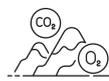




Large Cube

Ascent to Mount Everest

The test in a nutshell



Atmosphere



Group testing



Flights and climbs



Heavy storm



Day and night



Temperature ranging



Humidity

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

This test procedure is the simulation of a Mount Everest ascent (maximal altitude ~9,000 m) by a group of 12 people. The test's estimated duration is 45 days and includes acclimatisation to intermediate altitudes.

All the main functions of the room LEC (pressure, climatic factors, etc.) will be activated during this experiment. Participants in the experiment will be inside the LEC chamber for the duration of the experiment. Sport activity with the possible inclusion of additional stress factors (rain, wind, etc.) is planned during daylight hours only; overnight participants will stay in tents.

The cube will be active and in use 24/7 during the 45-day test

- 10 participants and 2 supervisors will be inside the main room
- 1 technician and 1 supervisor will be outside the room (control room and adjacent spaces)

- Both a technician and a medical doctor will be inside or nearby the control room during the experiment (24/7).

A frequent exchange of people between the test chamber and the ambulatory room will take place. In both rooms several medical - physical - psychological tests can be performed. For these tests, different types of monitoring tools such as ECG or EEG will be available to doctors in the ambulatory room. Other medical tests, including blood sampling, will be performed directly inside the test chamber. Some psychometric tests will be performed using the test chamber's audio-video system. Sport activity will be performed within the test chamber. Tools dedicated to these activities can be present in the chamber or can be brought in through the airlock. Environmental factors such as rain, snow and wind, can be activated, either individually or simultaneously. Both in the case of rain, and in the case of snow, it is possible to rapidly clean the test room.

Lighting inside the chamber simulates solar radiation: change in intensity simulates the day / night cycle. The UV part of the spectrum is excluded.

Constant visual contact is possible with the control for the test room, the ambulatory room and the airlock: In the case of the test and ambulatory room, this is possible also due to a window. In addition, a video control system is present in order to give the technician and the supervisor the possibility of monitoring activities inside the 3 rooms simultaneously.

Main focus

Simulation of an ascent to Mount Everest (maximal altitude ~ 9,000 m) by a group of 12 people. The test's estimated duration is 45 days, including acclimatisation to intermediate altitude.

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 ² + 100 m ² 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
Capacity	Up to 12 participants and 3 investigators
Duration of the Study	Up to 45 days without interruption
Medical Monitoring System	Full medical monitoring system for both test subjects and investigators: <ul style="list-style-type: none">• Portable harness• Wireless data transmission within the chamber• Real time medical data acquisition<ul style="list-style-type: none">– ECG– SpO2– Blood pressure– Core temperature• Synchronised medical and environmental parameters• Threshold alarms
Available Equipment	Climbing wall Treadmills and cycle ergometers Audio & video projection system

Ambulatory Room

General Characteristics	The ambulatory room allows participants to be medically examined during tests. It can also be used to evaluate small or medium-sized objects at high altitudes and non- extreme temperatures. The room has a line of sight between the control room on one side and the test chamber on the other via pressure-tight windows.
Internal dimensions	4.5 m x 2.8 (L x W)
Maximum simulated altitude	9,000 m ±10 m (~ 30,000 ft)
Maximum Rate of Climb (ROC)	6 m/s (~ 1,180 ft/min)
Minimum Rate of Climb (ROC)	0.1 m/s (~ 20 ft/min)
Temperature Range	20...30°C ± 1°C

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