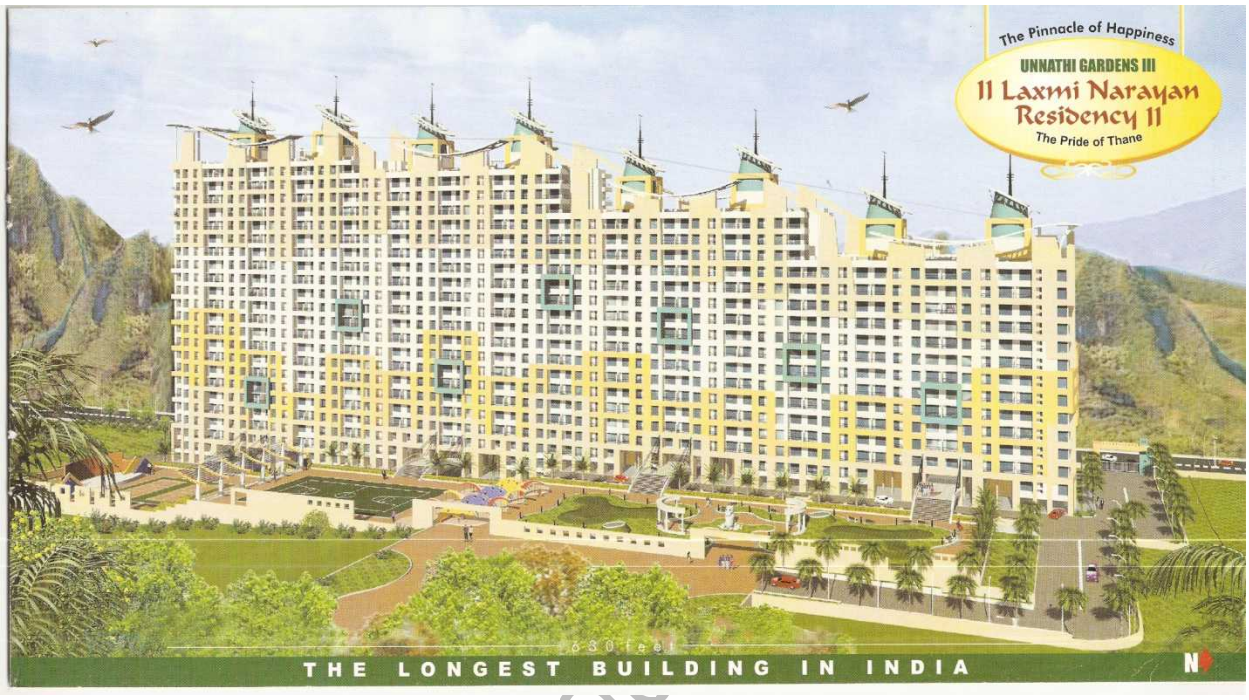
CASE STUDY

SOLAR WATER HEATING SYSTEM

FOR A MULTI-STORIED RESIDENTIAL BUILDING



1) PROJECT DESCRIPTION:

PROJECT NAME: LAXMI NARAYAN RESIDENCY- THANE.

A) LONGEST RESIDENTIAL BUILDING IN THE COUNTRY- 637 FEET LONG. CONTAINING

Tower A, B- 2 x 15 Storied plus

Tower C, D- 2 X 18 Storied plus

Tower E, F- 2 X 20 Storied plus

Tower G, H-2 X 22 Storied towers

B) Total No. of flats: 600

C) Capacity per flat: 125 LPD

D) Building wise System Capacity:

Tower A,B – 2X 7,000 LPD

Tower C, D- 2 X 8,500 LPD

Tower E, F- 2 X 10,000 LPD

Tower G, H-2 X 12,000 LPD

E) System Type: Differential Temperature Forced Circulation (DTFC)

F) System Configuration: The system capacity split in TWO PRESSURISED tanks connected in series.

G) Issues in System Design/ Installation:

Limited terrace space

Identical terrace space for all buildings

High elevation on all sides casting shadow on terrace

Wave shaped 3.5 meter wide RCC pergola – not to touch

Heavy wind site during monsoon

Partial shadow (East/West side Sun) of the water tanks

High pressure on the tanks due to multiple users

Concern for the system disturbing the aesthetics

H) Akson's Solution: Elevated slanting roof concept for collector installation to get optimal space usage.

Differential Temperature Forced Flow (DTFC) system for flexibility in construction.

Steel structure designed to withstand the wind load and to match the contour of the Wave shaped pergola structure- RESULT Entire slopping roof area utilized. The terrace fully available for use.

Entire system load transferred on the RCC structure and no load on the terrace slab.

Collectors installed at height to minimize the shadow effect.

More collectors provided to compensate the shadow effect on part of the array due to East- West direction near the overhead tanks.

