

## BUILDING AIRTIGHTNESS IMPROVEMENTS IN THE FRENCH BUILDING STOCK

### Analysis of CEREMA database

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AIVC Webinar - Building airtightness improvements  
of the building stock- Analysis of European databases

01-19-2021

1

## AIRTIGHTNESS IN THE EP-REGULATION RT2012

- **French indicator:**  $q_{a4} = \frac{q_4}{A_{Tbat}} = Q_{4Pa-Surf}$

$q_4$  = airflow rate at 4 Pa

$A_{Tbat}$  = envelope surface area excluding lowest floor

- **Limit values for residential buildings:**
  - Single-family houses:  $q_{a4} \leq 0.6 \text{ m}^3 \text{ h}^{-1} \text{ m}^{-2}$  ( $n_{50} \approx 2.3 \text{ h}^{-1}$ )
  - Multi-family buildings:  $q_{a4} \leq 1.0 \text{ m}^3 \text{ h}^{-1} \text{ m}^{-2}$
- **Default values for non-residential buildings**
  - $q_{a4} = 1.7$  or  $3.0 \text{ m}^3 \text{ h}^{-1} \text{ m}^{-2}$

2

## TESTERS QUALIFICATION

- **Mandatory justification:**
  - Airtightness measurement performed by a qualified tester
  - Certified Quality Management Approach
- **National qualification scheme for testers:**
  - reference: ISO 9972 + French standard (FD P50-784)
  - qualifying State-approved training + examination
  - testing experience (minimum 10 tests)
  - yearly follow-up checks including a national database
- **September 2020: 896 qualified testers**

3

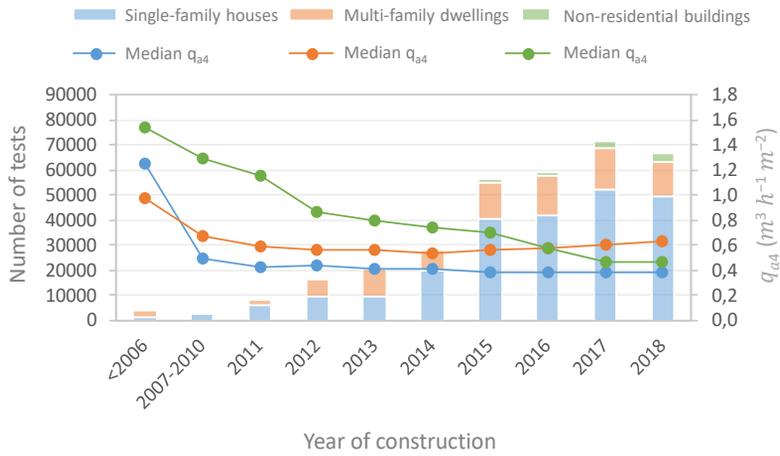
## AIRTIGHTNESS DATABASE FIELDS

- **Building general information:** owner, location, use, year of the construction, year of the rehabilitation
- **Special requirements:** label, certification
- **Building main characteristics:** main material, constructional type, insulation, ventilation system, heating system
- **Measurement protocol:** tester, date of measurement, measurement device, time of measurement (building state), method
- **Measurement input data:** envelope area (excluding low floor), floor area, volume
- **Measurement results:**  $C_{L,n}$ ,  $q_{a4l}$ ,  $n_{50}$ , uncertainties
- **Leaks:** classification of the leaks (46 categories)

