Ventilation inspection schemes in France

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Outline

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

1. Regulatory context in France

Ventilation system characteristics	RT 2012 Declaration in EP calculation	Requirements
Ductwork airtightness	Default value / Class A / Class B or C	• Class A for Effinergie labels
Airflow at terminal devices	Q total	• Q_{min} imposed by ventilation regulation • Q_{max} calculated to limit energy consumption
Condition of installation of the ventilation system		• Ventilation regulation • Professional standards

1. Regulatory context in France

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Airflow at terminal devices	Q total	• Q_{min} imposed by ventilation regulation • Q_{max} calculated to limit energy consumption
Condition of installation of the ventilation system	Has to be justify by a measurement	• Ventilation regulation • Professional standards

1. Regulatory context in France

Ventilation system characteristics	Declaration in EP calculation (RT 2012)	Requirements
Ductwork airtightness	Default value / Class A / Class B or C	Has to be justify for certification: • Effinergie labels • "bonus of constructability" (2016) • "public buildings showing exemplary energy and environmental"(2016).
Airflow at terminal devices	Q total	Might be controlled by authorities
Condition of installation of the ventilation system		

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

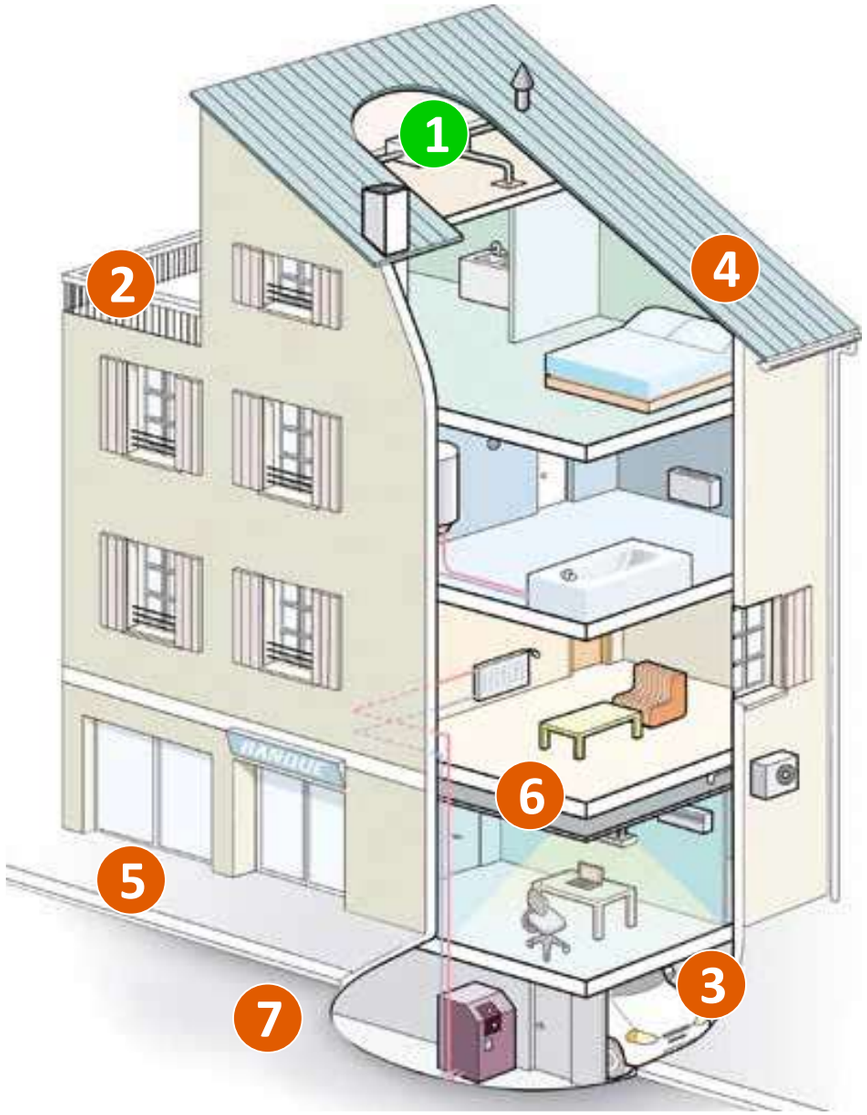
- **99 qualified testers in march 2019**

