# Example name: Solar facade – unglazed solar collector

Template completed by:
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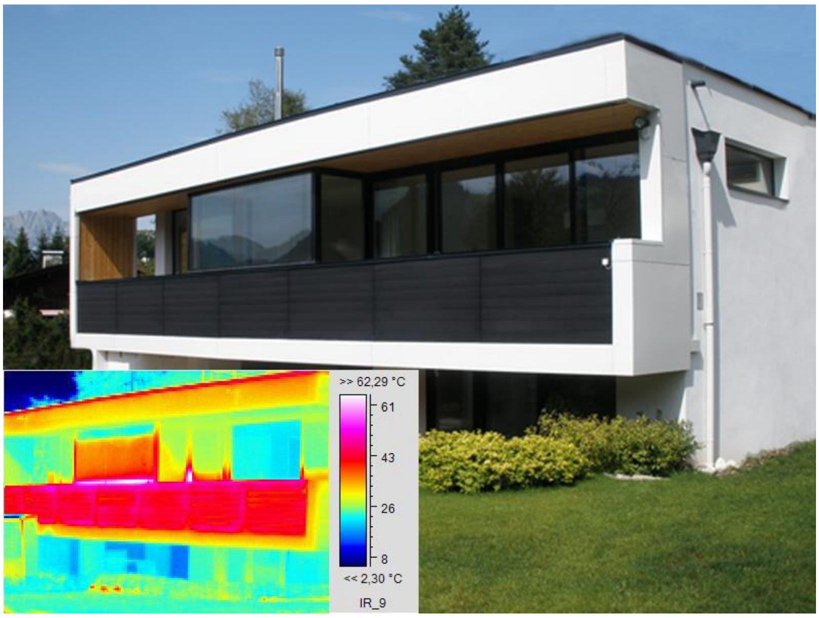
*Photographs*




**For installations**

BISTS Location: can be placed
anywere

Climate Type: - (*Köppen climate classification)*
Building Use: residential building

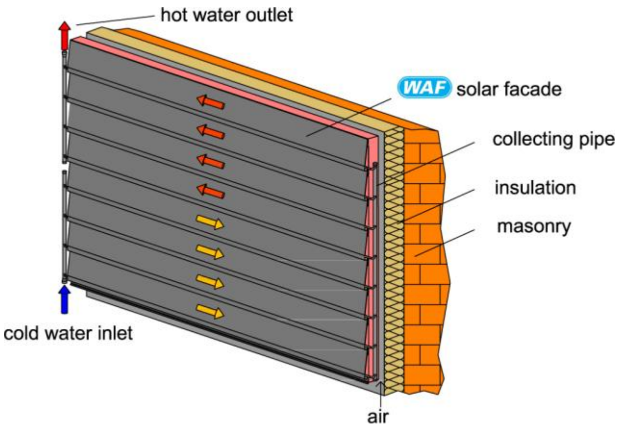
Level of BISTS integration

Ox New Build
Ox Refurbishment
O Other: ……………………..

**Type of BISTS**:

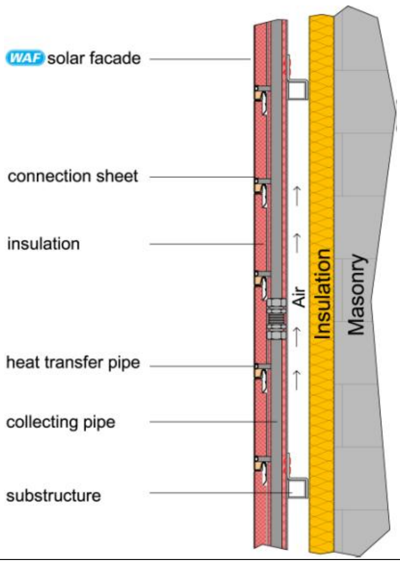
**Active**

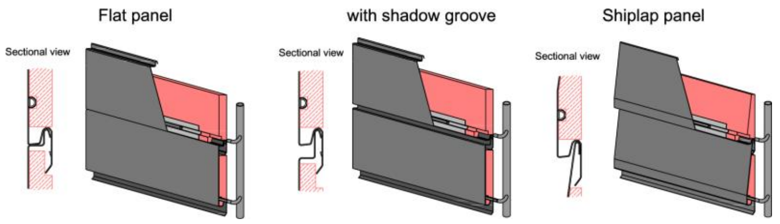
Function(s):
Ox Water heating
Ox linked to heat pump
Ox linked to space heating system




**Building element:**

Ox Facade
O Roof
O Other: ……………………..






