

## Three-Chamber Climate Simulator

Thermal investigations of large building components

- up to three simultaneous stationary investigations
- programmable alternating climate in each chamber
- time lapse investigations
- rapid change of temperature

The accessible three-chamber climate simulator of the Fraunhofer Institute for Building Physics, IBP, is suited for general building physical as well as special thermal investigations of all kinds of large building components, façade elements in particular. The three-chamber climate simulator allows the simulation of many natural processes under exactly defined reproducible laboratory conditions, and therefore it is an essential tool for parameter investigations in building component development.

Besides the usual investigations of quality control and quality assurance of building materials and components, e.g. U-value measurements, this test facility offers the opportunity to investigate:

- Stationary and non-stationary processes of thermal conductivity and humidity penetration
- Thermal cycling
- Storage properties of building components
- Short-term temperature cycling
- Alternating climate loads
- Thermal bridges
- Building component surface effects
- Cavity convection
- Vapor diffusion processes

Moreover, the various properties of the three-chamber climate simulator also allow the testing and functional testing of technical equipment, for example:

- Charging and discharging cycles of heat storage facilities
- Equipment for natural and controlled ventilation
- Heat recovery installations
- Absorber elements



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**Technical Data**

**Internal dimensions:**

	chamber 1 and 2	chamber 3
length	2.0 m	2.4 m
Width	4.0 m	4.0 m
Height	2.75 m	3.0 m

Total volume	approx. 70 m <sup>3</sup>	
Total surface area	6.4 m x 4 m	

**Temperature range:**

Temperature stability	-30 °C ... 80 °C temporal ±0.2 K spatial ±1.5 K	-20 °C ... 80 °C temporal average ±0.5 K ... ±1 K
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**Climate area:**

Temperature range	5 °C ... 60 °C	5 °C ... 85 °C
Temperature range of dew point	2.5 °C ... 55 °C	5 °C ... 58 °C
Relative humidity	20 % ... 90 %	10 % ... 95 %
Stability:		
- Temperature of dew point	±0.5 K	no specification
- Relative humidity	±3.0 %	±3.0 % ... ±5 %

**Alternating climate control: (without load)**

Cooling-off rate	50 K/h
Heating rate	85 K/h

**Air circulation:** 7000 – 30000 m<sup>3</sup>/h

**Testing material:**

Total volume maximum 3000 kg

**Applications of the three-chamber climate simulator:**

U-value and K-value and thermal resistance of large façade and roof elements, prefabricated house elements, door and window elements, temporary thermal insulation by means of external shutters, folding shutters, roller blinds etc., thermal transmission measurements in composite constructions with thermal bridges, convection effects in multi-layer building components with cavities, surface icing of massive absorbers, surface and interstitial condensation, effects of IR reflecting building components, curtain walls, membranes, coatings etc., thermal and moisture conditions on external building elements with windows ...

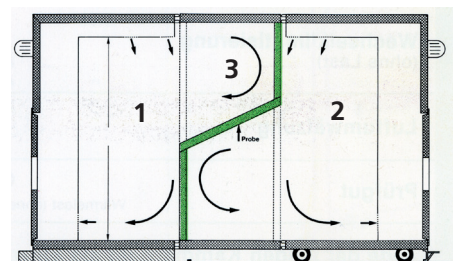
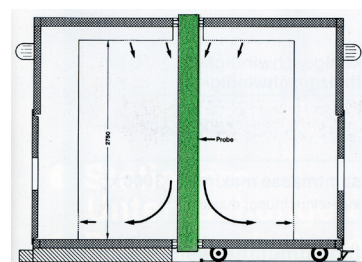
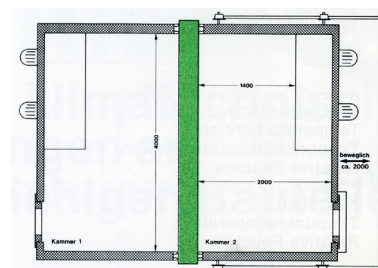


Fig. top: view of chambers 1 and 2 from above.

Fig. center: side view of chambers 1 and 2.

Fig. bottom: chamber 1 is stable, chambers 2 and 3 can be moved.

Each of the chambers 1, 2 and 3 can be used as single climate simulator.