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

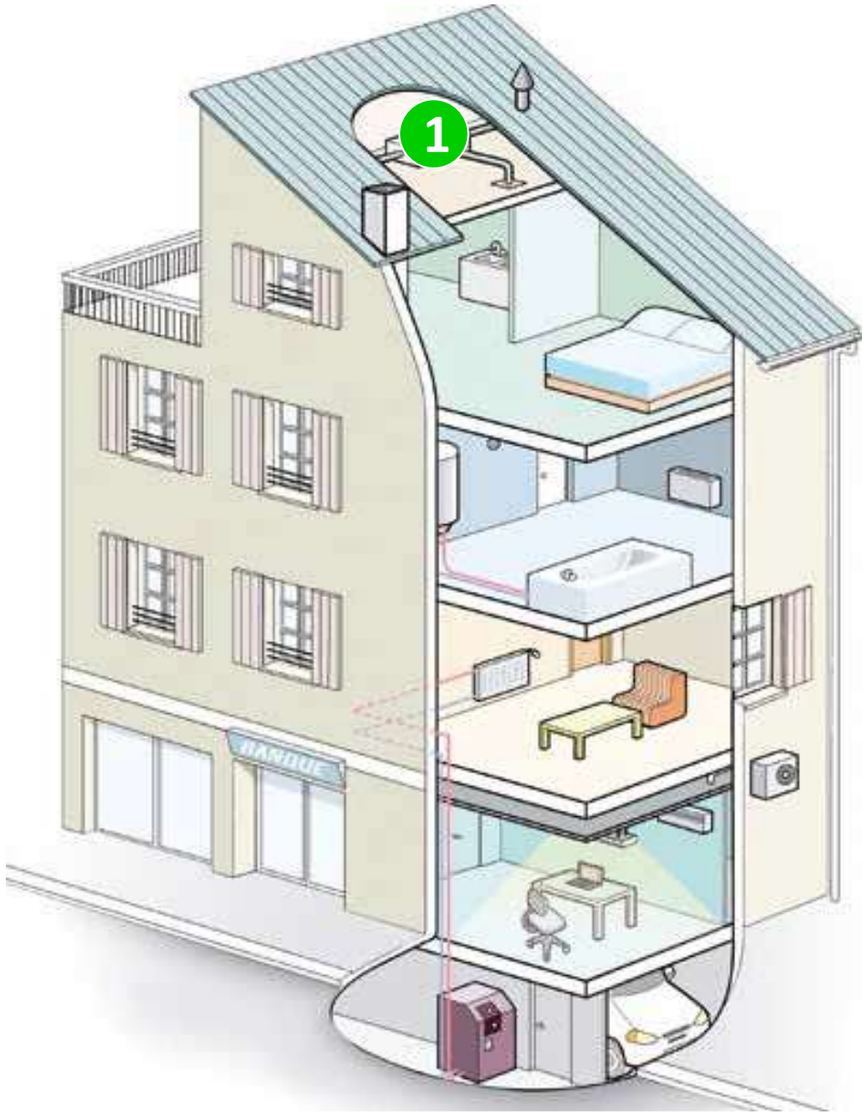


3. Authorities controls

1 Ventilation system

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

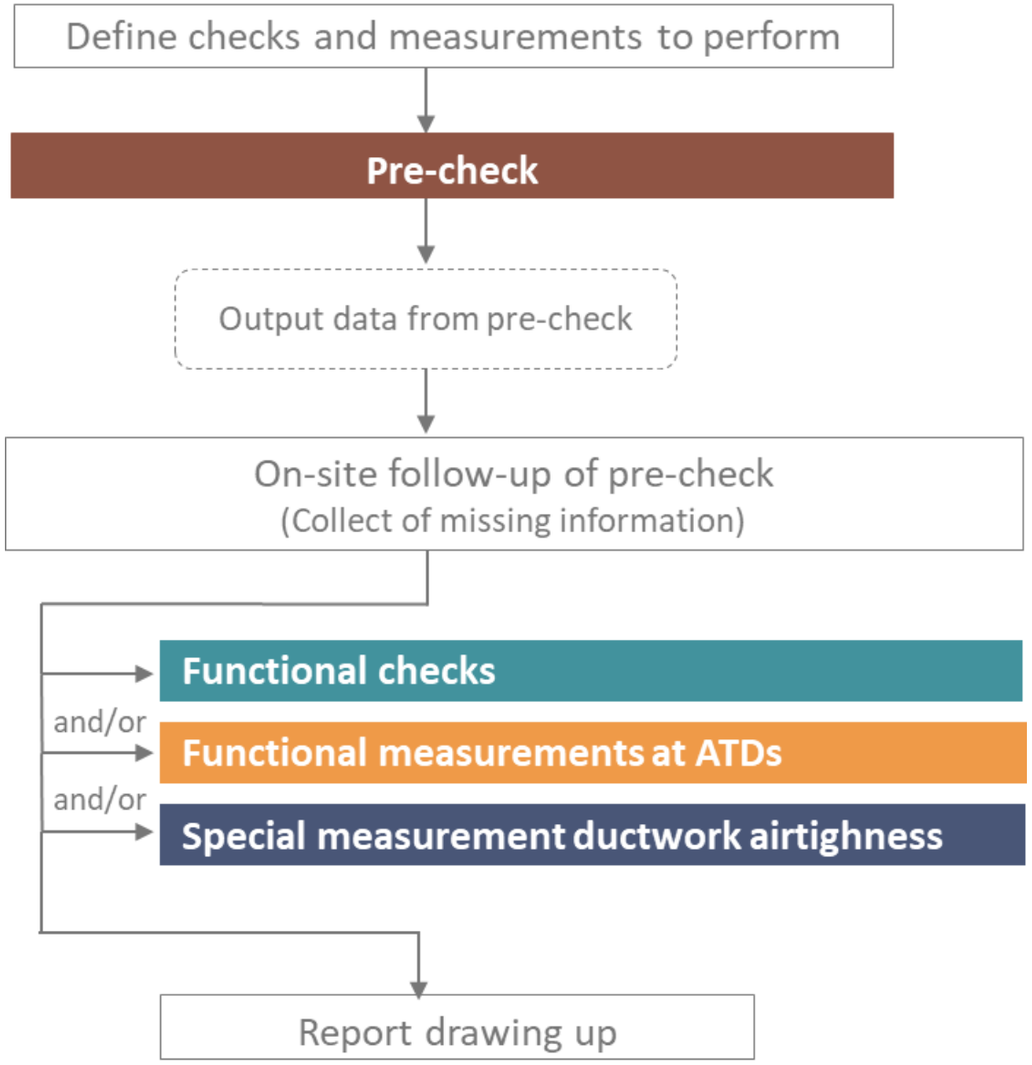
→ 548 buildings controlled in 2017



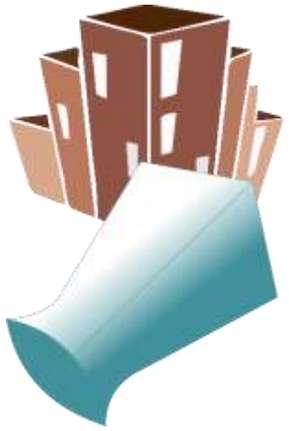
4. Promevent protocol

- 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

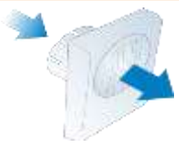
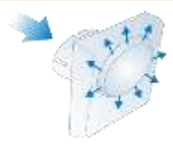
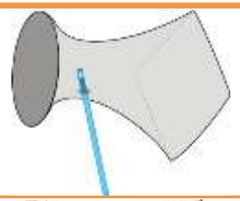
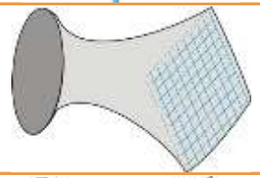
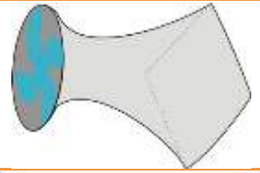
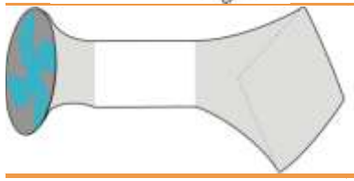


4. Promevent protocol



- 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

		Extraction		Soufflage		
						
	One-point thermal anemometer + hood	✓	✓	✗	✗	✗
	Checkered thermal anemometer + hood	✓	✓	✓	✓	✗
	Pitot tube + powered flow hood	✓	✓	✓	✓	✓
	Propeller anemometer + hood	✓	✓	✓	✓	✗
	Propeller anemometer + hood with extension	✓	✓	✓	✓	✓

