

International Workshop on Ventilation and Airtightness in Buildings

Voluntary and Regulatory Frameworks to Improve Quality and Compliance

Status on the ground and industry- driven initiatives in the French regulatory context

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

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Regulatory

French regulation requirements on ventilation and airtightness

Legend:

: EP and airing regulation requirements


: Justification required

	Building airtightness	Ducts airtightness	Ventilation system
Single-family buildings 	Limit Value: $0.6 \text{ m}^3 \cdot \text{h}^{-1} \cdot \text{m}^2$		
Multi-family buildings 	Limit Value: $1 \text{ m}^3 \cdot \text{h}^{-1} \cdot \text{m}^2$		
Non-residential buildings 	Default Value		






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Multi-family buildings 	Limit Value: $1 \text{ m}^3 \cdot \text{h}^{-1} \cdot \text{m}^2$ 	Default Value: 2.5 * Class A	
Non-residential buildings 	Default Value	Default Value: 2.5 * Class A	






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Single-family buildings 	Limit Value: $0.6 \text{ m}^3 \cdot \text{h}^{-1} \cdot \text{m}^2$ 	Default Value: 2.5 * Class A	Energy Consumption Limit Minimum exhaust airflows
Multi-family buildings 	Limit Value: $1 \text{ m}^3 \cdot \text{h}^{-1} \cdot \text{m}^2$ 	Default Value: 2.5 * Class A	Energy Consumption Limit Minimum exhaust airflows
Non-residential buildings 	Default Value	Default Value: 2.5 * Class A	Energy Consumption Limit Healthy airflows /person (from 15 to 60 L.s ⁻¹)

Regulatory

French regulation requirements on ventilation and airtightness

Legend:

- : EP and airing regulation requirements
- : Regulatory possibility

: Justification required

	Building airtightness	Ducts airtightness	Ventilation system
Single-family buildings 	Limit Value: $0.6 \text{ m}^3 \cdot \text{h}^{-1} \cdot \text{m}^2$ Better Value	Default Value: 2.5 * Class A Better Value	Energy Consumption Limit Minimum exhaust airflows
Multi-family buildings 	Limit Value: $1 \text{ m}^3 \cdot \text{h}^{-1} \cdot \text{m}^2$ Better Value	Default Value: 2.5 * Class A Better Value	Energy Consumption Limit Minimum exhaust airflows
Non-residential buildings 	Default Value Better Value	Default Value: 2.5 * Class A Better Value	Energy Consumption Limit Healthy airflows /person (from 15 to 60 L.s ⁻¹)

Regulatory

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■ : Effnergie+ label

: Justification required

	Building airtightness	Ducts airtightness	Ventilation system
Single-family buildings 	Limit Value: $0.6 \text{ m}^3 \cdot \text{h}^{-1} \cdot \text{m}^2$ Better requirement: $0.4 \text{ m}^3 \cdot \text{h}^{-1} \cdot \text{m}^2$ or workers training	Default Value: 2.5 * Class A Class A required	Energy Consumption Limit Minimum exhaust airflows Control of the ventilation system
Multi-family buildings 	Limit Value: $1 \text{ m}^3 \cdot \text{h}^{-1} \cdot \text{m}^2$ Better requirement $0.8 \text{ m}^3 \cdot \text{h}^{-1} \cdot \text{m}^2$ if sampling testing	Default Value: 2.5 * Class A Class A required	Energy Consumption Limit Minimum exhaust airflows Control of the ventilation system
Non-residential buildings 	Default Value Measurement for buildings < 3000m ²	Default Value: 2.5 * Class A Class A required	Energy Consumption Limit Healthy airflows /person (from 15 to 60 L.s ⁻¹) Control of the ventilation system

Regulatory

French regulation requirements on ventilation and airtightness

Legend:

- : EP and airtight regulation requirements
- : Regulatory possibility
- : Effinergie+ label
- : Justification required