4



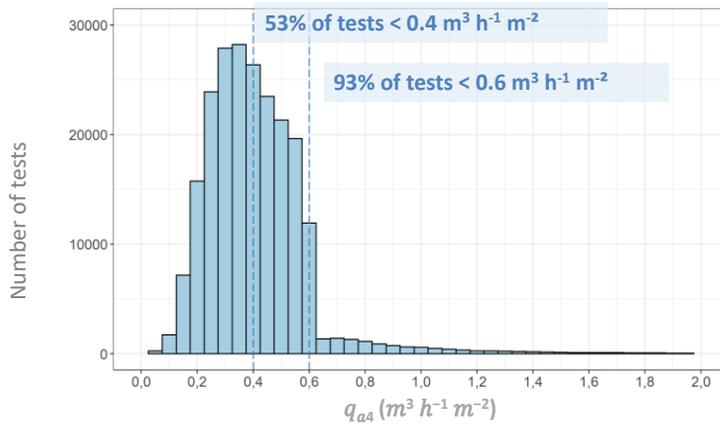
## EVOLUTION OF THE TESTS RESULT



7

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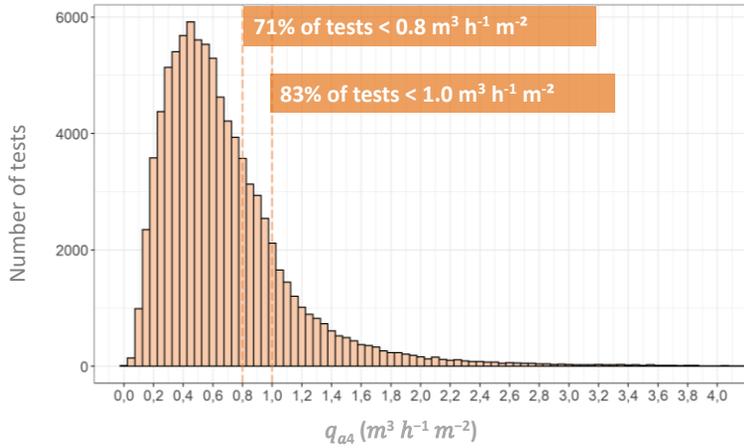
### Single-family houses performance



8

## EVOLUTION OF THE TESTS RESULT

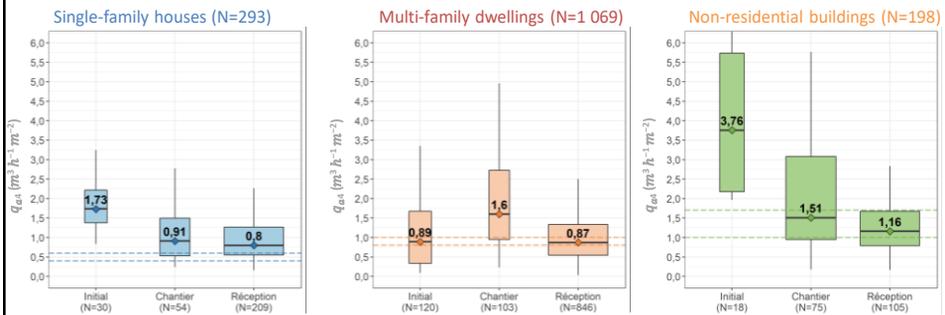
### Multi-family dwellings performance



9

## DATA FOR RENOVATION

### 1 560 tests on renovated buildings (EP regulation for renovation)

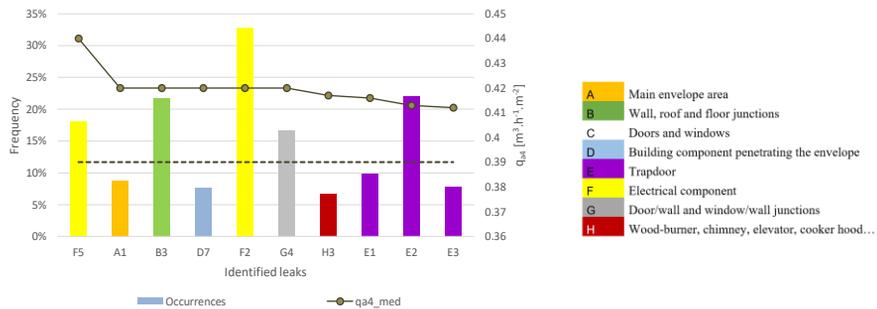


Initial = before renovation / Chantier = during renovation / Réception = after renovation

10

## DATA REGARDING LEAKS LOCATION

Number of observations for 10 leaks identified on single-family houses with the highest median  $q_{a4}$  value  
(from the sample of 121,478 measurements on houses)



Source : A.B. Mélois, B. Moujalled, G. Guyot, V. Leprince, *Improving building envelope knowledge from analysis of 219,000 certified on-site air leakage measurements in France, Building and Environment*. (2019).

11

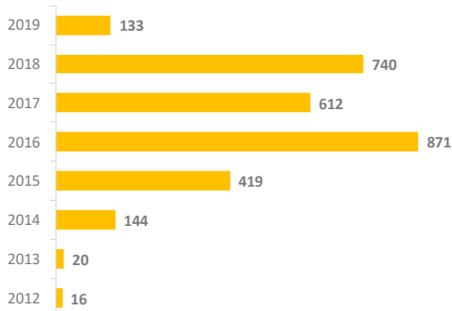
## FRENCH DATABASE FOR DUCTWORK AIRTIGHTNESS

