

## The BlowerDoor Test

Continuously high energy prices only underline the necessity of energy-efficient building construction and rehabilitation. As part of environmental policy measures legislators require airtight building envelopes for all new buildings. After all, air tightness is a prerequisite for realizing up-to-date energy concepts. Energy-efficient measures like installing state-of-the-art heating systems or windows only develop their full potential if undesired leakages in the building envelope are eliminated.

The BlowerDoor measurement allows you to test the air tightness of buildings. It can also protect against severe structural damage caused by warm and humid indoor air penetrating the building construction through joints. In addition, the comfort level rises, because you no longer have draughts or cold-air pools. When rehabilitating existing buildings, an air barrier planned according to the recognized standards often achieves current low-energy or even passive-house standards.



**BlowerDoor test of a new single-family home**



**BlowerDoor measurement during the rehabilitation of a timber-framed house**

## The Tale of the Breathing Building

It is only a myth that buildings need to have cracks and joints to “breathe naturally”. Such an air change occurs in an uncontrolled manner. Too much or too little fresh air will enter the building. Even worse, pollutants and dust from the insulation mix with the indoor air. A

building should consequently be ventilated by frequently opening the windows or via a ventilation system.

A building is considered airtight, when the air in the building under testing conditions is not exchanged more than three times per hour. In a building equipped with a ventilation system, the air change at testing pressure in accordance with the German Energy Savings Regulation (EnEV 2002, Appendix 4 No. 2) cannot exceed 1.5 m<sup>3</sup> per hour. „Airtight“ thus does not mean making a building absolutely airtight, but avoiding undesired leakages in the building envelope. This is important, because warm air will flow outside through the joints, which costs energy. At the same time, the warm air transports moisture. It cools at the outside wall of the building and condenses. The condensation water can cause severe structural damage. Outside air infiltrating the building through joints transports allergens and dust particles into the house, which can lead to ill effects on the occupants' health.

## Typical Building Leakages

Construction-related leakages or permeability often occur at connections and penetrations. When planning an air barrier, these areas should be given careful consideration to avoid costly rework later.

Typical leakages mainly occur in the area of

- junctions and joint butts of building components
- pipe and cable penetrations through the air barrier
- floor junctions at doors and windows at floor level in converted attics
- connections of different building materials (e.g. massive/light construction)
- building extensions and bay windows
- window flannings and external door reveals
- roof lights and dormers
- trap doors



Leakage due to cable penetrations



Leakage due to incorrect air insulation at a chimney junction

## **The Principle behind the BlowerDoor Measurement**

The Minneapolis BlowerDoor has been used for air-tightness measurements in Germany since 1989 and today is one of the most successful testing devices for air-tightness worldwide. IR thermography during the BlowerDoor measurement optimally completes the test of the building envelope delivering comprehensive results and conclusive evidence of the condition of the building envelope. These conclusions are illustrated and documented within the quality assurance process.

For the measurement, a BlowerDoor fan is installed in an external door or window of the building. All other outside doors and windows are closed. All inside doors of the building remain open. As an acknowledged rule of technology, the automated BlowerDoor procedure is carried out according to the European Standard DIN EN 18329. Via the BlowerDoor fan, air is continuously sucked out of the building, so that an imperceptible negative pressure of 50 Pascal is generated in the building. Occupants can remain in the building during the measurement without experiencing any discomfort. If there are leakages in the building envelope, outside air will infiltrate the building through them. During the walkaround, the building is carefully inspected for air flows which are located by means of an air speed meter or via IR thermography.

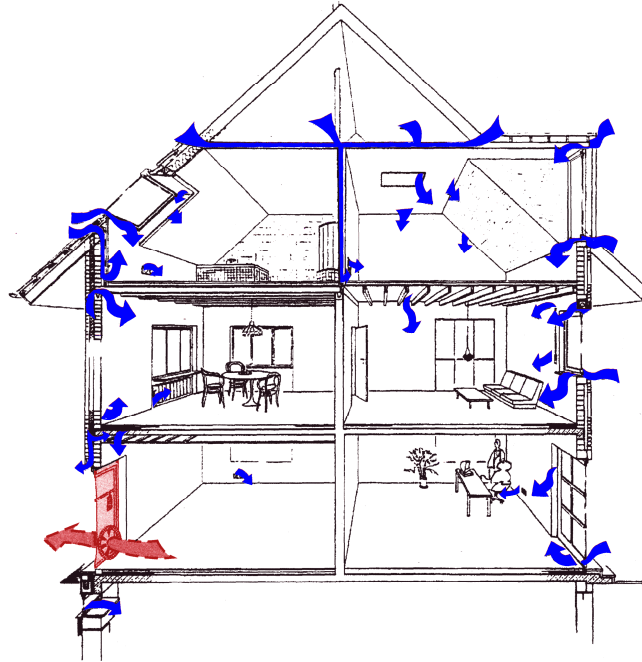
According to the German Energy Savings Regulation, air-tightness measurements are to be conducted while the building is in use. We recommend an additional BlowerDoor test already at the time when the air barrier is still accessible. Leakages can then be eliminated in a targeted manner and often with little effort. Leaks that are only detected during an air-tightness test when the building is already in use, usually not only require more, but also considerably more costly rework.



**The air barrier is still visible (sheets and wood panels):  
This is the optimum time for a BlowerDoor measurement**



**BlowerDoor GmbH**  
MessSysteme für Luftdichtheit



**The BlowerDoor method: A fan draws the air out of the building. Outside air flows into the building through any leaks.**

A BlowerDoor measurement of a single-family home including quality assurance in accordance with the requirements of the German Energy Savings Regulation (ENEV) takes about three hours. Depending on the amount of work involved, the test costs about EUR 450,- but is an investment that is well worth the effort.

Further information is available from:



**BlowerDoor GmbH**  
MessSysteme für Luftdichtheit

**BlowerDoor GmbH**  
**MessSysteme für Luftdichtheit**  
Energie- und Umweltzentrum 1  
31832 Springe-Eldagsen

Tel. 05044 975-40  
Fax 05044 975-44  
E-Mail: [info@blowerdoor.de](mailto:info@blowerdoor.de)  
[www.blowerdoor.de](http://www.blowerdoor.de)