Example name: Hybrid installation consisting of solar collectors, phase change materials and borehole storages

Template completed by:

Prof. Aleksandar Georgiev, Dept. of Mechanics, Technical university of Sofia, Branch Plovdiv, Plovdiv, Bulgaria, ageorgiev@gmx.de>

Assoc. Prof. R. Popov, Dept. of Optoelectronic

For installations

BISTS Location:

***Place**: Plovdiv*
***Longitude**: 24º 46.21'*
***Latitude**: 42º 08.22'*

Climate Type: *Cfc Köppen climate classification*

Building Use: *public*

Level of BISTS integration

Reijenga classification:
Added to the design

Other: partially refurbishment

Type of BISTS:

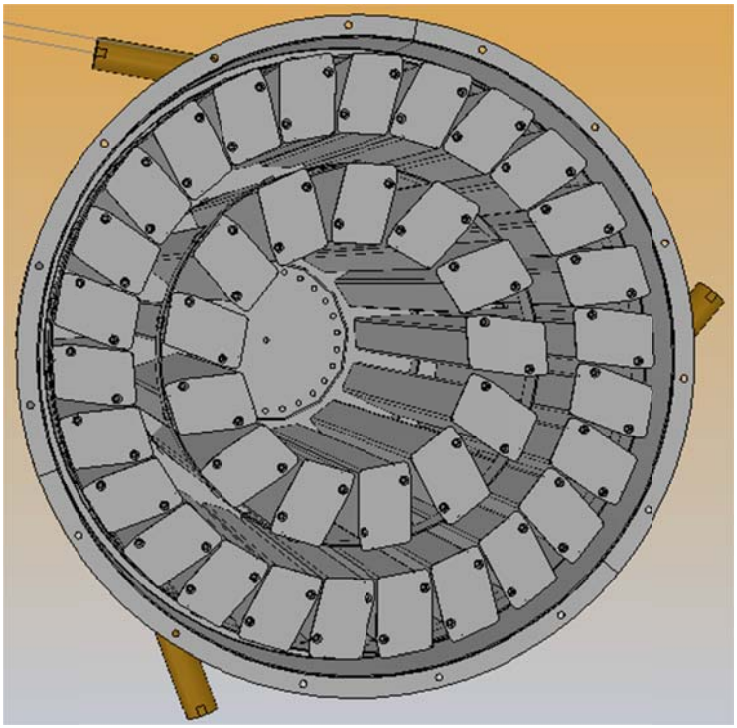
Active/ Hybrid

Function(s):

O Water heating

O linked to another system (heat pump)

