Airdeck® and concrete core activation: the perfect harmony between construction efficiency and climate control

Futuristic day-dreaming? NO!

Without doubt, concrete core activation will be the future climate system in commercial and industrial construction. In the Netherlands and Switzerland the system is already being frequently and successfully applied. A well thought-out integrated climate design will always provide a great energy saving in comparison with traditional systems. In combination with cold-gaining heating systems with heat pumps the cooling doesn’t even need more energy than necessary for the pumping.

Concrete core activation: the principle

The principle or the essence of concrete core activation is not new: by bringing the mass of a building up to a certain temperature, one takes care of the heating or cooling in comparison with the surrounding temperature. Without doubt, concrete core activation will be the future climate system in commercial and industrial construction. In the Netherlands and Switzerland the system is already being frequently and successfully applied. A well thought-out integrated climate design will always provide a great energy saving in comparison with traditional systems. In combination with cold-gaining heating systems with heat pumps the cooling doesn’t even need more energy than necessary for the pumping.

The concrete mass barely operates as a heat buffer.

Without question, the concrete mass barely operates as a heat buffer. In this way a space is continuously heated up or cooled down. In most cases this is even not necessary. Through the small temperature difference a well-regulating effect already occurs to a great degree. Should no water temperature regulation be applied and the temperature of the water is fixed at 22°C, then the floor and ceiling cooling only start warming the space in the winter, because the enormous mass in building materials has a damping effect on the wind-chill factor. The church does not easily assume the wind-chill factor. The church does not easily assume the wind-chill factor. The church does not easily assume the wind-chill factor. The church does not easily assume the wind-chill factor. The church does not easily assume the wind-chill factor. The church does not easily assume the wind-chill factor. The church does not easily assume the wind-chill factor. 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Concrete core activation: this is how the system functions

Since most modern buildings nowadays are, by definition, well insulated, there is in any case only a limited capacity for heating up or cooling down. As a result of this and because of the large heating/cooling surface of the floor and the floor/air temperature difference between air in the space and the space the floor and the floor and ceiling only needs to be small in order to meet the real heating or cooling need. Through the small temperature difference a well-regulating effect already occurs to a great degree.

In order to get a faster or more individual adjustment, the system can be combined with a supplementary installation, but in most cases this is even not necessary. By making use of a water temperature regulation the return temperature is measured and, in this way the temperature is raised during a heating demand and lowered in the event of a cooling demand. As a result of this the control valves adjust in a modulating way to the heating or cooling demand.

Integrated design: the main condition for application of concrete core activation

It is of the greatest importance that all parties involved in a project are on the same wavelength at the design phase, when they opt for the Airdeck® system and concrete core activation, and want to integrate this into the building.

Permanent dialogue between INTEGRAL and CONCEPT-ORIENTED DESIGNERS and experience in the matter are essential.

Architects play the principle roles during this process.

Comfort assets

• Low energy invoice (payback) and no longer renewable energy such as solar panels and heat pumps.
• Greatly increased level of comfort through silent operation and dry air during heating up.
• Very little or no spreading of bacteria during the cooling.
• Low electrosmog thanks to less electrical piping.
• Almost maintenance-free.
• The system integrates extremely but without any noise or other appliance taking up the space.
• Quite low installation costs.
• No knocking, no humming air-conditioning and no radiators or other appliances taking up the space.
• A lower energy cost.

Conclusion: a lot more comfort at a lower energy cost.
Concrete core activation and Airdeck® floors

... synonym of energy efficient construction

**Airdeck®, the principle**

The Airdeck® floor is a reinforced floor slab fitted with concrete-saving plastic boxes, called airboxes. The floor slab has a standard width of 3.00 m and a minimum thickness of 60 mm. In locations where such is constructively justified, the material-saving airboxes are robot-placed in a raster of 300x300 mm onto the elements, and are then isolated to the exact height.

The airboxes installed in this way ensure an important saving in the quantity of cast-in-place concrete needed on the construction site. The total structural floor heights varies from 280 to 450 mm. With this, spans up to respectively 12.5m to 12m can be achieved, in normal use and load large spans are possible through post stressing.

