

## Right and Tight: What's New in Ductwork and Building Airtightness?

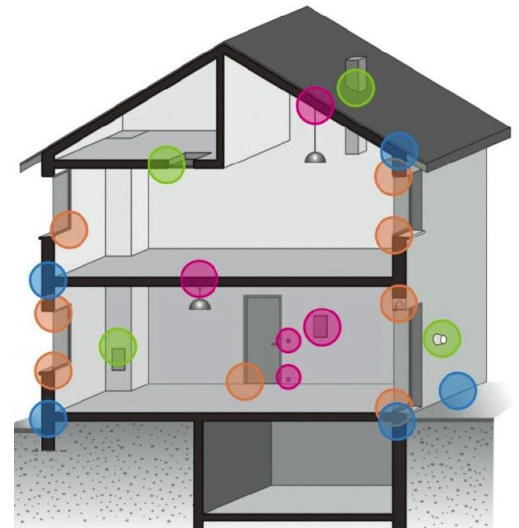


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Legislative drivers and new research on the importance of building and ductwork airtightness are leading to increased activity in this aspect of building energy performance. Qualification schemes for competent testers, training and events and where to find the best information are summarised here.

### Increasing pressure on building and ductwork airtightness with the EPBD recast

The implementation of the [EPBD recast](#) puts increasing pressure to achieve better building and ductwork airtightness since for most European climates and countries, **good airtightness levels are necessary to achieve nearly zero-energy buildings**. This has been shown in a number of studies (e.g. [ASIEPI](#) project report, [BUILD UP Community 'Airtightness of Building and Ductwork'](#)) with energy impacts of the order of 10 kWh per m<sup>2</sup> of floor area per year for the heating needs in a moderately cold region (2 500 degree-days) and 0 to 5 kWh/m<sup>2</sup>/year for the ducts plus the additional fan energy use. Several studies (e.g. QUAD-BBC results in [AIVC Newsletter n°2](#), [TightVent overview report](#)) have also shown that **better building and ductwork airtightness converge with better indoor air quality** - provided that the building is equipped with an appropriate ventilation system (whether natural, mechanical or hybrid).



COMMON LEAKAGE SITES  
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### Examples of measures taken

The impact of envelope and, to a lesser extent, ductwork airtightness is accounted for in the energy performance regulations in many European countries ([ASIEPI project report](#)). The examples that follow include measures taken **both for building and ductwork airtightness** with respect to requirements and EP-calculation methods, as well as **steps to encourage market transformation**.

### Airtightness requirements in European countries

An increasing number of countries (e.g. Czech Republic, Denmark, France, Germany, Ireland, Netherlands, Norway, Portugal, UK – for more, read this [article](#) published at 2009 AIVC conference) include in their regulations either **required or recommended minimum airtightness levels with or without mandatory testing**. The number of tests performed on a voluntary basis is rapidly increasing either because of the energy penalty for untested buildings in the calculation method or due to the specific requirements of a given program.

Furthermore, **mandatory testing came gradually into force** in the United Kingdom, Portugal, Denmark and France.



**In the United Kingdom**, the [Building Regulations](#) have gradually enforced building airtightness requirements over the last 10 years. **Subjecting samples of newly built dwellings to a pressure test in order to measure and confirm their airtightness on completion is compulsory.** Airtightness performance is specified in terms of air permeability, and should not be worse than 10 m<sup>3</sup>/h.m<sup>2</sup> at a reference pressure of 50 Pa. The same requirement applies to non-residential buildings above 500 m<sup>2</sup>. Pressure testing of ductwork is also required and should be conducted for design flow rates greater than 1 m<sup>3</sup>/s.



**In Portugal**, mandatory requirements for ductwork airtightness have been included in the regulation since 2006, as part of the [implementation of the EPBD](#). **Requirements for new HVAC systems include a set of mandatory tests that must be carried out during commissioning, before the building receives its use permit;** these requirements apply to buildings larger than 1,000 m<sup>2</sup>. To pass the test on airtightness, ductwork leakage may not exceed 1.5 L/s.m<sup>2</sup> under a static pressure of 400 Pa ([TightVent Newsletter n°2](#)).



**In Denmark**, with the [BR 2010 regulation](#), **the municipal council is required to demand airtightness measurement in no less than 5 % of construction projects.** Airtightness testing is required for the low-energy standard 'Building class 2020' which anticipates 2020 regulatory requirements.



**In France**, the building thermal regulation requires **explicitly justified building airtightness levels for residential buildings.** The latest update of the French energy performance regulation ([RT 2012](#)), limits the airtightness value of a single family house below 0.6 m<sup>3</sup>/h.m<sup>2</sup> at 4 Pa (i.e. 3.2 m<sup>3</sup>/h.m<sup>2</sup> at 50 Pa) and of other residences below 1 m<sup>3</sup>/h.m<sup>2</sup> at 4 Pa (i.e. 5.4 m<sup>3</sup>/h.m<sup>2</sup> at 50 Pa).

