Overall findings on status on the ground

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QUALICheck approach
Status on the ground

• Existing data analyses report based on 31 previous studies:
  • Measured performance
  • Reliability of input data
  • Quality of the works
  • Compliance frameworks

• 10 new data collection studies from 9 focus countries
  • 10 reports + summary (available Nov 2015)
Field data confirms concerns for compliance and quality of the works

“Status on the ground” report based on outcomes of 31 studies addresses specific concerns on performance data from the field, the compliance of the input data, the quality of the works, and the compliance frameworks

Technology areas covered:
- Transmission characteristics and air tightness
- Ventilation systems
- Summer thermal comfort solutions
- Renewable systems (heat pumps, thermal solar, PV)
New data collection studies on

• EP compliance and EPC input data quality (5 studies)
  • Site visits
  • Check of design documentation
  • New EPC calculation
• Summer thermal comfort compliance (1 study)
  • Measurements, design documentation, temperature simulations
• Reliability of EPC issued with different methods (1 study)
• Transmission characteristics related studies (3 studies)
  • Cavity insulation: quality framework for cavity wall insulation
  • Windows: input data on window thermal performance
  • U-values compliance

→ Reports available in November 2015
Some findings: **Compliance frameworks**

- Compliance frameworks stop to scheme design/building permit; final design, construction and actual energy performance of buildings is not under control, i.e. the **compliance is controlled until issuing the building permit**.

- Majority of countries have no control mechanism for:
  - Final design/production information
  - Design changes during construction
  - Commissioning

- 2 out of 9 countries have compliance frameworks extended to final design and construction and commissioning phases.
## Typical examples of approval procedures in design and construction phases

<table>
<thead>
<tr>
<th><strong>Submission of preliminary design to apply building permit</strong></th>
<th>Building permit is issued by local authority based on (preliminary) scheme design documentation and EPC.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Final design/production information</strong></td>
<td>Usually there is no official control mechanism for final design stage, energy calculations are not required to be repeated (exemption e.g. province Salzburg where a design EPC and a completion EPC is required).</td>
</tr>
<tr>
<td><strong>Design changes</strong></td>
<td>The building owner, or the site supervisor representing the building owner, is responsible to fulfil legal obligations such as the energy performance minimum requirements and in the case of significant design or component changes, energy calculations have to be revised, but as there is no control mechanism, this is not followed in practice.</td>
</tr>
<tr>
<td><strong>Commissioning</strong></td>
<td>Commissioning includes several measurements, but is only required for the housing subsidy scheme and for voluntary building certification (e.g. TQB, klima:aktiv, Passivhaus)</td>
</tr>
<tr>
<td><strong>Completion announcement, handover and permit of use</strong></td>
<td>The building authority issues the permit of use based on the completion announcement and connected with a site visit, but in fact there is no inspection. With the permit of use the building may be occupied.</td>
</tr>
<tr>
<td><strong>Operation phase</strong></td>
<td>New energy certificate after 10 years is mandatory.</td>
</tr>
</tbody>
</table>
Some findings: Reliable input data

• Because of EPC procedure of EPBD this area is somewhat under control:
  • National procedures do exist
  • Building permit is not issued without EPC calculation
  • EPC databases are based on building permit, not “as built“ data

• Developed schemes to improve input data quality:
  • Approaches of certified products and products databases – to be sure that correct product data is used
  • Approaches focusing on documentation – to be sure that the values actually used are documented

• Random checks of EPC calculations (EPBD requires)
Some findings: Measured performance

• Poor ventilation could be seen as a major European problem: ventilation rates and noise typically did not comply
• Ductwork air tightness is an issue in Central Europe, but was solved 30 years ago in North Europe
• Building leakage showed both good and bad examples
• Limited data on transmission characteristics (mostly inconclusive, additional studies needed)
• Heat pumps, solar thermal and other renewables showed good performance if certified installers etc. schemes applied
• Limited data on summer thermal comfort (not well addressed in building codes)
Example of a new data collection study: Summer thermal comfort

EPBD Annex I requirement:
“1. The energy performance of a building shall be determined ... and shall reflect the ... cooling energy needs (energy needed to avoid overheating) to maintain the envisaged temperature conditions ...”