The attached photographs show the system. The side view confirms the perfect matching with the wave structure elevation.

Pressurised- dish ended tanks tested @10 kg pressure. 2 tanks connected in series to minimize mixing loss.

I) Site Photographs: Since the building is very difficult to be covered in one photograph, following are some snaps trying to cover views of the systems.

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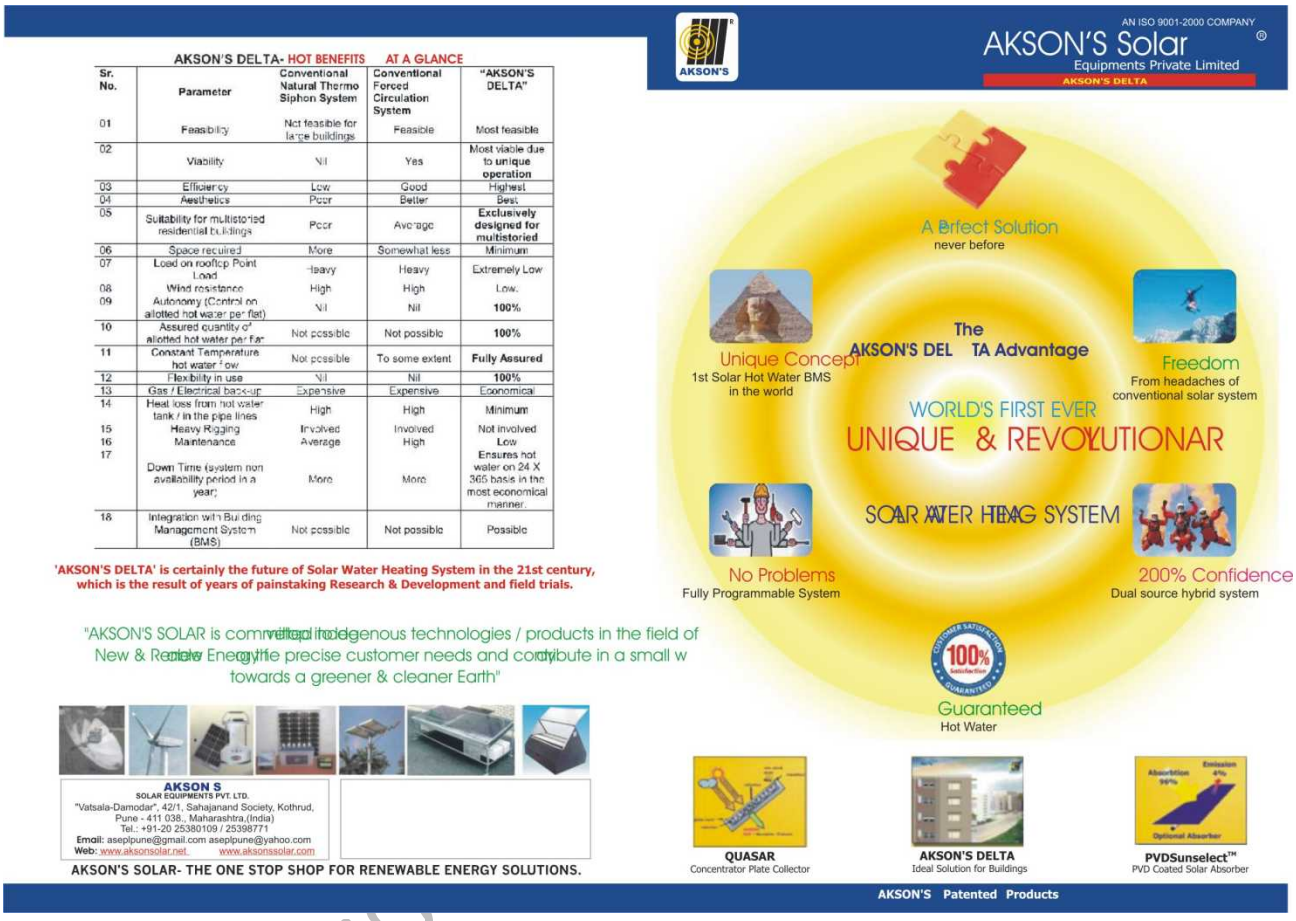
PRESENTATION ON

"AKSON'S DELTA" (PATENT PENDING)

INDIA'S FIRST FULLY PROGRAMMABLE SOLAR WATER HEATING SYSTEM

1) PRODUCT CATALOGUE: Please refer the attached brochure.



