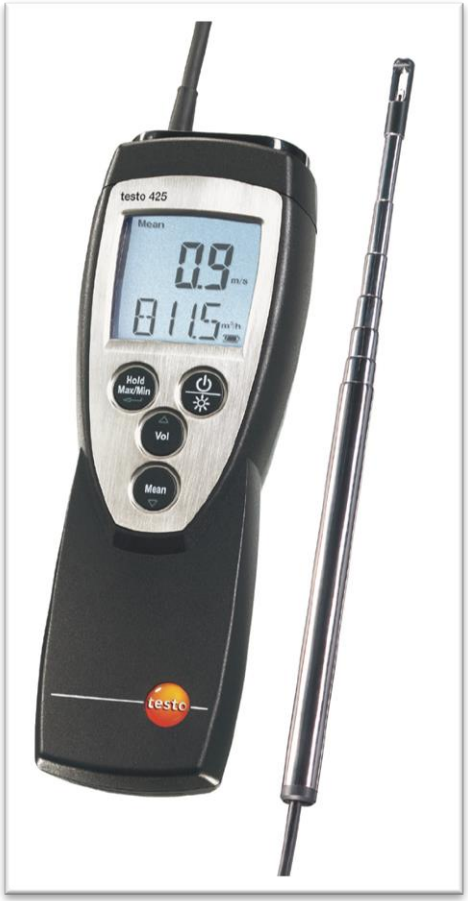
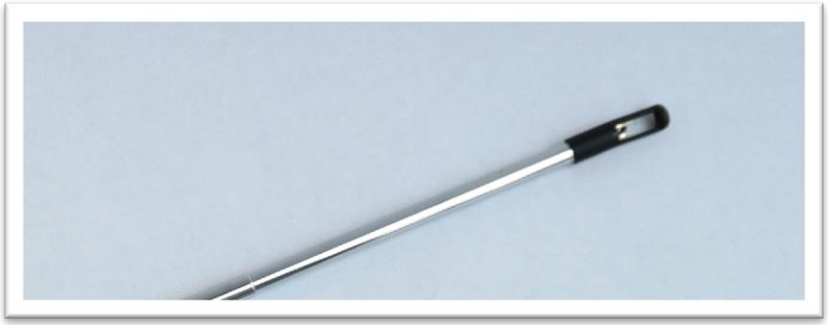
Leakage Detection with the Thermal Anemometer



A thermal anemometer is a flow meter (also air velocity meter). Since it can also be used for temperature measurement, it is excellently suited as a leak detection device within the scope of BlowerDoor measurement.

The thermal anemometer is primarily used for leakage detection to detect the presence of air currents.

The measuring principle of a thermal anemometer



The flow-sensitive sensor of the thermo-anemometer is temperature-dependent. It is heated to 100 °C by current flow.

Heat is extracted from the sensor by air flow,
a control circuit increases the heating current, keeping the temperature constant. The size of the control current is therefore a measure of the flow velocity.

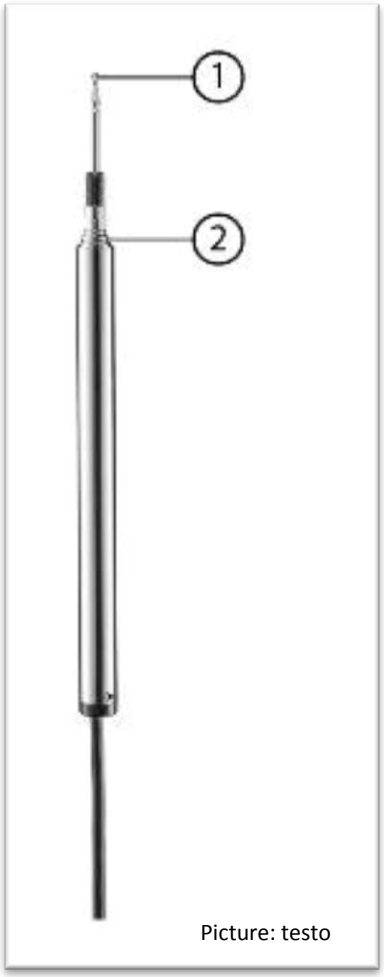
The standard measuring heads have the following characteristics:

- Heat ball probe
- Hot-wire probe

The anemometer with heat ball probe

The heated resistor is inside a metallic ball.

- Relatively long reaction time of approx. 4 seconds
- The ball head must be held freely in the air and must not touch any surface
- The ball head is direction-independent, i.e. sensitive to air flows from all directions
- Due to the small ball diameter, well suited for measurements in and near joints
- The temperature is measured about 1 to 2 cm below the ball in the rod

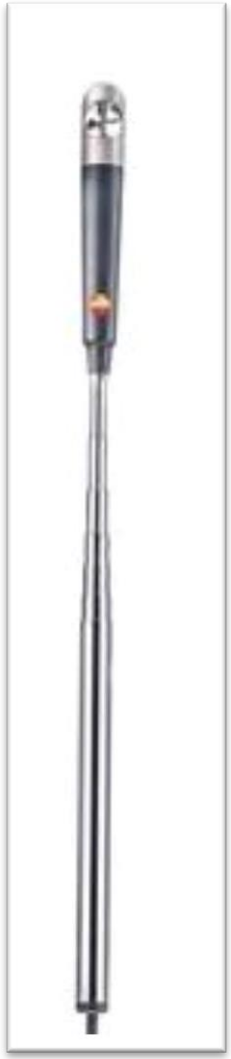


1 Flow Probe
2 Telescope

The anemometer with hot wire probe

The heated resistor is suspended freely from very thin wires within a protective construction. Due to its fast reaction time, it is well suited for the location of air leaks.