	Building airtightness	Ducts airtightness	Ventilation system
Single-family buildings 	<div style="background-color: #ADD8E6; padding: 2px; margin-bottom: 2px;">Limit Value: $0.6 \text{ m}^3 \cdot \text{h}^{-1} \cdot \text{m}^2$ </div> <div style="background-color: #90EE90; padding: 2px; margin-bottom: 2px;">Better Value </div> <div style="background-color: #800080; padding: 2px; margin-bottom: 2px;">Better requirement: $0.4 \text{ m}^3 \cdot \text{h}^{-1} \cdot \text{m}^2$ or workers training </div>	<div style="background-color: #ADD8E6; padding: 2px; margin-bottom: 2px;">Default Value: 2.5 * Class A </div> <div style="background-color: #90EE90; padding: 2px; margin-bottom: 2px;">Better Value </div> <div style="background-color: #800080; padding: 2px; margin-bottom: 2px;">Class A required </div>	<div style="background-color: #ADD8E6; padding: 2px; margin-bottom: 2px;">Energy Consumption Limit </div> <div style="background-color: #ADD8E6; padding: 2px; margin-bottom: 2px;">Minimum exhaust airflows </div> <div style="background-color: #800080; padding: 2px; margin-bottom: 2px;">Control of the ventilation system </div>
Multi-family buildings 	<div style="background-color: #ADD8E6; padding: 2px; margin-bottom: 2px;">Limit Value: $1 \text{ m}^3 \cdot \text{h}^{-1} \cdot \text{m}^2$ </div> <div style="background-color: #90EE90; padding: 2px; margin-bottom: 2px;">Better Value </div> <div style="background-color: #800080; padding: 2px; margin-bottom: 2px;">Better requirement $0.8 \text{ m}^3 \cdot \text{h}^{-1} \cdot \text{m}^2$ if sampling testing </div>	<div style="background-color: #ADD8E6; padding: 2px; margin-bottom: 2px;">Default Value: 2.5 * Class A </div> <div style="background-color: #90EE90; padding: 2px; margin-bottom: 2px;">Better Value </div> <div style="background-color: #800080; padding: 2px; margin-bottom: 2px;">Class A required </div>	<div style="background-color: #ADD8E6; padding: 2px; margin-bottom: 2px;">Energy Consumption Limit </div> <div style="background-color: #ADD8E6; padding: 2px; margin-bottom: 2px;">Minimum exhaust airflows </div> <div style="background-color: #800080; padding: 2px; margin-bottom: 2px;">Control of the ventilation system </div>
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Justifications



Justifications

Building and ducts airtightness		Ventilation system
Measurement	Quality Management Approach (QMA)	Visual check (waiting for standards on airflow measurements and/or qualifications)

Justifications



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)



Justifications



Justifications

Building and ducts airtightness

Measurement

Qualibat

Measurer Qualification

Initial evaluation
Training
Validation
Experience
Annual follow-ups
Controls if denunciation

Quality Management Approach (QMA)

National Committee Annexe VII

QMA certification

Initial evaluation
Processes
Sample testing
Annual follow-ups
Controls

Ventilation system

Visual check

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



Control



Control



Justifications

Building and ducts airtightness

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Measurer Qualification

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Experience

Annual follow-ups

Controls if denunciation

Quality Management Approach (QMA)

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Initial evaluation
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Visual check