4. Promevent protocol

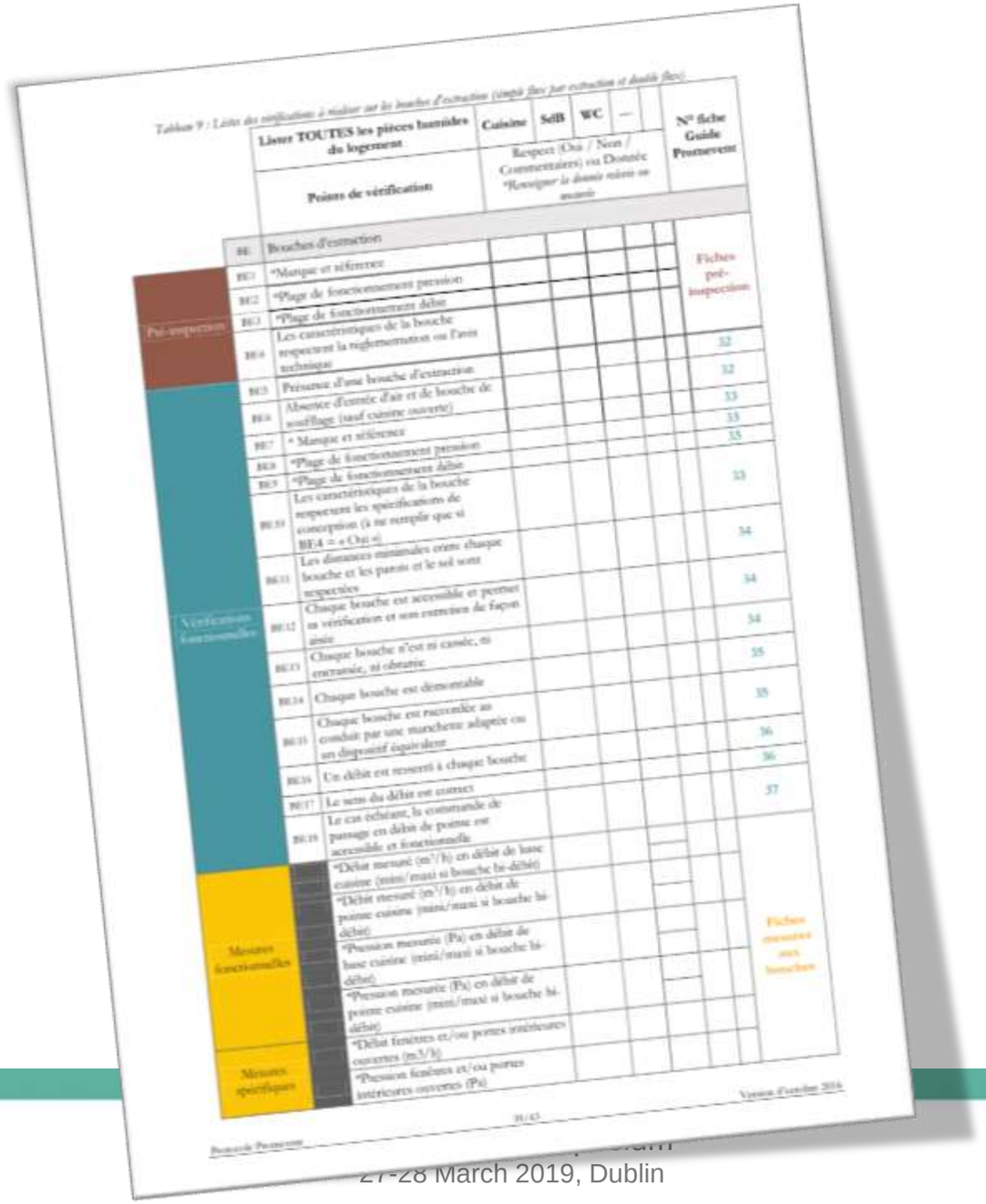


Tableau 9 : Liste des vérifications à réaliser sur les bouches d'extraction (simple flux hot extraction et double flux)

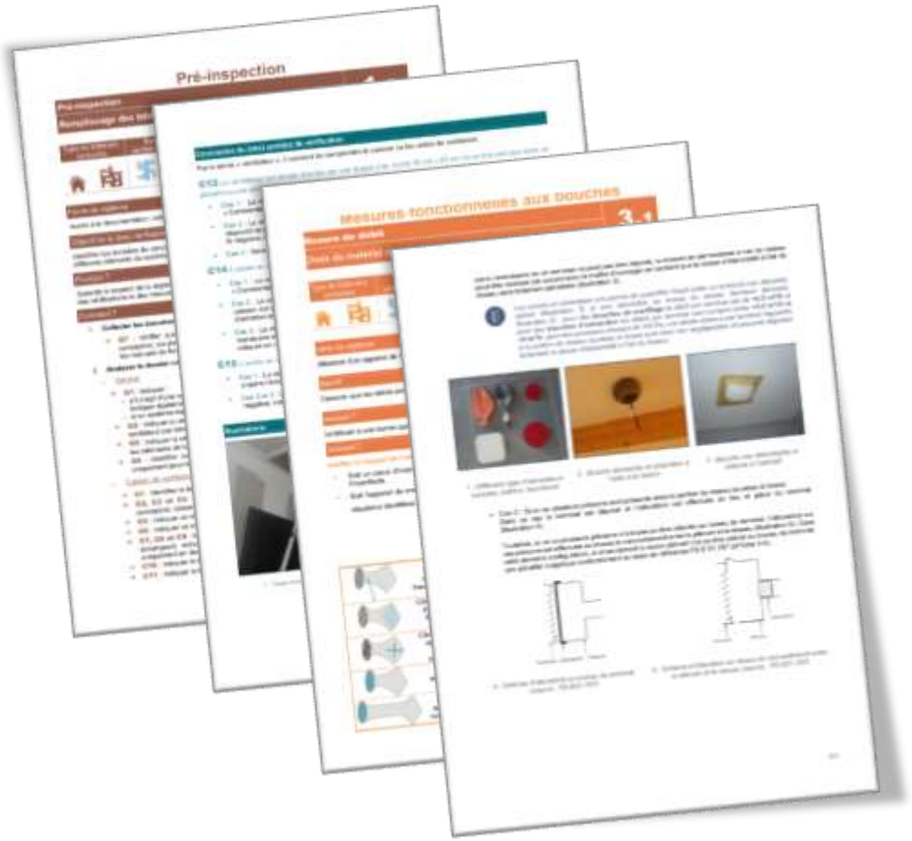
	Lister TOUTES les pièces humides du logement	Cuisine	SdB	WC	—	N° fiche Guide Promevent
	Points de vérification	Respect (Oui / Non / Commentaires) ou Donnée *Renseigner la donnée relevée ou mesurée				
Pré-inspection	BE	Bouches d'extraction				Fiches pré-inspection
	BE1	*Marque et référence				
	BE2	*Plage de fonctionnement pression				
	BE3	*Plage de fonctionnement débit				
Vérifications fonctionnelles	BE4	Les caractéristiques de la bouche respectent la réglementation ou l'avis technique				32
	BE5	Présence d'une bouche d'extraction				32
	BE6	Absence d'entrée d'air et de bouche de soufflage (sauf cuisine ouverte)				33
	BE7	* Marque et référence				33
	BE8	*Plage de fonctionnement pression				35
	BE9	*Plage de fonctionnement débit				
	BE10	Les caractéristiques de la bouche respectent les spécifications de conception (à ne remplir que si BE4 = « Oui »)				33