AKSON'S DELTA- HOT BENEFITS AT A GLANCE

Sr. No.	Parameter	Conventional Natural Thermo Siphon System	Conventional Forced Circulation System	"AKSON'S DELTA"
01	Feasibility	Not feasible for large buildings	Feasible	Most feasible
02	Viability	Nil	Yes	Most viable due to unique operation
03	Efficiency	Low	Good	Highest
04	Aesthetics	Poor	Better	Best
05	Suitability for multistoried residential buildings	Poor	Average	Exclusively designed for multistoried
06	Space required	More	Somewhat less	Minimum
07	Load on rooftop Point Load	Heavy	Heavy	Extremely Low
08	Wind resistance	High	High	Low.
09	Autonomy (Control on allotted hot water per flat)	Nil	Nil	100%
10	Assured quantity of allotted hot water per flat	Not possible	Not possible	100%
11	Constant Temperature hot water flow	Not possible	To some extent	Fully Assured
12	Flexibility in use	Nil	Nil	100%
13	Gas / Electrical back-up	Expensive	Expensive	Economical
14	Heat loss from hot water tank / in the pipe lines	High	High	Minimum
15	Heavy Rigging	Involved	Involved	Not involved
16	Maintenance	Average	High	Low
17	Down Time (system non availability period in a year)	More	More	Ensures hot water on 24 X 365 basis in the most economical manner.
18	Integration with Building Management System (BMS)	Not possible	Not possible	Possible

'AKSON'S DELTA' is certainly the future of Solar Water Heating System in the 21st century, which is the result of years of painstaking Research & Development and field trials.

"AKSON'S SOLAR is committed to indigenous technologies / products in the field of New & Renewable Energy to fulfill the precise customer needs and contribute in a small way towards a greener & cleaner Earth"

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AKSON'S SOLAR- THE ONE STOP SHOP FOR RENEWABLE ENERGY SOLUTIONS.

AN ISO 9001-2000 COMPANY
AKSON'S Solar Equipments Private Limited
AKSON'S DELTA

A Perfect Solution never before

Unique Concept 1st Solar Hot Water BMS in the world

The AKSON'S DELTA Advantage

Freedom From headaches of conventional solar system

WORLD'S FIRST EVER UNIQUE & REVOLUTIONARY SOLAR WATER HEATING SYSTEM

No Problems Fully Programmable System

200% Confidence Dual source hybrid system

100% Guaranteed Hot Water

QUASAR Concentrator Plate Collector

AKSON'S DELTA Ideal Solution for Buildings

PVDSunselect™ PVD Coated Solar Absorber

AKSON'S Patented Products

With the Housing construction industry boom and ever growing power shortage, Solar Water Heating Systems have become a 'MUST' requirement for any housing project.

The Government directives also make installation of Solar Water Heating Systems mandatory.

The conventional Solar Water Heating Systems have two options: **Individual & Common**.

Individual Systems

Common System

Following are the common problems associated with conventional solar water heating systems for multistoried residential building:

- Lack of control on consumption by members resulting in disputes & dissatisfaction.
- The number of persons in a flat & hot water usage habits may vary, resulting in failure of standard per flat designed capacity provided, leading to disputes.
- Round the clock uncontrolled, intermittent use results in mixing of cold water in the hot water tank & unsatisfactory system performance.
- Availability of hot water for fixed hours / restricted timing, defeats the purpose of free hot water round the clock.
- Back up if provided to common systems, results in one paying even on non usage.
- Heavy heat loss during flow of hot water from the tank at the roof top to the flats due to difference of temperature at the peak bathing hours in morning / evening.
- Heat loss from the hot water storage tank being exposed to the weather on terrace.
- Concentrated point load on the roof slab of a tall building. This hampers the aesthetics of the building in a big way
- Wastage of water : the most precious natural resource
- Poor satisfaction due to time required to get hot water at tap

Unfortunately the solar manufacturing industry has not been able to provide any convincing solution to these problems.

As the number of floors are likely to go up in near future, & the class of customer more demanding, a good builder certainly needs a solar water heating system which is technically advanced, compact in size, offering one point solution to the above listed problems & attractive on the price.

'AKSON'S DEL TA' is a unique fully programmable solar-grid hybrid water heating system **that offers you a hot water system eliminating all problems associated with the con ventional solar systems ensuring instantaneous hot water on 24 X 365 basis.**

AKSON'S DEL TA

Features

Unique Concept

- Solar Collector Array heats the water
- Insulated hot water storage tank provided for individual flat
- Computerised controller ensures dispensing of measured quantity Hot water at constant temperature till the last drop

Freedom

- 100% autonomy on hot water quota
- Instant hot water
- 24 hours availability

No Problems

- World class reputed components ensure reliability
- No effect of power failure
- Display unit indicating system status

200% Confidence

- Foolproof hot water delivery
- Advantage of gaining bonus hot water quantity
- Gas/electricity backup heating system

Guaranteed

- Intelligent, integrated Solar / grid hybrid system
- Ensures 24 hours hot water availability
- Fully automatic & care free system

A Perfect Solution

- The first Solar Hot Water Building Management System (BMS) system in the world
- Most scientifically designed, eliminates all problems associated with conventional systems
- The perfect solution on single point turn key basis
- Annual Maintenance Contract (AMC) services available

