Purpose of the topic task

1. The basics of radiant cooling systems
2. Thermically Activated Building Slabs, TABS
3. Chilled ceiling technologies
4. Hydronic systems vs. forced air systems
5. Hydronic systems and utilisation of sustainable energy sources
What is radiation?
What is radiation?
Chilled floors and walls
Chilled floors and walls

Surface temperature: 17-21°C

Chilled water inlet temperature: 14-19°C
Chilled slabs: TABS
(Thermally Activated Building Systems)
TABS in a building slab
TABS in a building slab

Concrete overpour
Wire tie
Slab insulation
Concrete slab
Chilled water pipes
Edge insulation
Wire mesh, rebar or stable to rigid foam
Pipes in a cooling floor
Slabs in prefabricated concrete deck
Slabs in prefabricated concrete deck
Chilled ceiling panel
Chilled ceiling panel
Chilled water pipes in gypsum plaster
Water temperature

°C

Air dew point temperature

Water temperature
Water temperature

°C

Air dew point temperature

Water temperature
Water temperature

°C

Air dew point temperature
Water temperature

14-19°C

Air dew point temperature
Chilled ceiling panels
Chilled ceiling panels

80-90%
Traditional forced air VAV-system

Outdoor air

Exhaust air

Cooling coil
Traditional forced air VAV-system

Outdoor air

Air recirculation

Exhaust air

Cooling coil
Dedicated Outdoor Air System (DOAS) with radiant cooling
Forced air system

Chilled water temperature: 6-8 °C
Hydronic system

AHU 1

AHU 2

Chiller system

Radiant ceiling

Radiant ceiling
## Energy distribution cost

<table>
<thead>
<tr>
<th>Description</th>
<th>Symbol</th>
<th>Cooling with Water</th>
<th>Cooling with air</th>
<th>Units</th>
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<tbody>
<tr>
<td>Density</td>
<td>p</td>
<td>1.000</td>
<td>1,2</td>
<td>Kg/m³</td>
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<tr>
<td>Specific heat</td>
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<td>kJ/kg.K</td>
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<td>Delta T</td>
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<td>8</td>
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<td>Flow per kW cooling</td>
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Sustainable options

Groundwater

Water from rivers or lakes

Sea water