Hybrid Adsorption/Compression Chiller

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Adsorption cooling advantages

Saves up to 80% electricity compared to classic cooling

Functions without synthetic refrigerants or toxic substances

Helps in establishing a sustainable infrastructure

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The principle of adsorption

Water turns into vapor which gets adsorbed by the sorbent, causing evaporative cooling.
Adsorption chillers operation

- No moving parts inside the modules
- Water as refrigerant
- No toxic or climate damaging substances
Turning solar heat into cold

Solar heat -> Adsorption Chiller
Optional backup compressor
60-95°C
Re-cooling circuit
25-45°C
10-20°C
Cooling circuit (e.g. for A/C)
Base load coverage with adsorption

Annual cooling demand

- Adsorption: 76,421 kWh (93.6%)
- Compression: 0 kWh (0.1%)
- Free cooling: 2,231 kWh (2.7%)
- Required peak load: 6,664 kWh (7.9%)
- Occurrence: 2,015 h (76.6%)
- Free cooling: 94 h (3.4%)
- Monothermic: 835 h (31.0%)

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A Hybrid Chiller has decisive advantages for air conditioning and cooling demands

- Peak load coverage
- Efficiency increase
- Reduction of the payback period
- Expansion of areas of applications and utilization limits
- Compression chiller acts as back up to the adsorption chiller in base load operation
- Usage of Propane (R-290) as refrigerant in the compression part (GWP 3)
Flow Diagram & Operation Modes

Operation mode: monovalent adsorption

- Hot water
- Glycol water
- Chilled water

Adsorption
Compression
Operation mode: monovalent Compression

Flow Diagram & Operation Modes

- Hot water
- Glycol water
- Chilled water
Flow Diagram & Operation Modes

Operation mode: bivalent AdCh + CoCh

Hot water
Glycol water
Chilled water

Adsorption
Compression
Design parameters:

- Total cooling capacity: up to 100 kW
  - Adsorption part: up to 40 kW
  - Compression part: 60 kW
- Refrigerants:
  - Adsorption: Water (R718)
  - Compression: Propane (R290)
- Chilled water buffer tank: 1000 l
- Indoor installation
- Chilled water temperature: 8°C
- Hot water temperature: 95°C
- Required heat: 80 kW
- Dry Re-cooler with 160 kW capacity