Lessons learnt from regulatory compliance checks on ventilation and airtightness: regulatory, context, control procedures, results

Sandrine Charrier, Adeline Bailly - Cerema, France
**Regulatory**

**French regulation requirements on ventilation and airtightness**

<table>
<thead>
<tr>
<th>Single-family buildings</th>
<th>Ducts airtightness</th>
<th>Ventilation system</th>
</tr>
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<tr>
<td><strong>Building airtightness</strong></td>
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<tr>
<td><strong>Multi-family buildings</strong></td>
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<td><strong>Non-residential buildings</strong></td>
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Legend:
- ** curses**: EP and airing regulation requirements
- ** person**: Justification required
French regulation requirements on ventilation and airtightness

### Building airtightness

**Single-family buildings**
- **Limit Value:** $0.6 \text{ m}^3 \cdot \text{h}^{-1} \cdot \text{m}^{-2}$
- **Better Value:**

**Multi-family buildings**
- **Limit Value:** $1 \text{ m}^3 \cdot \text{h}^{-1} \cdot \text{m}^{-2}$
- **Better Value:**

**Non-residential buildings**
- **Default Value:**

### Ducts airtightness

**Default Value:** $2.5 \text{ }^{\circ} \text{ Class A}$

### Ventilation system

- **Energy Consumption Limit**
- **Minimum exhaust airflows**
- **Healthy airflows (per person from 18 to 60 L/s)**
## Regulatory

### French regulation requirements on ventilation and airtightness

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**Legend:**
- EP and airing regulation requirements
- Regulatory possibility
- Effinergie+ label
- Justification required

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## Justifications

### Justifications

#### Building and ducts airtightness

- **Measurement**
- **Quality Management Approach (QMA)**

#### Ventilation system

- **Visual check**
  - (waiting for standards on airflow measurements and/or qualifications)
Justifications

Building and ducts airtightness

Measurement
- Qualibat
- Measurer Qualification

Quality Management Approach (QMA)
- National Committee Annexe VII
- QMA certification

Ventilation system

Visual check
(waiting for standards on airflow measurements and/or qualifications)

Cerema Qualicheck
### Control

#### Justifications

**Building and ducts airtightness**

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<td></td>
</tr>
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</tr>
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<td>- Annual follow-ups</td>
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<td>Controls if denunciation</td>
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**Ventilation system**

- Visual check
  - (waiting for standards on airflow measurements and/or qualifications)
  - National compulsory checks
Penalties

- In theory, a non-compliance to regulatory can lead to financial sanctions (from 45000€ to 75000€) and 6 months emprisonment, decided by public prosecutor.

- In facts:
  - For airtightness: compliance to regulation can be asked. New actions so that the airtightness comply with requirements.
  - Ventilation: the non-compliance is noted in the compulsory check report. Possibility to cancel if new proofs given.
Status on the ground: envelope airtightness

Evolution of the median value of the airtightness of French residential buildings

Status on the ground: Quality Management Approaches

Distribution of measured single dwellings, with or without certified quality management (QM) approach
Frans, March, 2015
Status on the ground: ventilation

- Ventilation systems have frequent failures
  - French construction technical regulation observatory (ORTEC) compiles the controls data on both sections

- The recent national statistics* are the following:
  - 50% of the controlled buildings do not meet the requirements in terms of ventilation technical equipment
  - 43% of the controlled buildings do not comply with the regulatory airflow rates
    - 84% of non-complying exhaust flows are insufficient
    - 16% of non-complying exhaust flows are excessive

* French national statistics published by ORTEC in the last report of non-compliance rate for new buildings (CSTB-ORTEC, Synthesis report of ventilation topic, 2005-2009 period)

Status on the ground: ventilation

- Dysfunction points

![Graph showing non-compliance or dysfunction observed: 1246]

- Exhaust airflow: 338
- Air inlet: 300
- Air outlet: 271
- System configuration: 124
- Ventilation unit: 108
- Ductwork and Air transfer: 106

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QUALICHecK
Synthesis of French actions

- French EP regulation requirements and processes implemented, enabled:
  - To accompany designers and workers to learn, train and apply good treatment of building envelope;
  - To accompany measurers to a good practice of measurement;
  - To get good applications and practices.

Limits

- For envelope airtightness, are questioned:
  - Third-party testing,
  - Result of commissioning test,
  - Measurers’ practice.

- For duct airtightness, lack of referent standards on flow rates measurements. For the moment, few ducts airtightness measures (no analysis possible).
Questions

- Should French next regulation ask for a better building airtightness?
- Or should French authorities focus more on ventilation requirements, without reinforcing envelope airtightness ones?
- Will professionals voluntary involve themselves in ventilation efficient installation, with a QM approach or a voluntary will to have better-than-default value or to comply with the Effinergie+ requirements?
- Will French authorities be able to impulse the same dynamic on ducts airtightness and ventilation efficiency than the one known for envelope airtightness since 2006?

- To encourage the ventilation system consideration, French authorities could:
  - Enable economic motivations,
  - Implement labels or future regulations that impose or highly put forward efficient ventilation systems.

Thank you for your attention

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