Ventilation inspection schemes in France

Adeline Mélois
Cerema, France
Outline

1. Regulatory context in France
2. Testers schemes for ductwork airtightness
3. Authorities controls
4. Promevent protocol
1. Regulatory context in France

<table>
<thead>
<tr>
<th>Ventilation system characteristics</th>
<th>Declaration in EP calculation</th>
<th>Requirements</th>
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<tr>
<td>Ductwork airtightness</td>
<td>Default value</td>
<td>• Class A for Effinergie labels</td>
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<td></td>
<td>Class A</td>
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<td></td>
<td>Class B or C</td>
<td>• $Q_{\text{min}}$ imposed by ventilation regulation</td>
</tr>
<tr>
<td>Airflow at terminal devices</td>
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Has to be justify by a measurement
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<td>• Effinergie labels</td>
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<tr>
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<td>• “bonus of constructability” (2016)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “public buildings showing exemplary energy and environmental” (2016)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Professional standards</td>
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<td></td>
<td></td>
<td>• Might be controlled by authorities</td>
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</table>
2. Testers schemes for ductwork airtightness

- **A national qualification for ductwork airtightness testers**
  - Undergo a qualifying State-approved training
  - Pass the training examination
  - Justify a minimum 10 tests performed
  - Yearly follow-up checks

- **Two national documents**
  - Measurements: FD E51-767
  - Checks: Promevent protocol

- **99 qualified testers in march 2019**
3. Authorities controls

- **What for?**
  - Improve buildings quality
  - Inform professionnal regarding sources and impacts of non-compliance

- **Which buildings?**
  - new buildings (0-3 years after commissioning)
  - In 2017: 670 buildings = 20,505 dwellings

- **By whom?**
  - Expert civil servants

- **How?**
  - Documents analysis
  - On-site visit (half day) with building’s owner and inoccupants
  - Official report sent to the prosecutor when there are non-compliances
3. Authorities controls

1. Ventilation system
2. Bodyguard
3. Fire safety
4. Thermal properties
5. Accessibility
6. Acoustics
7. Earthquake resistance
3. Authorities controls

Ventilation system

Method: national guide includes requirements and method of the Promevent protocol

→ 548 buildings controlled in 2017
4. Promevent protocol

- A shared though: need of a unique and reliable protocol

- A 3-years on-field research project with 8 partners

- Scope: mechanical ventilation systems in dwellings

- 2 deliverables:
  - 1 protocol for:
    - visual checks
    - pressure differences and airflow at air vents
    - ductwork airleakage
  - 1 guide
4. Promevent protocol

Define checks and measurements to perform

Pre-check

Output data from pre-check

On-site follow-up of pre-check (Collect of missing information)

Functional checks

Functional measurements at ATDs

Special measurement ductwork airtightness

Report drawing up
4. Promevent protocol

- measurement conditions (closed windows and doors, the settings at ventilation unit and at the ATDs)
- measurement principle (types of measuring instrument, minimum duration of the measurement, the position of the instrument)
- relevant corrections to apply
- uncertainty for airflow measurements:
  - MPE ≤ 10%
    total maximum uncertainty = 15%
  - OR total uncertainty precisely evaluated and under 15%
- uncertainty for pressure measurements:
  - MPE ≤ 3%/0.5 Pa
    total maximum uncertainty = 10%/5 Pa
  - OR total uncertainty precisely evaluated and under 10%/5 Pa
4. Promevent protocol

<table>
<thead>
<tr>
<th></th>
<th>Extraction</th>
<th>Soufflage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>One-point thermal anemometer + hood</strong></td>
<td>✔ ✔</td>
<td>✘ ✘ ✘ ✘</td>
</tr>
<tr>
<td><strong>Checkered thermal anemometer + hood</strong></td>
<td>✔ ✔</td>
<td>❌ ✔ ✔ ✘</td>
</tr>
<tr>
<td><strong>Pitot tube + powered flow hood</strong></td>
<td>✔ ✔</td>
<td>✔ ✔ ✔ ✔ ☒</td>
</tr>
<tr>
<td><strong>Propeller anemometer + hood</strong></td>
<td>✔ ✔</td>
<td>✔ ✔ ✔ ✔ ☒</td>
</tr>
<tr>
<td><strong>Propeller anemometer + hood with extension</strong></td>
<td>✔ ✔</td>
<td>✔ ✔ ✔ ✔ ✔</td>
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- **MPE ≤ 10%**
- **Total maximum uncertainty = 15%**
- **OR total uncertainty precisely evaluated and under 15%**
- **MPE ≤ 3%/0.5 Pa**
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4. Promevent protocol

www.promevent.fr
4. Promevent protocol

www.promevent.fr

- 2 cards on pre-check
- 40 cards on functional checks
- 4 cards on functional measurement
- 7 cards on ductwork airtightness measurement
4. Promevent protocol

- Recommendations from on-site and laboratory campaigns

- Errors on the measured airflow up to 30%.

- Errors on the measured airflow up to 50%.
4. Promevent protocol

- Rules to analyze results of a diagnostic for conformity

- Functional Check:

<table>
<thead>
<tr>
<th>Check points</th>
<th>Regulatory requirements</th>
<th>Essential points for operational ability of the ventilation system</th>
<th>Other good practices points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum compliance rate</td>
<td>100%</td>
<td>100%</td>
<td>Single house: 70%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Multi-family dwellings: 80%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(90% bonus COS)</td>
</tr>
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</table>
4. Promevent protocol

- Rules to analyze results of a diagnostic for conformity

  - Functional measurements: tolerance/measurement uncertainties

![Graph showing Promevent protocol with Qmin axis and tolerances/versions.]

NEW
March 2019
PromevenTertiaire 2018-2021

- Protocol for ventilation systems inspection in non-residential buildings
  - 3 years projects : 9 French partners

- Funding from:

![Partners Logos]
PromevenTertiaire

- **On Site Campaign**
  - 3 buildings (office buildings and schools) to test protocol application robustness
  - 4 different measuring teams

- **Laboratory tests**
  - Calibration
  - Uncertainties evaluation

- **Impact of observed dysfunctions**

- **Final result: Protocols + Guidebook**
Thank you for your attention

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