Estonian legislation:
• Addressed by a requirement not allowing to exceed 27°C more than 150°C in residential buildings and 25°C more than 100°C in non-residential buildings from June 1 till Aug 31
• Compliance verification to be done with specific temperature simulation based procedure (needs to be simulated in critical rooms with standard use data and test reference year, cannot be measured)
• The study included:
  • Simulations in total in 158 dwellings from 25 new apartment buildings
  • Measurements in 22 dwellings
The requirement of temperature excess \( \leq 150 \, ^\circ\text{Ch} \) (degree-hours)
The requirement of temperature excess $\leq 150$ °Ch (degree-hours)

<table>
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<th>Date</th>
<th>Time</th>
<th>Temp, °C</th>
<th>Excess, °Ch</th>
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</table>

$\Sigma 685.0 \leq 150$ °Ch

Temperature excess over 27 °C

4.2°Ch
Selection of dwellings with highest risk of overheating
Window modelling

<table>
<thead>
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<th>TÜÜP</th>
<th>KOGUS</th>
<th>AVA MÕÕDUD</th>
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<tr>
<td>A6</td>
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<td><img src="image6" alt="Diagram A6" /></td>
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</tbody>
</table>

**AVA MÕÕDUD**

- **AVA MÕÕDUD**
- **MATERJAL**
- **VIIMISTLUS**
- **TULEPÜSIVUS**
- **SOOJAPIDAVUS**
- **HELIPIDAVUS**
- **AVA LAIUS**
- **SULUSED**

**Window modelling** (Schüco FW50 v? i analoog puitkarkassil (nn. 0-liistuga) avatav osa saksa tüüpi üheraamne puit-alumiiniumaken joonise järgi liimpuit, mänd puit: peits+lakk, toon täpsustada tellijaga, Alumiinium RAL 7016 - U<=1.1 W/Km² Tänava fassaadis Rw>=38dB, mujal Rw>=35dB joonise järgi vastavalt tootjale, kooskõlastada projekteerijaga, +tihendtuulutus)

**Detailed window construction**

- **Name**
- **Layers**
  - Outside (ambient or adjacent zone)
    - Gep: 16.0 mm Air (10%) / Argon (90%) Mix (WIN7)
    - Pane: PLANILUX 4mm.SGG (WIN7)
    - Gep: 16.0 mm Air (10%) / Argon (90%) Mix (WIN7)
    - Pane: PLT ULTRA N 4mm.SGG (WIN7)
  - Inside (this zone)
    - Data for selected layer
      - Gep: 16.0 mm Air (10%) / Argon (90%) Mix (WIN7)
      - Pane: PLANILUX 4mm.SGG (WIN7)

**Glazing properties at reference conditions**

- Solar heat gain coefficient: 0.58
- Solar transmittance: 0.413
- Visible transmittance: 0.719
- Glazing U-value: 0.894 (W/m².K)

**Project details**

- **Objekt**:
- **Mõtt**
- **Mõtt nr.**
- **Joonis**
- **Tellija**
- **Projekteeris**
- **1:100**

**Stadium**

- **Joonis nr.**
- **Kuupäev**

**MÄRKUSED**

- Kõik joonised vaatega väljaspoolt.
- Kõik gabariitmõõdud kontrollida kohapeal.
- Teostusjoonised ja kõik muudatused kooskõlastada projekteerijaga.
- Paigaldus vastavalt tootja juhistele.
- Põrandani ulatuvatel klaaspindadel on tuleb kasutada lamineeritud klaasiga klaaspaketti, mille lamineeritud klaasidena on kasutatud karastatud klaasi.
Window opening

Openable window airing area ~10%

Not openable
Estonian summer thermal comfort results

• Out of the 25 new apartment buildings studied, 17 buildings (68%) did not comply with the summer thermal comfort requirements

• This relatively new building code requirement was not fully established in practice, as only in 8 buildings the required calculations were included in the building permit documentation

• Other findings:
  • The methodology proved to be sound and robust
  • Some improvements were suggested, critical rooms selection guidance etc.
  • The study was able to identify the parameters defining critical rooms as well as combination of measures avoiding the risk of overheating
Example from ESTONIA:
Assessment of overheating

Overall building results:
17 out of 25 (68%) did not comply with the regulation

Requirement ≤150 °Khr
Some other examples of new data collection studies

Will follow in presentations by:

• Observations on heat transmission coefficients compliance in Cyprus,
  *Marina Kyprianou-Dracou, Cyl*

• Measured versus calculated energy use in Sweden
  *Per Johansson, Chalmers*

• Practical experiences with quality frameworks for post insulation of cavity walls
  *Arnold Janssens, UGent*
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