- Short response time (approx. 2 bit/second)
- Contact of the sensor with components is not possible
- Due to the protective housing, the inflow is only possible in a certain range (direction-dependent)
- The temperature is measured at the lower edge of the protective housing



Picture: testo

Leakage detection with the thermal anemometer

The flow velocity can be used to evaluate a leakage under consideration of certain influencing factors:

Size and geometry of the leakage

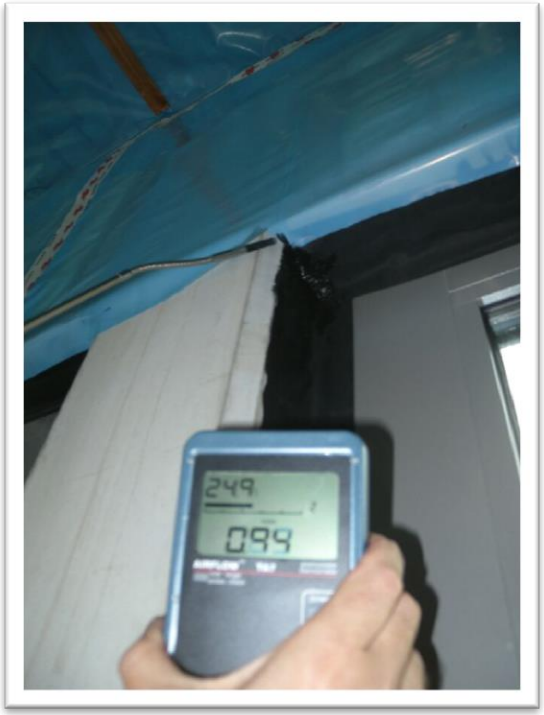
A high flow velocity at an orifice does not necessarily mean a high leakage volume flow and vice versa.

Distance between anemometer and leakage

The greater the distance between anemometer and leakage, the lower the flow velocity.

Position of the anemometer

If the air flows are very narrowly limited, even a small "change in location" of the sensor can lead to large changes in the indicated flow velocity.



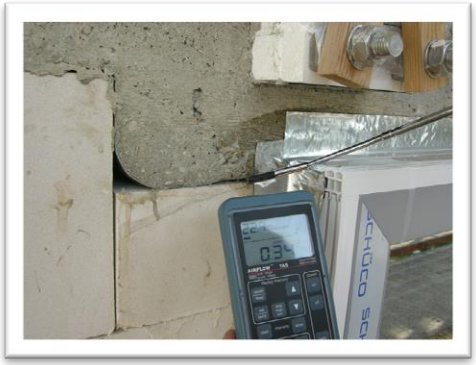
Leakage detection with the thermal anemometer

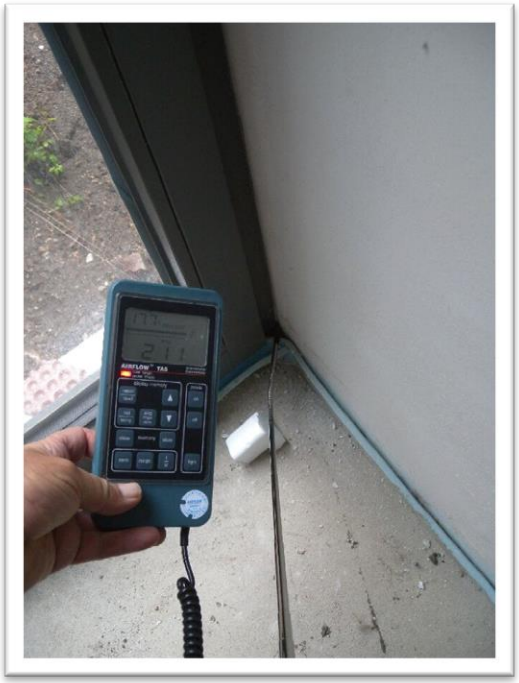
Temperature compensation with the air flow

The anemometer also needs the temperature of the air to determine the flow velocity (see measuring principle). Since the temperature is measured at a certain distance from the flow sensor, the associated temperature may not be recorded in narrow air flows. The flow velocity indicated by the anemometer is therefore not correct.

Reaction time of the anemometer

For a correct display of the flow velocity, the sensor must be held in the air flow for at least the duration of the reaction time.





Leakage detection with the thermal anemometer

The thermal anemometer is ideal for leak detection in residential buildings.

In larger non-residential buildings such as commercial halls or cold storage shelves, the thermo-anemometer is a useful supplement to leakage location with thermography: Any abnormalities in the thermogram can be specifically checked with the thermo-anemometer. Thus it can be clearly determined whether it is a thermal bridge or an air leakage, for example.

Literature

- Dr. Markus Renn: Hinweise zur Verwendung des Thermo-Anemometers bei der Leckagesuche, FLiB-Buch Band 1 „Gebäude-Luftdichtheit“ (2008, in German)