

## U-value measurement on a wall of unknown materials with the **testo 635**.



### **Find out what old walls are hiding.**

Calculating the U-value of an older building presents a measurement challenge: the walls are often made of unknown materials; it is difficult to measure their thickness; and the idea of drilling to take material samples can meet with scepticism or even refusal on the part of the owners. You can find out how using the testo 635 enables you to measure the U-value both reliably and precisely in such cases.

### **Bau-Expert Engineering Consultants**

The Engineering Consultants Bau-Expert from the Frankfurt/Main region of Germany provide consultation and diagnosis in cases of moisture damage and mould, constructional assessment reports, and comprehensive concepts for thermal renovation or other modernisation measures. The company's customers include housing societies as well as property management companies and private customers. building administrations and private customers.



The outside temperature is transmitted to the testo 635 by a wireless probe.



The U-value probe determines not only the temperature of the wall, but also the indoor room temperature.

### The challenge.

In order to be able to evaluate the heat insulating capacity of a building component (wall, door, window, etc.), it is necessary to know its heat transfer coefficient, the U-value. This is measured in  $W/(m^2K)$ , and results from the flow of heat transferred through 1 square metre ( $m^2$ ) of outer wall or window when it is 1 degree (in Kelvin = K, corresponds to 1 degree Celsius) colder outside than inside. The smaller the U-value, the lower the heat loss through the building component measured.

In order to obtain approximate values for this integral measurement value for building assessment, it can be sufficient to measure the thickness of the corresponding building component, determine the materials contained in it as closely as possible using a bore sample, and then take a standard value from a specific reference work.

However, this method involves a not inconsiderable level of inaccuracy, since an exact laboratory examination of the building materials is comparatively costly and time consuming, and as a result is only carried out very rarely.

So what is the answer if using the above mentioned method is simply not viable, yet as exact a U-value measurement as possible is still required? This was the problem presented to Martin Giebeler, the founder and owner of Bau-Expert Engineering Consultants, when he was required to create a renovation and modernisation concept for a building from 1970:

- The walls of the building were arranged in such a way that it was not easily possible to measure their thickness.
- A thermographic examination showed that the walls were of heterogeneous construction.
- The owners expressly stipulated that no boreholes were to be drilled.

In order to be able to carry out the U-value measurement under these difficult conditions, and plan the projected renovation measures without delay, Giebeler decided to use the U-value measuring instrument testo 635.



The different temperatures come together in the measuring instrument testo 635, and the U-value is calculated.



The development of the U-value can be followed in real time with the testo ComSoft software.

### The solution.

The wall whose U-value was to be measured pointed north – which is ideal for the measurement, as any solar irradiation can falsify the measurement result and should therefore be avoided. The measurement was carried out in February. The outdoor temperature was 3 °C; inside it was 24 °C. A low outside temperature and indoor heating are recommended, as there must be a difference of at least 15 Kelvin between the inside and outside temperatures – and the greater the difference, the more accurate the measurement result.

The outside temperature was transmitted to the measuring instrument via a wireless probe. Giebeler fitted the special three-wire U-value probe to the inside wall. The indoor room temperature was recorded by a temperature sensor directly integrated into the U-value probe's plug. After the start of the measurement, the three measurement values were transferred to the testo 635 at a measurement rate of one second. The specialists from Bau-Expert were able to follow the detailed measurement curve graphically and as a time progression via the testo ComSoft software installed on the connected laptop.

After a longer measurement duration of over 90 minutes, it was possible to record stable temperature values and calculate the U-value. In fluctuating ambient conditions, and if the measurement site permits it, it is recommended that the measurement should be allowed to run overnight.