	BE11	Les distances minimales entre chaque bouche et les parois et le sol sont respectées				34
	BE12	Chaque bouche est accessible et permet sa vérification et son entretien de façon aisée				34
	BE13	Chaque bouche n'est ni cassée, ni encrassée, ni obturée				34
	BE14	Chaque bouche est démontable				35
	BE15	Chaque bouche est raccordée au conduit par une manchette adaptée ou un dispositif équivalent				35
	BE16	Un débit est renseigné à chaque bouche				36
	BE17	Le sens du débit est correct				36
	BE18	Le cas échéant, la commande de passage en débit de pointe est accessible et fonctionnelle				37
Mesures fonctionnelles		*Débit mesuré (m³/h) en débit de base cuisine (mini/maxi si bouche bi-débit)				Fiches mesures aux bouches
		*Débit mesuré (m³/h) en débit de pointe cuisine (mini/maxi si bouche bi-débit)				
		*Pression mesurée (Pa) en débit de base cuisine (mini/maxi si bouche bi-débit)				
		*Pression mesurée (Pa) en débit de pointe cuisine (mini/maxi si bouche bi-débit)				
Mesures spécifiques		*Débit fenêtres et/ou portes intérieures ouvertes (m3/h)				
		*Pression fenêtres et/ou portes intérieures ouvertes (Pa)				

Protocole Promevent — 31/43 — Version d'octobre 2016

www.promevent.fr

4. Promevent protocol

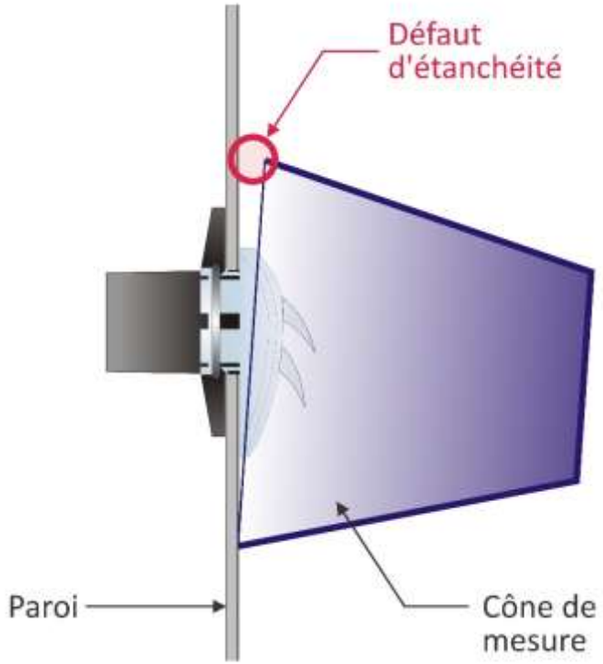
www.promevent.fr



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

4. Promevent protocol

- **Recommandations from on-site and laboratory campaings**



errors on the measured airflow up to 30%.

errors on the measured airflow up to 50%.

4. Promevent protocol

NEW March 2019

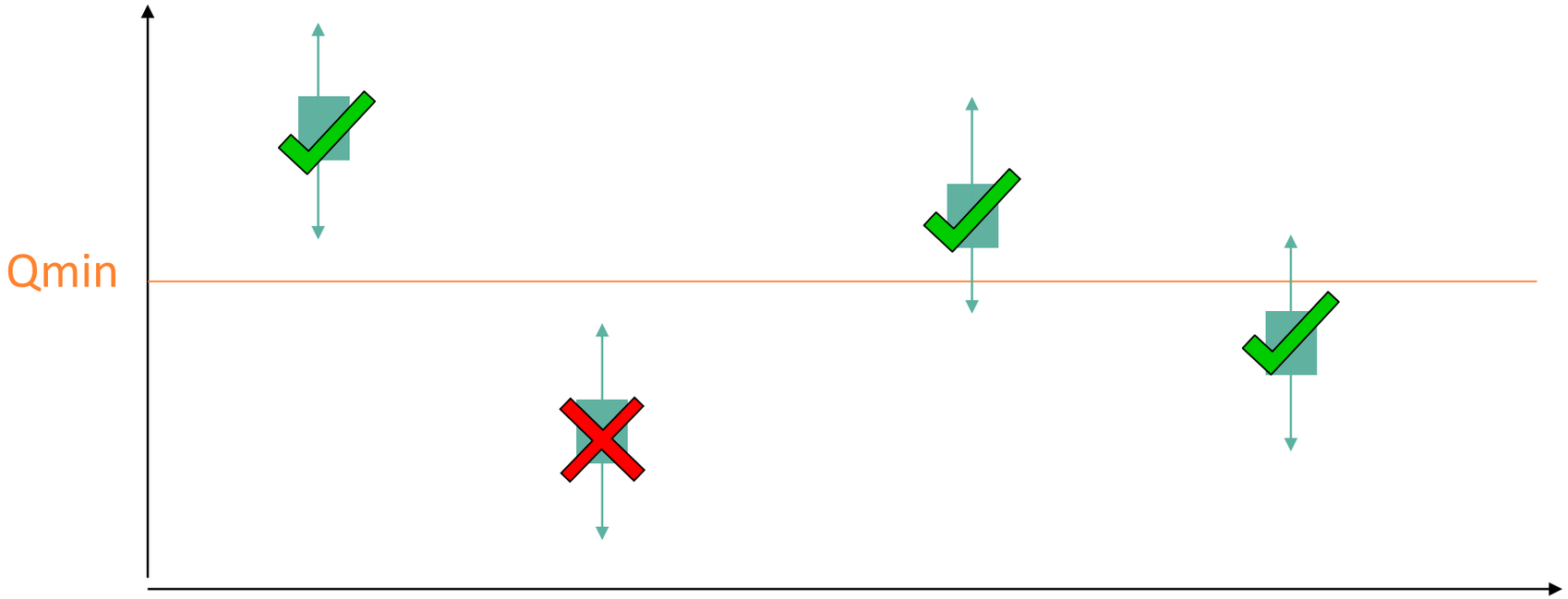
- **Rules to analyze results of a diagnostic for conformity**
  - Functional Check:

Check points	Regulatory requirements	Essential points for operational ability of the ventilation system	Other good practices points
Minimum compliance rate	**100%**	**100%**	Single house : **70%** Multi-family dwellings : **80%** (90% bonus COS)

4. Promevent protocol

NEW March 2019

- **Rules to analyze results of a diagnostic for conformity**
  - Functional measurements: tolerance/measurement uncertainties



PromevenTertiaire 2018-2021

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

Cerema · CETIAT ensemble, innover et valider · ALLIE'AIR · CETIIE · PBC Pierre Barles Consultant · effinergie · ICEE · PLEIAQ · AQC Agence Qualité Construction

  - Funding from : ADEME Agence de l'Environnement et de la Maîtrise de l'Energie · Ministère de l'Environnement, de l'Energie et de la Mer · Ministère du Logement et de l'Habitat durable

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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