- **Regulatory context:**
  - Tests only for class A, B or C in EP-calculation
  - Mandatory tests and minimum class for Effinergie labels
- **Justification:**
  - Airtightness measurement performed by a qualified tester
- **National qualification scheme for testers:**
  - reference: French standard (FD E51-767)
  - qualifying State-approved training + examination
  - testing experience (minimum 10 tests)
  - yearly follow-up checks including a national database
- **December 2020: 123 qualified testers**

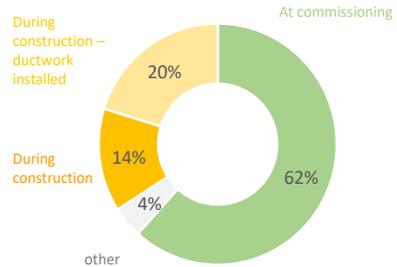
12

## FRENCH DATABASE FOR DUCTWORK AIRTIGHTNESS

Evolution of the number of tests

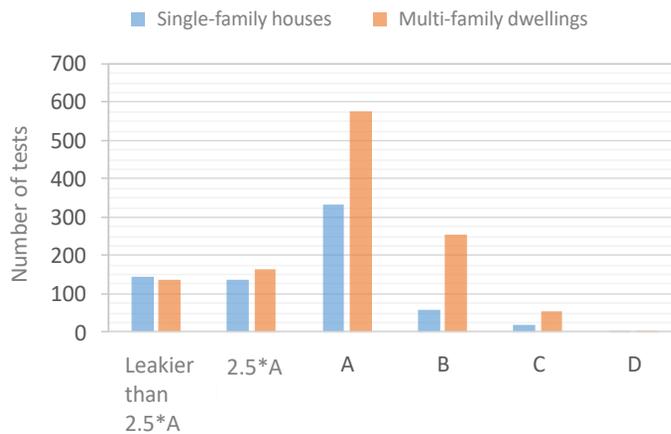


Distribution according to the construction phase



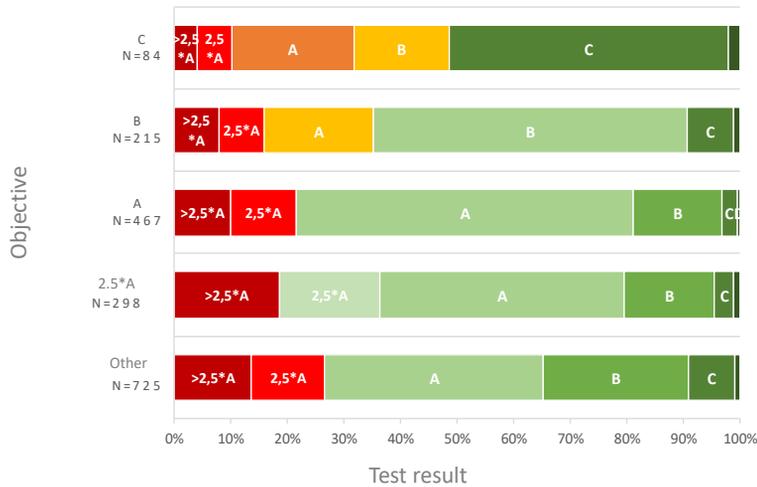
13

## FRENCH DATABASE FOR DUCTWORK AIRTIGHTNESS



14

## FRENCH DATABASE FOR DUCTWORK AIRTIGHTNESS



15

## FRENCH DATABASE FOR VENTILATION SYSTEM

- Regulatory context:**
  - New regulation for building RE2020: from January 1st, 2021
  - Ventilation: mandatory check and measurement for residential buildings
- Justification:**
  - Promevent protocol (similar to EN14134) performed by a qualified tester
- National qualification scheme for testers:**
  - Being defined at the moment
  - Similar than envelope and ductwork airtightness
  - Better process to collect data

16

# FRENCH DATABASE FOR VENTILATION SYSTEM

- Private database:  
by DooApp

<https://open-promevent.fr/>



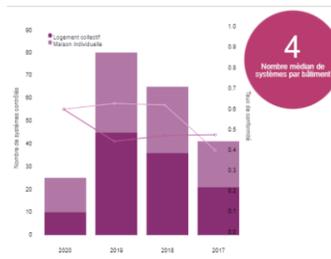
OpenPromevent

Statistiques À propos Contact

RETOUR COMPTES DE 2021

## Evolution du nombre de systèmes contrôlés

L'évolution, année par année du nombre de systèmes contrôlés



Evolution du nombre de systèmes contrôlés et du taux de conformité des systèmes par type de bâtiment



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17



## THANKS

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02/06/2020

18