

## Climate chamber

### SECTION

Buildings and Installations –  
Retrofit and Design

### CONTACT

Amaryllis Audenaert, [amaryllis.audenaert@uantwerpen.be](mailto:amaryllis.audenaert@uantwerpen.be)

### Summary

The “climate chamber” is a set-up in which the thermal behaviour of building components can be determined. It consists of two rooms which are both separately air-conditioned, which are separated by the building component under investigation. The heat transport through the building component may then be measured, as well as the temperature gradient and local humidity level. With this climate chamber, the EMIB research group can study hygrothermal behaviour in complex structures and building connections.

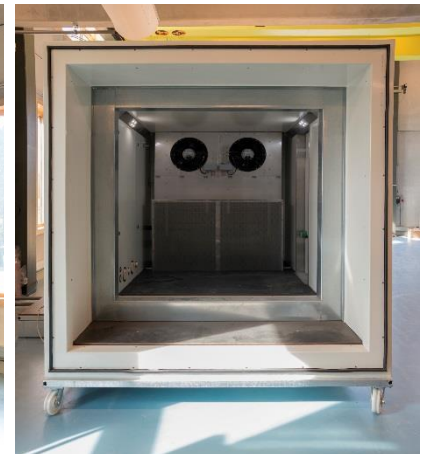
### Description

The climate chamber is divided into three parts:

- A. fixed part in which "outdoor conditions" are simulated, provided with a door;
- B. mobile part in which "indoor conditions" are simulated, provided with a door;
- C. movable intermediate part in which the test panel can be built up.

Of the movable intermediate part, three pieces are available, so that it is possible to carry out a test and at the same time already build up a next test panel.

An overhead crane is available in the laboratory with which, if desired, a prefabricated panel can be placed in the test set-up.



For more information or a meeting, please contact Amaryllis Audenaert ([amaryllis.audenaert@uantwerpen.be](mailto:amaryllis.audenaert@uantwerpen.be)).

## Technical specifications

### Outdoor climate room

Dimensions	<ul style="list-style-type: none"> <li>• exterior (l x b x h): 2280 x 2460 x 2710 mm</li> <li>• net interior (l x b x h): 1350 x 2100 x 2100 mm</li> <li>• door (b x h): 700 x 2000 mm</li> </ul>
Construction	<ul style="list-style-type: none"> <li>• on fixed steel frame</li> <li>• sandwich panels with 180 mm PIR insulation (<math>K=0,120 \text{ W/m}^2\text{K}</math>)</li> <li>• maximum floor load of <math>1000 \text{ kg/m}^2</math></li> </ul>
Temperature control	<ul style="list-style-type: none"> <li>• <math>-20^\circ\text{C} \dots +65^\circ\text{C}</math></li> <li>• <math>\leq \pm 1\text{K}</math> in stable conditions</li> <li>• <math>0,2^\circ\text{C}/\text{min}</math> heating / cooling speed (within temperature range <math>-10^\circ\text{C} \dots +60^\circ\text{C}</math> with test panel with U-value of <math>20\text{W/m}^2\text{K}</math> or lower)</li> </ul>
Humidity control	<ul style="list-style-type: none"> <li>• 30% ... 90% (within temperature range <math>+10^\circ\text{C} \dots +50^\circ\text{C}</math>)</li> <li>• <math>\leq \pm 5\%</math> in stable conditions (at <math>20^\circ\text{C}</math> and 65% RH)</li> </ul>
Air pressure control	<ul style="list-style-type: none"> <li>• max. 100 Pa pressure difference with indoor climate room</li> <li>• only applicable when temperature neither relative humidity control is active</li> </ul>

### Indoor climate room

Dimensions	<ul style="list-style-type: none"> <li>• exterior (l x b x h): 2280 x 2460 x 2710 mm</li> <li>• net interior (l x b x h): 1350 x 2100 x 2100 mm</li> <li>• door (b x h): 700 x 2000 mm</li> </ul>
Construction	<ul style="list-style-type: none"> <li>• on movable steel frame</li> <li>• sandwich panels with 180 mm PIR insulation (<math>K=0,120 \text{ W/m}^2\text{K}</math>)</li> <li>• maximum floor load of <math>1000 \text{ kg/m}^2</math></li> </ul>
Temperature control	<ul style="list-style-type: none"> <li>• <math>+10^\circ\text{C} \dots +40^\circ\text{C}</math></li> <li>• <math>\leq \pm 1\text{K}</math> in stable conditions</li> <li>• <math>0,2^\circ\text{C}/\text{min}</math> heating / cooling speed (within temperature range <math>+10^\circ\text{C} \dots +30^\circ\text{C}</math> with test panel with U-value of <math>20\text{W/m}^2\text{K}</math> or lower)</li> </ul>
Humidity control	<ul style="list-style-type: none"> <li>• 20% ... 90% (within temperature range <math>+10^\circ\text{C} \dots +40^\circ\text{C}</math>)</li> <li>• <math>\leq \pm 5\%</math> in stable conditions (at <math>20^\circ\text{C}</math> and 65% RH)</li> </ul>

### Test panel module

Dimensions	<ul style="list-style-type: none"> <li>• exterior (l x b x h): 1260 x 2460 x 2710 mm</li> <li>• net interior (l x b x h): 1260 x 2100 x 2100 mm</li> <li>• test panel opening (b x h): 1712 x 1712 mm</li> </ul>
Construction	<ul style="list-style-type: none"> <li>• on movable steel frame</li> <li>• sandwich panels with 180 mm PIR insulation (<math>K=0,120 \text{ W/m}^2\text{K}</math>)</li> <li>• maximum floor load of <math>1000 \text{ kg/m}^2</math></li> </ul>

### Sensors for monitoring (total for both rooms)

	Quantity	Measuring range	Resolution	Uncertainty	Response time $t_{90}$
Temperature (Pt100)	120	$-50 \dots +200 \text{ }^\circ\text{C}$	$0,1 \text{ }^\circ\text{C}$	$0,3 \text{ }^\circ\text{C}$	2 s
Relative humidity	30	0...100 %	0,5 %	1,8 %	8 s ( $t_{63}$ )
Air velocity (anemometer)	2	$0,2 \dots 20 \text{ m/s}$	$0,1 \text{ m/s}$	1...1,5 %	5 s
Heat flux	9	$-2000 \dots +2000 \text{ W/m}^2$	$0,5 \text{ }^\circ\text{C}$	5 %	0,4 s
Air pressure difference	1	0...100 Pa	1 Pa	1 %	1 s