LATVIJAS UNIVERSITATE
UNIVERSITY OF LATVIA

Laboratory for mathematical modelling of environmental and technological processes

VTPMML

Testing of Energy-Efficient Building Envelope Materials in Natural Condition

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IEGULDĪJUMS TAVĀ NĀKOTNĒ

EIROPAS SAVIENĪBA

ERAF

EIROPAS REĢIONĀLĀS ATTĪSTĪBAS FONDS

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Energy Efficiency Requirements for Latvia

Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings

.. after 31st December 2018, all public buildings are nearly zero-energy buildings;

on the 31st December 2020, all new buildings are nearly zero-energy buildings ..

The Law on Energy Performance of Buildings

(Ēku energoefektivitātes likums)

(adopted in Saeima 06.12.2012., **in force from 09.01.2013.**)

.. 1) basic building energy efficiency class;

2) increased energy efficiency class of the building ..

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Experimental Constructions

Location: Riga, Latvia

Average heating period: 203 days

Average outdoor air temperature during the heating period 0.0°C

The coldest five-day average temperature -20.7°C

The daily average relative humidity 79%

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The Parameters of Constructions

- 5 identical experimental buildings with different composite building materials of external walls;
- internal area 9 m^2, ceiling height: 3 m;
- *U*-value for all boundary structures: 0.16 W/(m^2K);
- indoor temperature:

  in summer: 24.5°C ± 1.0°C (at the air velocity 0.18 m/s),

  in winter: 22.0°C ± 1.0°C (at the air velocity 0.15 m/s);
- relative humidity 30÷70%;
- constant air exchange rate: 0.6 h^{-1}
  (for indoors 27 m^3 it is necessary to supply and exhaust 16.2 m^3/h of air).

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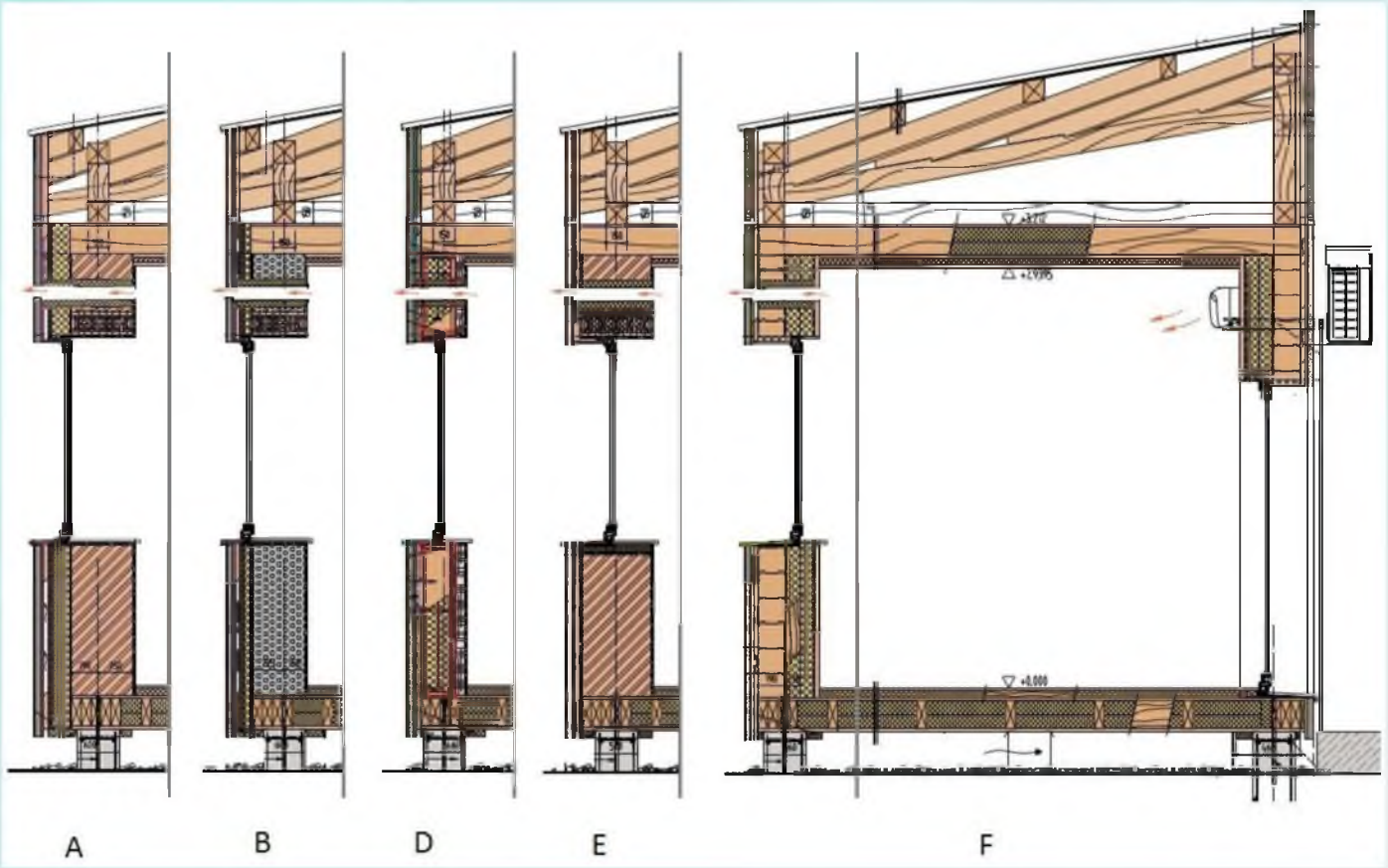
The Types of Constructions