Weight saving has been an important motive behind this new development. On this floor by itself a saving of concrete and steel up to 25 to 35% is achievable. In addition, a weight saving of the entire construction is possible. Less weight means less material and that is, by definition, environmentally-friendlier.

After all these the entire creation process of the gazing and the strength achieving and, in the same day recycling. Larger elements also mean a faster assembler and therefore a saving in the deployment of manpower and materials.

For the architect/client:
- great architectural freedom
- free span possible up to 12 x 12 metres (and more through post stressing)
- perfect flat underlayment with small, tight and covering in-seam
- more floors within the maximum height through - the lack of columns heads and beams - the lack of lowered ceilings and heightened floors by using thermally active concrete cores (and more through post stressing)

For the building contractor:
- quick assembly through standard width of 3,00 m
- easy application of additional reinforcement and upper reinforcement
- large saving on cast in-place concrete
- concrete-saving airboxes are well and safely walkable

For the installer:
- possibility of concrete core activation on the upper reinforcement on the airboxes beneath the upper reinforcement in the under-shell and between the airboxes
- possibility of concrete core activation on the under-shell and between the airboxes
- installing of piping
- concrete colour or tin layer plastering
- material: recycled polypropylene
- point-concentrated load up to 180 kg (walkable on the construction site)

For the constructor:
- identical to a full floor (euro code 4)
- ceiling: flat without beams and column heads
- floor boxes and electricity and data pipes for electricity and electro-box data
- observation, view - concrete colour or tin layer plastering
- material: recycled polypropylene
- point-concentrated load up to 180 kg (walkable on the construction site)

Observation, view - concrete colour or tin layer plastering - ceiling: flat without beams and column heads - floor boxes and electricity and data pipes for electricity and electro-box data - observation, view - concrete colour or tin layer plastering - material: recycled polypropylene - point-concentrated load up to 180 kg (walkable on the construction site)

Mechanical performance - material: recycled polypropylene

**Performances in the event of fire**

<table>
<thead>
<tr>
<th>Floor slab thickness (mm)</th>
<th>Fire resistance (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>B-3530</td>
</tr>
<tr>
<td>80</td>
<td>B-3530</td>
</tr>
<tr>
<td>100</td>
<td>B-3530</td>
</tr>
<tr>
<td>120</td>
<td>B-3530</td>
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</table>

**Suitability for use of piping**

<table>
<thead>
<tr>
<th>Type of piping</th>
<th>Sound transmission</th>
<th>Fire protection</th>
</tr>
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<tbody>
<tr>
<td>- flat tubing</td>
<td>Hearing limiting</td>
<td>Hearing limiting</td>
</tr>
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**User requirements**

<table>
<thead>
<tr>
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<th>Specification</th>
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</thead>
</table>
| - opening, closed in case of fire | Insulation can be fitted upon request of the client.
| - sprinklered | Sound limiting pipe for fire alarm and fire alarm data |
| - opening, closed in case of fire | Insulation can be fitted upon request of the client.
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**Preconditions**

- Necessary support with initial distance of 1,8 m in 2,4 m
- maximum of additional reinforcement and top grid to be carried on the construction site according to the drawing
- Compacting concrete with vibrating cylinder
- Controlling concrete with obtaining cylinder
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- Compacting concrete with vibrating cylinder
- Controlling concrete with obtaining cylinder

**Consultations**

- When requesting prices, please state requirements of sagging, fixed and variable load and Rf-class delivery term: 4 weeks after approval of the drawing.

**For more information and issues deriving from the standard, please contact our study service**

**For the building contractor:**
- free clear span possible up to 12 x 12 metres
- great architectural freedom
- less weight means less material and that is, by definition, environmentally-friendlier.

**For the installer:**
- possibility of concrete core activation on the upper reinforcement on the airboxes beneath the upper reinforcement in the under-shell and between the airboxes
- installing of piping
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