POZNAN UNIVERSITY OF TECHNOLOGY

Airtightness of buildings in Poland

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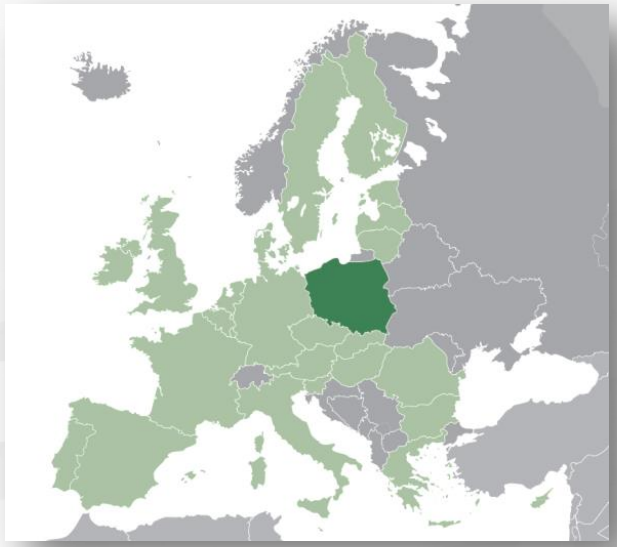
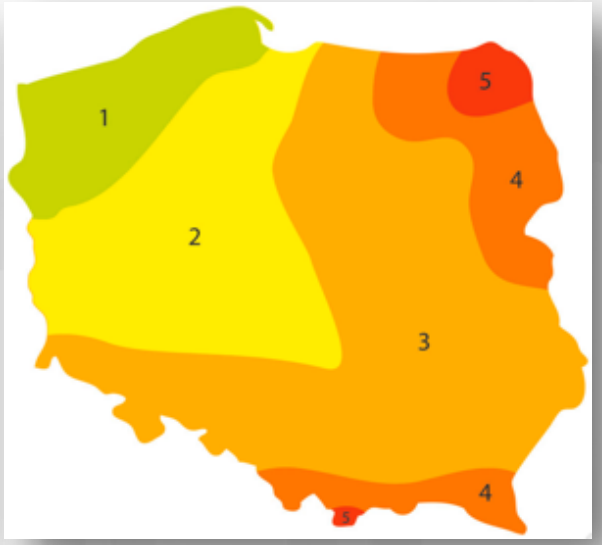
Poland





Poland
- population 38.500.000
- total area 313 000 km^2

Climate
- winter design parameters -24÷-16°C
- summer design parameters 28÷30°C

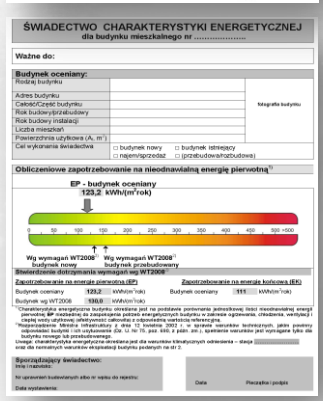
Poznan University of Technology

- Poland
- Poznan 600.000 citizens
- PUT 20.000 students

Institute of Environmental Engineering

- IEA Energy Conservation in Buildings and Community Systems, Annex 36, 1999-2003 Retrofitting of Educational Buildings REDUCE

- Energy Performance of Buildings Directive EPBD Polish calculation methodology



Institute of Environmental Engineering

Main research fields

- low energy buildings
- buildings airtightness
- heat and mass transfer in HVAC systems
- modeling and optimization of air conditioning
- fluid and heat flow measurements
- calculations of energy performance of buildings and building's components
- fluid mechanics

Passive House Center

- Part of Institute of Environmental Engineering
- Co-funded by Polish Passive House Institute
- Accredited by Passive House Institute Darmstadt
- Tasks: courses, trainings, energy performance calculations & assessments, measurements, expertises

Airtightnes & IR measurements
- comercial tests
- up to 6 Blower Door units

Legal regulations until 2013

- till 2008 only windows & doors permeability requirements existed in Poland
- the European Union Energy Performance of Buildings Directive (EPBD) established in 2008 the first regulations in Polish law, regarding airtightness of whole buildings
- current requirements (Building Codes 2008):
  - n_{50}<1.5 ACH for buildings with mechanical ventilation
  - n_{50}<3.0 ACH for buildings with natural ventilation
- measurement is only ADVISED
- n_{50} value is REQUIRED if measurement performed
- no reference to measurement procedure standard in Building Codes

Legal regulations 2014

Building Codes 2014:

- the same n_{50} values advised as now
- measurement is still only ADVISED
- but n_{50} value is only ADVISED (no longer REQUIRED)
- measurement procedure standard reference in Building Codes:
  - the Polish/European norm PN-EN 13829

Other guidelines

Passive house standard

- n_{50}<0.6 ACH is required
- few passive houses built in Poland with slowly growth observed due to lack of subsidies

National Fund for Environmental Protection and Water Management Programme

- fund set up requirements for new low energy buildings
- obligatory testing of building airtightness
- n_{50}<0.6/1.0 ACH is required
- fulfillment of all these demands in case of residential houses results in subsidy - good stimulus to care about building quality
- *„airtightness examinator may be any company which use appropriate instrumentation"*

General situation

Testing companies

- no testing companies association
- no real communication between testing companies
- about 15 testing companies in whole Poland
- at the moment no requirements imposed for testing companies: their competencies, experience, references, equipment and certification
- this results in measurement failures leading to wrong n_{50} values
- most companies have nearly no experience in large buildings testing

General situation

Poznan Aquapark

- A_f = 20.000 m^2 V = 220.000 m^3
- no simultaneous pressurization of adjacent zones - trans-zonal uncontrolled flows
- AHU flow measurement - unknown accuracy
- team not familiar with building and its design
- building not prepared for measurement
- tests conducted with other ventilation systems operating
- no control on trans-zonal openings position
- differences in n_{50} results: -1.9/+3.0 ACH

General situation

Equipment

- most popular are Minneapolis Blower Door units (over a dozen units)
- no XXL trailer fans
- large building measured with multi Blower Door sets
- attempts to measure large building with AHUs (low test price)
- AHU producers cannot guarantee the accuracy of flow measurement - PN-EN 13829 fulfillment?
- hard to estimate how many test-devices necessary for test (poor n_{50} database)

Single family houses

Large buildings

Delivered energy measured
(heat meters, winter 2012/2013):

- 16.1 kWh/(m²a) ventilation heaters
- 19.1 kWh/(m²a) space heating (radiators)

Summary

- beginning of the airtightness subject in Poland
- low level of awareness, competencies, experience, knowledge among architects/designers, investors, contractors and testing companies
- measurement ADVISED and n_{50} value REQUIRED (>ADVISED)
- Building Codes: n_{50}<1.5÷3.0 ACH

Fields of our interests

- IR thermograpy + blower door test
- airtightness influence on energy demand
- multizone residential buildings measurements
- use of AHU fans for testing (?)
- durability of airtight envelope (a few buildings to be retested)

Summary

Passive House Center & Institute of Environmental Engineering plans

- to organize (first in Poland) scientific conference in the field of building airightness
- to establish a testing companies association
- to lobby for setting requirements for testing companies
- to carry out training courses for new and existing companies

Thank you for your attention!

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