A (CER) – ceramic blocks (440 mm) with external insulation
B (AER) – aerated concrete blocks (375 mm) with external insulation
D (PLY) – plywood frame with mineral wool filling and fibrolite (296 mm)
E (EXP) – ceramic blocks with insulation material filled cavities(500 mm)
F (LOG) – laminated timber beams (200 mm) with internal insulation

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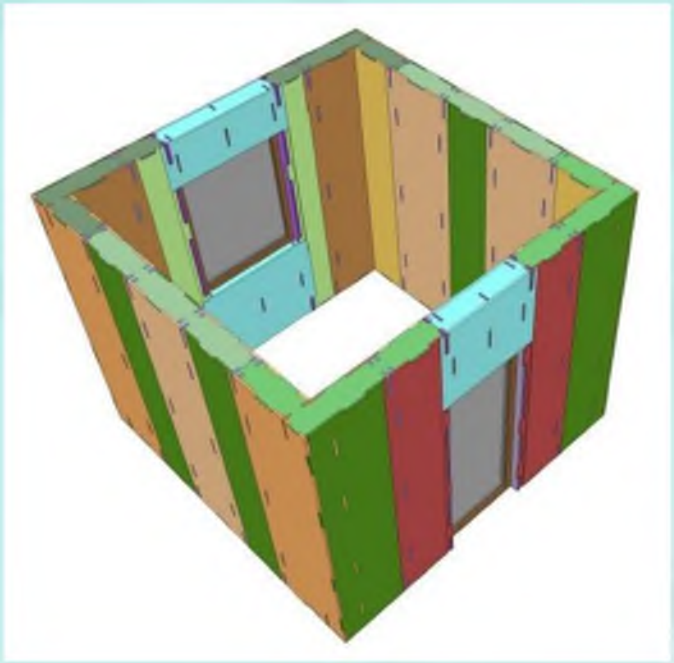
Innovative Constructions



plywood frame with mineral wool filling

ceramic blocks with insulation material filling

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Providing of Indoor Air Quality

HeatPump:

cooling capacity 2.8 kW;

heating capacity 3.6 kW;

the continuous outdoor air supply to the room minimum 24 or maximum of 32 m^3/h;

the supply air humidification;

supply air purification;

the range of outdoor temperatures cooling -10÷43°CDB,

heating -20÷18°CDB;

the sound pressure level of the internal unit nominal cooling/ heating mode 33/35 dB(A)

HeatPump *Ururu-Sarara*, "Daikin", Japan (model FTXR28E + RXR28E)00

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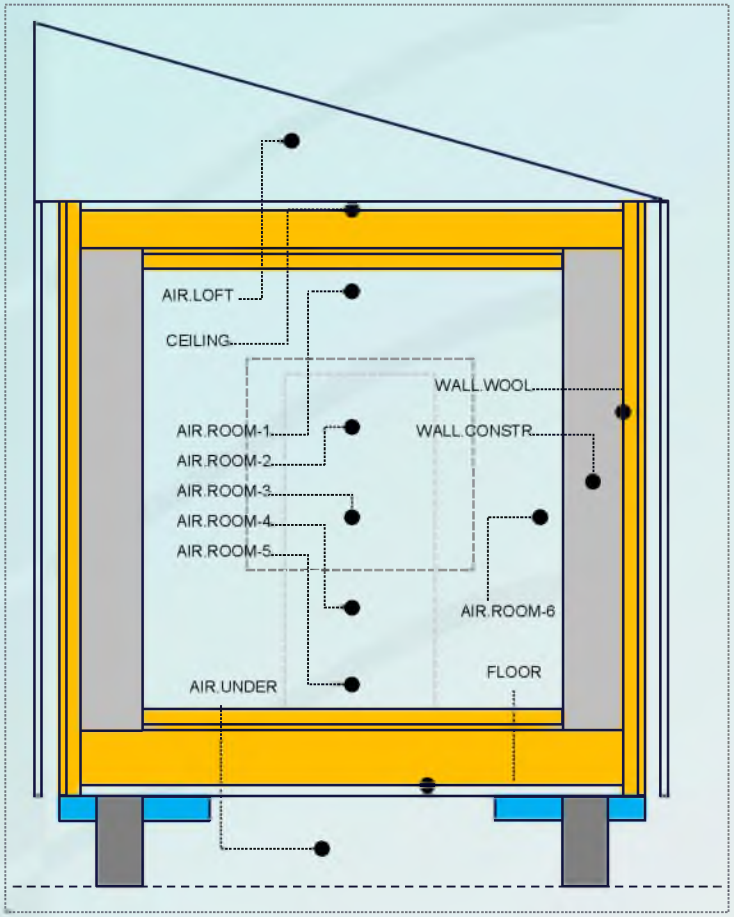
Planned measurements and data storage

The planned measurements of environmental parameters:

- temperature and humidity:
  - outdoors,
  - at different heights and horizontal positions in the room,
  - between constuction layers,
  - near the window and door,
  - in the loft and under the building,
  - airflow intensities,
- wind speed and direction,
- barometric pressure, pressure difference,
- solar radiation.



Data collecting and storage:

- data logger in every building,
- data storage and Wi-Fi transfer to the server,
- data post-processing and analysing

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Construction stages of test buildings in Riga

www.eem.lv

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