O Other: Phase change material storage, Borehole thermal energy storage

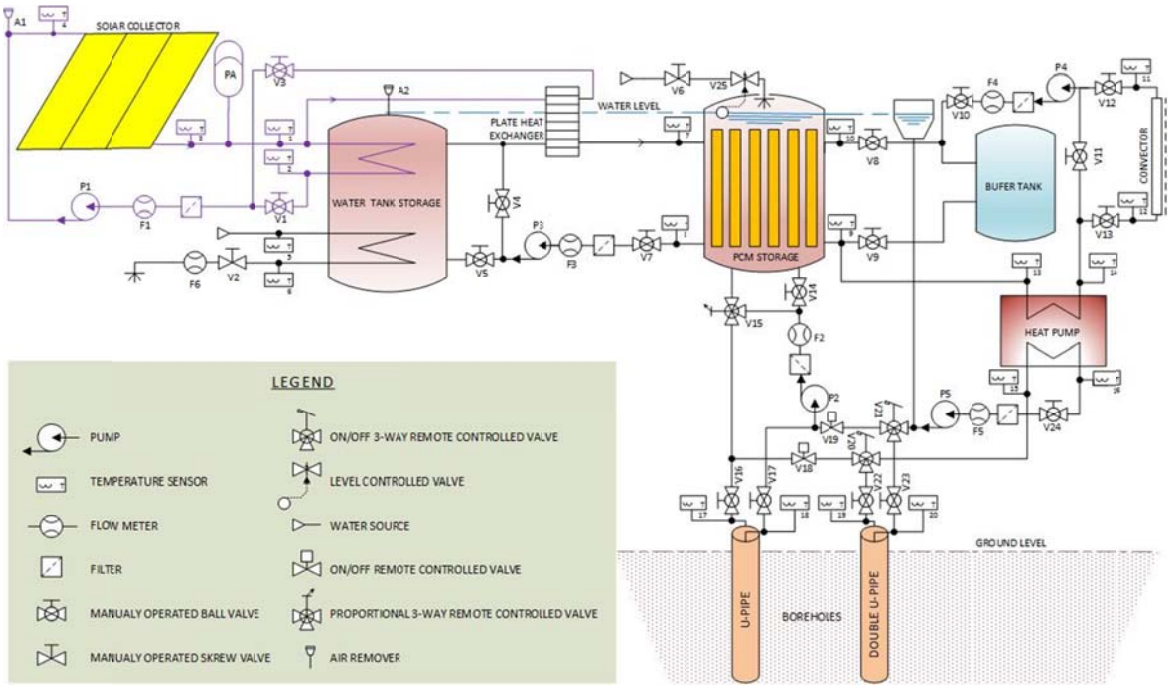


Building element:

O Roof, not integrated

BISTS characteristics:

1. Collection area: 6,3 m^2,
2. Orientation/ inclination/ south: 37º



Stage of Development:

O Idea/Patent
O Prototype
O Demonstration
O Integral building element
O Commercially available

Responsible: *Technical university Sofia, branch Plovdiv*

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Hybrid installation with solar collectors, PCM and BTES
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BISTS description and context

One room of the TU Sofia, branch Plovdiv, 4th floor, 25 m², last floor, orientation - East

System viability: N/a

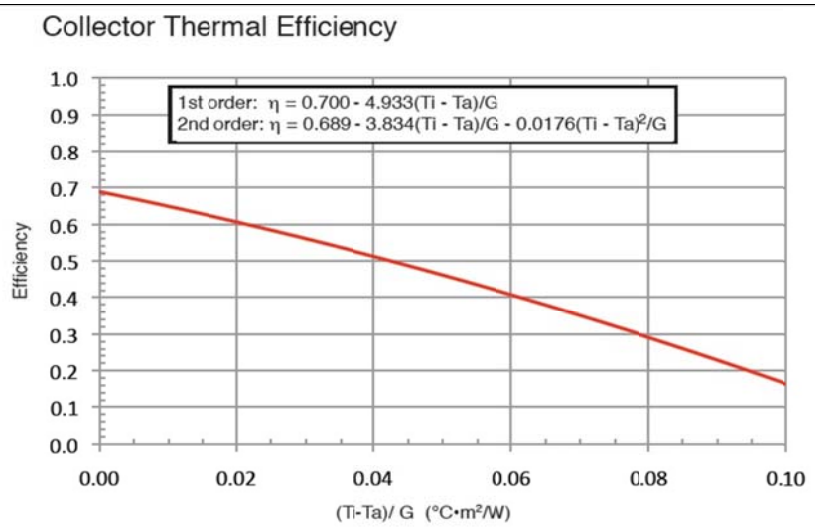
Modelling and simulation tools developed/used
TRNSYS, EED, Geosyst

BISTS Performance data

Based on:
O Measurement/testing

Performance parameters
For separate collectors:

Other:
1. Absorber: copper
2. Absorptivity: 95%
3. Emissivity: 5%
4. Conversion ratio: 600 kWh/m² year
5. Selective absorber layer: 6. Titanium Nutrir-Oxide



Additional information:

Sources and references:

[1] A. Stoyanov, A. Georgiev, R. Popov. Possibilities of using PCMs in solar thermal installations. Proc. of the Second European Polytechnical University Int. conference „Education, Science, Innovations", 9-10 June 2012, Pernik, Bulgaria, p. 359-365.
[2] E. Toshkov, A. Georgiev, R. Popov. Ground Coupled Heat Pumps with Solar Collectors – International and Bulgarian Experience. Proc. of the Second European Polytechnical University Int. conference „Education, Science, Innovations", 9-10 June 2012, Pernik, Bulgaria, p. 367-374.
[3] R. Popov, A. Georgiev. SCADA system for study of installation consisting of solar collectors, phase change materials and borehole storages. Proc. of the 2nd Int. Conf. on Sustainable Energy Storage, June 19-21, 2013, Trinity College Dublin, Ireland, pp. 206-211.
[4] A. Stoyanov, A. Georgiev, R. Popov. Experimental installation for investigation of latent heat accumulator as a part of hybrid system for air-conditioning. Proc. of the Nat. conf. Sliven 2013, June 19-21, Sliven 2013.