**BISTS characteristics**:

**TECHNICAL DATA** **The Solar Thermal Facade**
Patent number: AT 509.724 D 20 2011 050 389.5 CH 703.314

**Dimensions**

| | |
|---|---|
| Overall dimensions | 2000x1200x50 mm |
| Absorber area | 2,4 m² |
| Absorber thickness | 0,8 mm |
| Absorber material | Aluminium |
| Heat transfer pipe | Aluminium |
| Weight | 10 kg/m² |

**Solar varnish coating**

| | |
|---|---|
| Degree of absorption | 86% (anthracite grey) |
| Degree of emission | 36% (anthracite grey) |

**Colours**

Anthracite grey (RAL 7016)
Chocolate brown (RAL 8017)
Special colours on request

**Insulation**

| | |
|---|---|
| Insulation board | 20 mm |
| Expanded plastic slab | 30 mm |

**Piping**

| | |
|---|---|
| Piping type | Double harp |
| Heat transfers pipe | Ø 8 mm |
| Collecting pipe | Ø 18 mm |
| Number of pipes | 12 x 100mm |
| Heat transfer medium Water - | glycol |
| Connection absorber pipe | WAF connection sheet |

**Mounting**

| | |
|---|---|
| Laying | WAF Click system |
| Substructure | WAF System UK |

**Covering width**

100mm, 200mm, 300mm (Special dimensions on request)

**Stage of Development:**

**Responsible:** WAF Fassadenelemente
Gewerbezone, 3 - A - 6404 Polling in Tirol (A),
http://www.waf.at

| | | |
|---|---|---|
| O | Idea/Patent | ………………………………….. |
| O | Prototype | ………………………………….. |
| O | Demonstration | ………………………………….. |
| Ox | Integral building element | ………………………………….. |
| OX | Commercially available | ………………………………….. |

**BISTS description and context**

The WAF Solar facade combines energy generation with thermal insulation and is low maintenance due to its simple structure. The solar system works on the same principle as conventional solar thermal collectors.
A heat transfer medium, in general a water-glycol mixture, passes through the solar circuit behind the facade elements. Thanks to a selective solar varnish coating, solar energy is optimally converted into thermal energy.

The structure of a solar facade is different from conventional, uncovered solar systems, mainly because of the connection between the lamella and the pipe. The metal sheet and the copper pipe are laser-welded to the lamella, which ensures optimum heat transfer. Furthermore, the pipe is pressed into the metal sheet and flatted on one side. This results in a larger direct transfer surface.

The insulation of the WAF solar facade mainly consists of a PUR insulation board (l=0,03W/mK), which minimizes convective heat losses through the back panel. In order to avoid air pockets between the pipe and the insulation, PU foam is used for filling possible cavities. In addition, 50mm of mineral wool are used for insulating, among others, the collecting pipes.
The coating of the lamella consists of a special solar varnish with a very good degree of absorption (black: 86%) and emission (black: 36%). At the same time, this solar varnish is extremely weather resistant. The individual lamellae are connected via the WAF click system, allowing for easy self assembly.

**BISTS Performance data**

Based on:
O Estimation
O Detailed simulation
*Specify software(s) used*
O Measurement/testing
O Long-term monitoring
*tick all that apply*

**Performance parameters**

For integrated systems:
key performance indicators -

*Solar savings fraction: %*
*Light transmittance: %*
*Solar transmittance: %*
*Total solar energy transmittance: %:*
*Solar heat gain factor: %*
*Building fabric U-values: W/m$^2$K*
*Noise, fire, etc ratings*
*Other:*

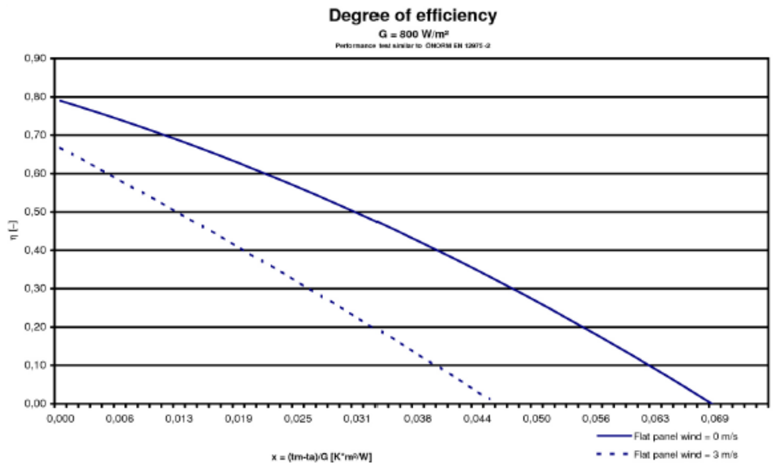
For separate collectors:
performance rating coefficients -
(EN12975, a0,a1,a2),
ASHRAE, etc

Other:

The power range of the **WAF solar facade** lies within that of low-temperature heat transformation systems. In order to guarantee the facade’s highest degree of efficiency, the temperature should be between 35°C and 45°C. In this range of temperature, preheating of drinking water, energy provision for low temperature heating or low temperature process heat can be provided.