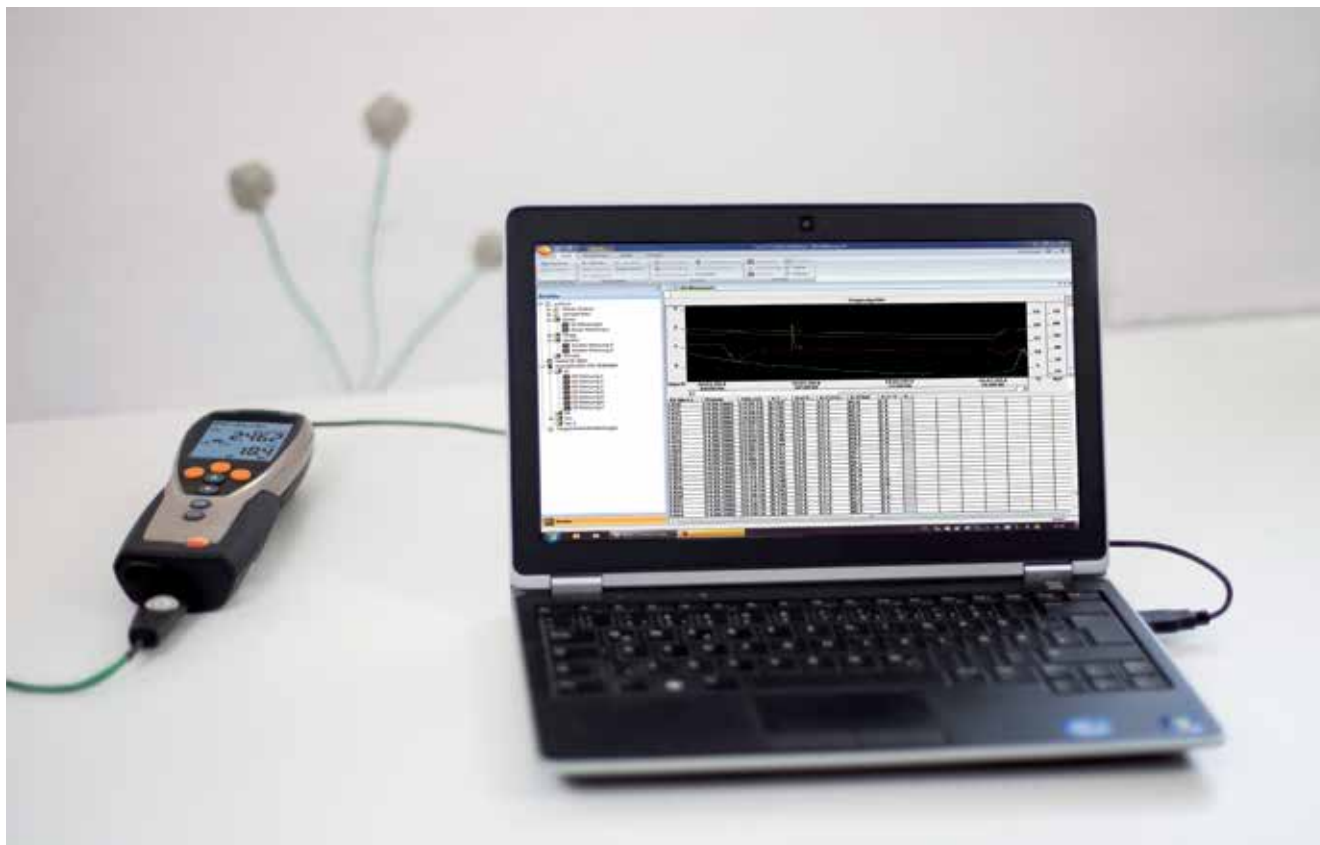
At 1.4 W/(m<sup>2</sup>K), the U-value was in this case far in excess of the usual values, and was in fact even worse than previously assumed (outer walls with modern insulation usually have a U-value of around  $\leq 0.24$  W/(m<sup>2</sup>K)). This information allowed a well-founded renovation concept to be created.

“Knowing the heat insulation properties of building components is important not only for evaluating mould, but also for planning modernisation. Numerical simulation is very complicated, and a building material catalog only provides guideline values. We prefer measuring with the testo 635, especially when the materials in the wall are unknown. The multi-wire temperature probe, the wireless probe and the graphic presentation of the measurement progression make recording easier and more accurate.”

Dipl. Ing. Martin Giebeler, Owner,  
BAU-EXPERT Engineering Consultants

### The advantages.

Using the testo 635, Martin Giebeler from Bau-Expert was easily able to measure the U-value of a wall of unknown materials – reliably, precisely and without needing to damage the building substance by drilling boreholes. The measuring instrument and the probes were intuitive to handle, and the visualisation of the measurement values in the testo Com-Soft software supported the measurement efficiently, laying the foundation for the creation of a modernisation concept.



**U-value measurement with the testo 635 – all advantages at a glance:**

- Easy attachment of the probes – even on difficult-to-access components
- Easy analysis by software
- Proof of service thanks to report creation

**More information.**

More information on U-value measurement and answers to all your questions regarding measurement solutions for the evaluation of buildings call us 01420 544433