(waiting for standards on
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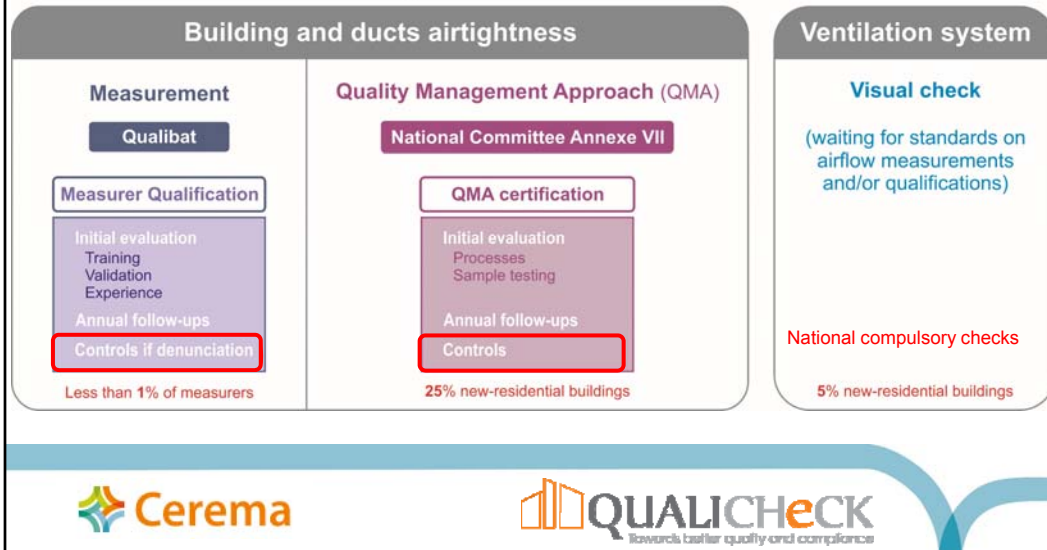
National compulsory checks



Control



Justifications

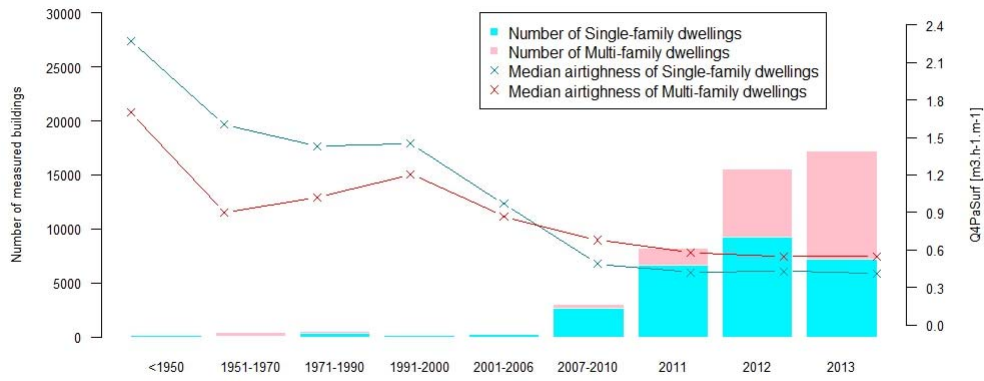


Penalties

- In theory, a non-compliance to regulatory can lead to financial sanctions (from 45000€ to 75000€) and 6 months imprisonment, 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: enveloppe 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

France, 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

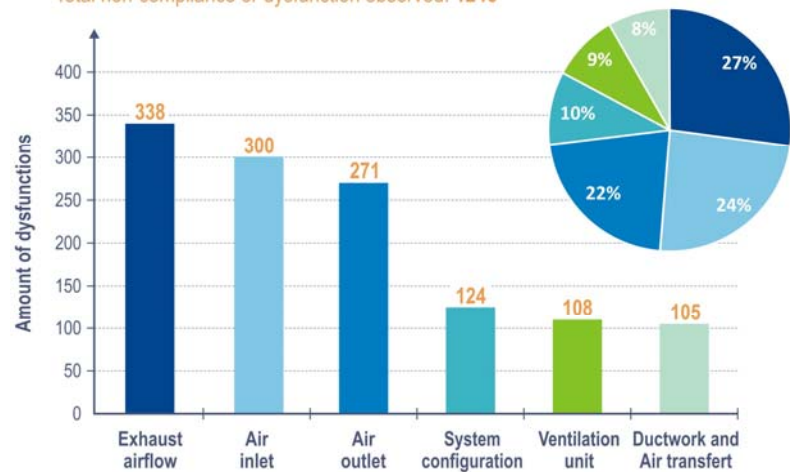
* French national statistics published by ORTEC in the last report of non-compliance rate for new buildings (CSTB-ORTEC, Synthesis report of ventilation topic, 2005-2009 period)



Status on the ground: ventilation

- Dysfunction points

Total non-compliance or dysfunction observed: 1246



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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