Collector test according to ÖNORM EN 12975 - 2 (Test made by ASIC - Austrian Solar Innovation Center Wels)

| | |
|---|---|
| Tested collector area | 2 m² |
| Conversion factor $\eta_{0,\,0\,m/s}$ | 0,79 |
| Conversion factor $\eta_{0,\,3\,m/s}$ | 0,67 |
| Heat loss coefficient $a_{1,\,0\,m/s}$ | 7,558 W/m²K |
| Heat loss coefficient $a_{2,\,0\,m/s}$ | 0,0728 W/m²K² |
| Heat loss coefficient $a_{1,\,3\,m/s}$ | 13,268 W/m²K |
| Heat loss coefficient $a_{2,\,3\,m/s}$ | 0,0357 W/m²K² |
| Max. operating pressure | 8 bar |
| Recommended flow | 40 l/m²h - high flow |
| Pressure drop / collector | 1,3 liter |




**Additional information:**

Sources and references:

[1] http://www.waf.at/

[2] http://www.waf-solarfassade.at/

**INSTRUCTIONS**

Please fill in as much information as possible.

Tick where appropriate.

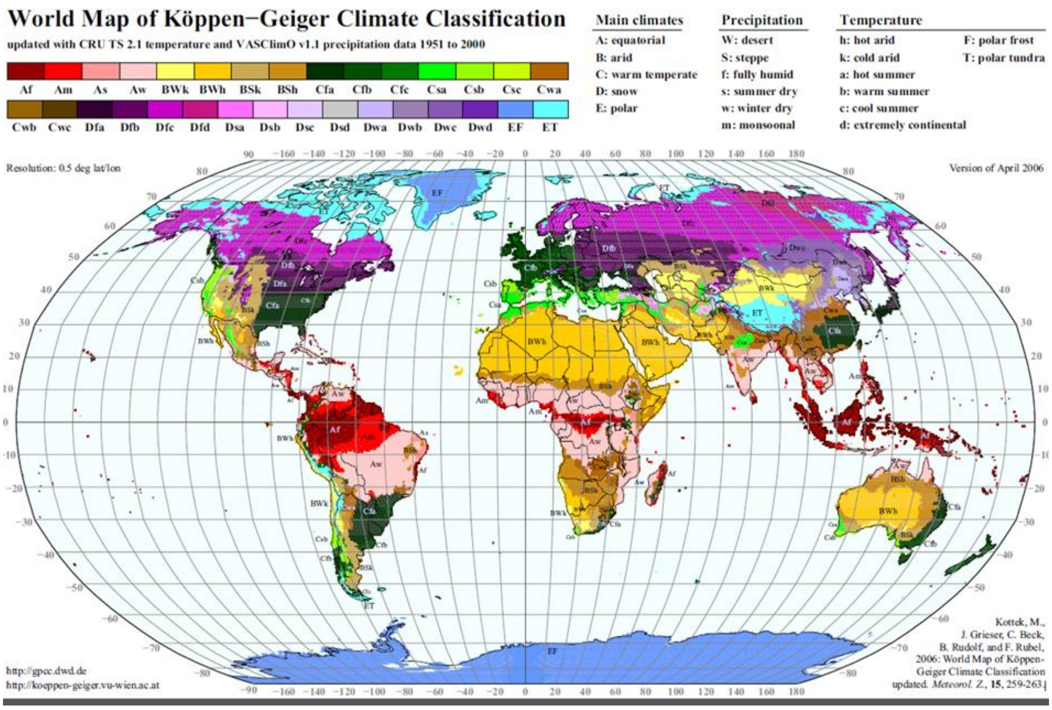
Text in red is suggested guidance. Insert information in provided space, removing red text as appropriate

If possible, use metric values.

If necessary, supply additional information on separate sheets

<u>Reference listing</u>

## Köppen climate classification




(Kottek, M., J. Grieser, C. Beck, B. Rudolf, and F. Rubel, 2006: World Map of Köppen-Geiger Climate Classification updated. Meteorol. Z., 15, 259-263.)

**Reijenga classification**
The integration of PV systems in architecture can be divided into five categories:

1. Applied invisibly
2. Added to the design
3. Adding to the architectural image
4. Determining architectural image
5. Leading to new architectural concepts.

(Reijenga, TH and Kaan, HF. (2011) PV in Architecture, in Handbook of Photovoltaic Science and Engineering, Second Edition (eds A. Luque and S. Hegedus), John Wiley & Sons Ltd, Chichester, UK)

**Rush classification**
The architectural/visual expression of building services systems are identified as:

Level 1. Not visible, no change
Level 2. Visible, no change
Level 3. Visible, surface change
Level 4. Visible, with size or shape change
Level 5. Visible, with location or orientation change

(Rush, RD. (1986) The Building systems integration handbook Wiley, New York, USA)

**Collector test standards**

BS EN 12975-2 2006 'Thermal solar systems and components solar collectors - Part 2 test methods'
ASHRAE Standard 93-2010 'Methods of Testing to Determine the Thermal Performance of Solar Collectors'
ASHRAE Standard 95-1987 'Methods of Testing to Determine the Thermal Performance of Solar Domestic Water Heating Systems'