2) SYSTEM WORKING LOGIC/ SYSTEM FEATURES:

The system shall have the following features:

1. When the solar insolation results in heating, the programmer shall deliver the measured quantity of hot water to the first tank selected as per the random sequencing feature of the programme.
2. In case the tank is empty, the designed quota of hot water will be delivered in one stroke. If the tank is partly empty, possible quantity of hot water will be delivered in the first round and the quantity delivered shall be recorded. The programmer shall make another round to deliver the balance quota of hot water to the tank during the heating period.
3. The programmer shall then deliver the measured quantity of hot water to the remaining tanks according to the sequence.
4. If any of the tank does not have the room for the whole/remaining quantity of hot water, the same (quantity of hot water that could not be delivered) shall be declared as BONUS.
5. The tanks that have been delivered the fixed quota of hot water earlier in the day but have room for getting additional quantity of hot water will be delivered the BONUS as per the available capacity.
6. The tank that receives BONUS shall automatically go to last number on the BONUS list the next day to ensure equal benefit to all tanks.
7. Each hot water tank shall be having pressure balancing system to ensure equal pressure for the COLD / HOT water at the mixer inlet in every bathroom.
8. The hot water tanks shall be intelligent having level sensor, control and cold water inlet control valve (electrically actuated valve) and electrical back up heater. Whenever any tank reaches the minimum reserve level on consumption of hot water, the controller shall open the cold water control valve and take in the fixed quantity of cold water as per the programme, start the electrical back up heaters and keep the hot water ready without manual intervention.
9. This cycle may be repeated as required to ensure the system providing single point hot water solution.
10. In case of the user wanting to get the full tank capacity to be heated using the electrical back up heater say during the non sunny period or to meet the requirement of additional quantity of hot water, the bypass/override switch can be used to fill the tank with cold water for back up heating.
11. The system delivers the hot water at a FIXED TEMPERATURE and does not allow mixing loss on account of entry of cold water as in the case of the conventional systems.
12. The tank outlet can be provided with ANTI SCALD protection, if required.
13. The electrical heaters with thermostat control will maintain the temperature of water in the tank, if the same remains stagnant for a long period.

3) SYSTEM CONFIGURATION:

In this system, only the collector array will be placed on the terrace- either on the terrace or on the superstructure as the case may be. There are no hot water tanks on the roof. Each apartment is provided with the insulated hot water storage tank placed on the bathroom loft, in the duct or in the dry balcony as the case may be.

The capacity of the hot water tank shall depend on the designed hot water capacity per apartment. Different capacity can be designed for different tanks depending on the size of the flat. E.g. say 150 LPD for 2 BHK flat and 200 LPD for a 3 BHK flat OR even for some of the users only.

The hot water tank is an intelligent tank with level sensors, heat separator , cold water inlet control, electrical back up heater (3 kW with ISI mark thermostat). The tank has set of controls for various functions like hot water management, pressure balancing etc.

The insulated hot water delivery piping from the collector array to the tanks is a single pipe of comparatively small diameter designed to suit the flow rate as only one tank gets the hot water at a time. The pipe shall have pressure regulator valves as required. The delivery zones shall be designed to ensure that the time to fill up a tank is less than 10 minutes.

The heart of the system is a Programmable Logic Controller with the programming done for the particular project. This makes the system a 100% flexible and not a standard rigid product. Each apartment will also have a "SMART HOME DISPLAY" unit displaying with LED the tank level, position of electrical back up, power and override switch etc.

4) ADVANTAGES:

Following are some of the advantages of "AKSON'S DELTA" beyond the advantages to the user.

The RCC cost shall be less on account of no heavy/ concentrated load of hot water tanks on the terrace.

The single tank with only one back up heater coil shall feed to all the bathrooms. This shall result in reduced electrical load required per apartment. This will save the deposit and also the cost of transformer.

The system shall save the cost of concealed plumbing and wiring for the boiler connection in bathrooms (say if 3 then saving of 2 connections)

Eliminates the need for re-circulation system saving the capital cost and also the running / maintenance cost. Saves energy loss.

Reduces electricity wastage by avoiding the wastage of residual hot water in number of bathroom boilers.

Ensures 100% autonomy for the user. Also enables freedom of use round the clock without any fear of mixing loss.

The system can be interfaced with any BMS system/ SCADA.

5) COST COMPARISON:

The system offers a SINGLE POINT HOT WATER SOLUTION.

The system cost needs to be worked out for each project on case to case basis, the variants being the No. of floors, No. of bathrooms/apartment , Capacity in LPD/apartment.

The system cost when compared to the conventional solar water heating system for a multi-storied apartment building works out to be 15-20% more.

SYSTEM PHOTOGRAPHS: