Why should we care about ductwork airtightness?

Webinar on ductwork airtightness
January 25th, 2018
Valérie Leprince, PLEIAQ

Outline

- Impact of ductwork leakages
- Ductwork airtightness level
- Evolution in regulatory and programme requirements in EU countries
- Presentation of speakers
IMPACT OF DUCTWORK LEAKAGES

Supply ductwork
- Losses of pre-conditioned air
- May induce over-ventilation
- Outside conditioned space
- Inside cond. space

The fan compensates leakages
- Increase of fan energy use

The fan does not compensate
- Decrease of hygienic flowrate
- Decrease of IAQ

Extract ductwork
- Air temperature decrease
- May induce over-ventilation

Outside conditioned space
- Inside cond. space
Fan energy use, test on laboratory replication of real ductwork system

- Area 18.7 m²
- Extract fan constant pressure
- 8 self-adjusting air terminal devices
- Airflow rate:
  - Max : 525 m³/h
  - Min : 260 m³/h
- Measurement and calculation method

Class C → Drilling → 1.5 *Class A

Source: (Berthault, Boithias, & Leprince, 2014)

Results for maximum airflow rate

- Decrease leakages from 1.5 class A to Class C can almost divide Fan energy use by 2

Source: Leprince, Carrié, AIVC 2017
Energy use impacts

• Impact on overall building energy use:
  • According to (Soenens, 2011) the total energy consumption related to ventilation can be reduced by over 30% by achieving an airtight ventilation system.
  • According to (Dyer, 2011) in a pharmaceutical plant over a 30 years life of the building the energy penalty associated with excessive duct leakage is more than 1.3 million dollars

=> More studies on the impact on heating and cooling are needed

IAQ impacts

• Duct leakage:
  • Reduces flowrates at air terminal devices, unless fan compensates
    • A decrease of 10% of flowrate has been observed by (Berthault, 2014) if the fan is not re-adjusted
  • Suspicions:
    • Increases dust accumulation in filters, heat exchangers, ducts, …
    • Weakens contamination protection of sensitive areas (operating theatres, clean rooms, etc.)

=> More studies on this field are needed
DUCTWORK LEAKAGE LEVELS

Ductwork leakage levels

• SAVE-DUCT project has shown striking difference between Sweden, Belgium and France (Carrié, 1999)
  • In Sweden, since 1966, the AMA tightness requirements have been raised to reach Class C for every ductwork since 2007 (Andersson, 2012)
• In US: duct leakage in 11 large buildings shown to represent on average 28% of the fan flow (Modera, 2013)
Evolution in regulatory or programme requirements

- In Sweden ductwork airtightness is required
  - Since 1966
  - Since 2007: Class C required
- In Portugal for large building
  - Since 2006 ductwork leakage below 1.5 l/s.m² under 400 Pa
- In Belgium
  - Taken into account in calculation method, but no minimum requirement
- In UK
  - Test mandatory for system with design flows > 1 m³/s
  - For low pressure ducting no test required but taken into account in calculation
  - Test typically performed by ducting contractor
- In France
  - Since 2013
  - Effinergie + label requires Class A
  - Test has to be performed by a qualified independent technician
How ductwork airtightness is taken into account in regulations?

- Result of a Tightvent Airtightness Association Committee (TAAC) survey
  - Only France (RT2012) and Belgium (EPB) consider ductwork airtightness as an input in EP-regulation
    - But there is no minimum requirement
    - In France if a value better than default value is used then it has to be justified (testing or certified quality approach)
  - Awareness is low

What is in your view the progress needed to promote ductwork airtightness in your country?

- As for building airtightness the main driver for change will probably be energy use therefore progress are needed in this topic
PRESENTATION OF SPEAKERS

Ductwork airtightness: standardisation's ongoing work and an overview of status and trends in Sweden, Japan, Spain and Portugal

Lars-Ake Mattsson
• CEN TC 156/WG3, Sweden
• European ductwork airtightness class, on-going standardization work and status in Sweden

Masaki Tajima
• KUT, Japan
• Status of ductwork airtightness in Japan and on-going work at ISO on ductwork airtightness

Rodrigo Sanz
• Gonal Driving Air, Spain
• Market trends in Spain and Portugal, an industry point of view