



## Large Cube

### Impermeability of a technical garment

#### The test in a nutshell



Rain



Temperature ranging



Group testing

#### terraXcube

terraXcube is Eurac Research's extreme climate simulation centre at the NOI Techpark in Bolzano, South Tyrol, Italy. Within its chambers, even the most extreme of all our Planet's environmental conditions can be created. By combining hypobaric and altitude technology with state-of-the-art environmental simulation, we aim to investigate the effects of extreme climate conditions on humans, ecological processes and industrial products.

The climate chambers differ in size and equipment and can accommodate people, plants and other living organisms for up to extended periods and have the space to accommodate large machines and products.

Each day our team breaks new ground with scientists and industry partners and prepares the path to gain discoveries.

#### Test description

The objective of the test is to verify the impermeability of a technical garment with standard and reproducible climatic conditions such as cold, warm and atmospheric precipitations. During the test, participants will wear the technical garment and perform a protocol of activities to test the garment's comfort.

Tests are carried out at atmospheric pressure and can involve up to 10 participants at a time.

A possible case study may involve the use of a lifelike model equipped with a series of humidity sensors. The sensors already present on the lifelike model are then placed on a stand in the middle of the LEC. The lifelike model is also able to reproduce the natural body temperature of 36°C thanks to its internal heating system, connected to a 230 Vac power supply in the

chamber. The sensors are then connected to the industrial Data Acquisition System.

The same conditions can be reproduced with up to 6 participants inside the chamber, involving a variety of tasks and activities according to the client's specification, these could include the following examples: climbing or exercising in the chamber or setting up and collapsing a tent.

#### Main focus

The objective of the test is to verify the impermeability of a technical garment with standard and reproducible climatic conditions such as cold, warm temperatures and atmospheric precipitations.

# Large Cube

## Impermeability of a technical garment

### Large Cube - General Characteristics and Environment Control

Internal dimensions	12 m x 6 m x 5 m (L x W x H)
Useful Square Footage	137 m <sup>2</sup> + 100 m <sup>2</sup> for test setup
Access to the chamber	Large sliding door: 3.6 m x 4 m (W x H)
Maximum simulated altitude	9,000 m ±10 m (~ 30,000 ft)
Maximum Rate of Climb (ROC)	6 m/s (~ 1,180 ft/min); 14 m/s (~ 2,756 ft/min) in the airlock
Minimum Rate of Climb (ROC)	0.1 m/s (~ 20 ft/min)
Temperature Range According to IEC 60068-3-5	-40...+60°C (± 1°C in time ± 2°C in space)
Temperature Rate of Change According to IEC 60068-3-5	± 0.5°C/min (cooling & heating)
Relative Humidity T > 4°C and according to IEC 60068-3-6	10...95% ± 3%
Humidity Rate of Change T > 4°C and according to IEC 60068-3-6	0.4%/ min cooling; 0.5%/ min heating
Wind	Up to 30 m/s
Precipitations	Rain: 0...60 ±1 mm/h Snow: up to 50 mm/h
Light	Day/night simulation up to 1,000 lux
Medical Monitoring System	Full medical monitoring system for both test subjects and investigators: <ul style="list-style-type: none"><li>• Portable harness</li><li>• Wireless data transmission within the chamber</li><li>• Real time medical data acquisition<ul style="list-style-type: none"><li>– ECG</li><li>– SpO2</li><li>– Blood pressure</li><li>– Core temperature</li></ul></li><li>• Synchronised medical and environmental parameters</li><li>• Threshold alarms</li></ul>
Available Equipment	Climbing wall Treadmills and cycle ergometers Audio & video projection system

### Other Features

Power Supply	230Vac 1~ 50Hz, 400Vac 3~ 50Hz, 63A
Data-acquisition equipment Smoke/Fire detection system + Fire suppression system CC cameras	
Network connection	Gigabit-Ethernet (1000BaseT) PoE/ Wi-Fi