### **Incentives through calculation procedures and/or subsidies**

**Most energy regulations in Europe include the impact of the building airtightness on the overall energy performance calculation** ([ASIEPI](#) project report). Some countries (e.g. Belgium and France) include also ductwork airtightness in the calculation.

Since 2006, the French regulations reward quality management approaches implemented to improve building airtightness. **In practice, this option is used mostly by builders who must fill an application to have their approach approved by the state.** Successful applicants can use a better value than the default value in the energy performance calculation without systematic testing. With the [2012 energy performance regulation](#), this will also be one path to prove compliance with

the minimum airtightness requirements without systematic testing. A similar concept is also operational in Japan ([AIVC Technical Note 67](#)).

There are also a number of low-energy programs whereby **a good building airtightness is a precondition for claiming subsidies**. The example of Norway (where the governmental House Bank gives economic incentives to low energy buildings, with a condition for payments according to documented energy relevant characteristics –one of which is airtightness) has been reported in the [ASIEPI project](#).

## Development of competent tester schemes

The development of competent tester schemes represents **an opportunity for improving the reliability of the building airtightness tests** including monitoring the application of policies in practice. Schemes are based on [EN 13829](#) which provides guidance for testing with good repeatability and reproducibility, and includes additional specifications - e.g. for testing large or multi-family buildings or for reporting in a database. Such schemes are operational in Germany ([FLiB](#)), in Denmark (Foreningen [Klimaskærm](#)), in Finland (Rateko), in France (QUALIBAT), in Japan, in the UK (BINDT) and in the USA (RESNET). Note that Japan has developed a successful certification framework since the early 1990s: in 2011, about 3 800 testers were registered.

## Development of airtightness networks

Many European countries are developing or considering the development of frameworks to increase the reliability of building airtightness testing and reporting for regulatory or voluntary compliance check purposes. [Airtightness networks](#) are often a central place to discuss these issues. The best known probably are the German [FLiB](#) and British [ATTMA](#). **Since September 2012, TightVent hosts an airtightness committee with representatives of national associations covering 8 countries.**

## Development of specific trainings and awareness raising

The development of specific trainings and awareness raising is **one of the major steps towards a successful wide scale implementation of envelope and ductwork airtightness**. Check out the [BUILD UP events](#) and publication listings for the latest updates on building and ductwork airtightness.



BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

The European Building and Ductwork Airtightness platform, [TightVent](#), has already organised **2 webinars**, one targeted at a specific region: [Airtightness and ventilation perspectives – Romania](#) and another one targeted on training namely as [Achieving better envelope in practice – Norway](#). Meanwhile, **relevant publications of reports** have been prepared by the AIVC (e.g. [Methods and techniques for airtight buildings](#), [An overview of national trends in envelope and ductwork airtightness](#)), or the [NHBC Foundation](#) ([A practical guide to building airtight dwellings](#)).

## Monitoring of the building stock

In France, the [Observatoire BBC](#), a database created by [ADEME](#), the Ministry of Ecology, Sustainable Development and Energy (MEDDTL) and [effinergie®](#), records **examples of energy efficient buildings** (BBC-Buildings) compliant with the [BBC-effinergie® label](#) (that includes a minimum requirement on the airtightness value at commissioning) as well as award winners of regional calls for projects. Currently, the [Observatoire BBC](#) references **over 900 projects while 450 buildings have been analysed** ([TightVent Newsletter n°3](#)).

A recent [AIVC-TightVent publication](#) includes information on existing envelope air leakage databases from countries involved in the [AIVC - TightVent](#) project '**Development and applications of building air leakage databases**'.

Exploratory field campaigns on airtightness measurements have been conducted in Denmark, Poland and Estonia. More information can be found in the [33<sup>rd</sup> AIVC - 2<sup>nd</sup> TightVent Conference](#) program as well as the summary of the AIVC - TightVent international workshop held in Brussels on 28-29 March 2012 Achieving relevant and durable airtightness levels: status, options and progress needed ([AIVC Technical Note 67](#)).

## Meeting places

Many airtightness events are taking place around the world – check out the [BUILD UP events](#) listing for the latest meetings, conferences and seminars on this topic. A taste of what's coming up: The **34<sup>th</sup> AIVC - 3<sup>rd</sup> TightVent - 2<sup>nd</sup> Cool Roofs' conference - 1<sup>st</sup> venticool conference** in Athens, Greece, 25-26 September 2013. Meanwhile, two upcoming **AIVC - TightVent workshops**; one entitled: [Design, Implementation, Control and Durability: Feedback from Practice and Perspectives](#) that will be held in Washington DC on 18-19 April 2013 and one with the title: [Securing the Quality of Ventilation Systems in Residential Buildings: status and perspectives](#) in Brussels on 18-19 March 2013. More information on the [AIVC](#) and [TightVent](#) websites.



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