

### Summary Case Study quarry stone wall

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Summary by: greenTEG

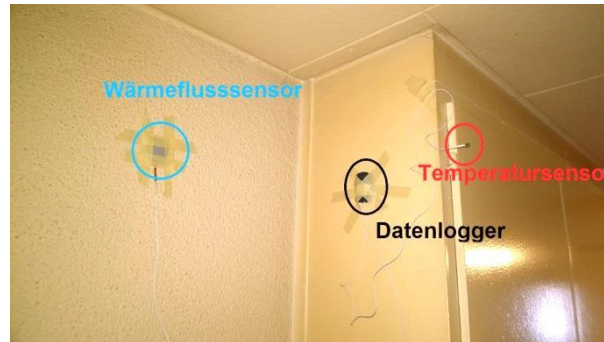


Figure 1 Inside experiment setup

Within the scope of a master's thesis the U-Values of two outside-facing walls, consisting of quarry stones, got measured using the gSKIN® U-Value Kit from greenTEG. The first wall has a thickness of 0,55m and the second one 0,70m.

In regard to the execution of the measurement two conditions had to be fulfilled according to the ISO 9869. Firstly, the duration must be at least 72 hours and secondly, the U-Value must not deviate more than  $\pm 5\%$  from the value obtained 24 hours earlier. The verification of both conditions is calculated automatically by the software.

Regarding the ISO-9869-1 the U-Value must converge to an asymptotic value during the measurement. This was only reflected in the first component while measuring a U-Value of  $1.72 \text{ W/m}^2\text{K}$ . For comparison, simulations with the software WUFI® were carried out. For this, a wall component with the same stone layers (lime plaster, natural stone, lime plaster) got modelled. The climate data came from a weather station which resembles the location of the measurement spot. The simulated U-Value is  $2.03$ . According to the ISO-9869, the differences between measured and calculated U-Values are significant if they differ more than 20%. In this case they differed by only 15%.

The measurement of the second component was executed in early May and suffered from high outside temperature. The result does not match the stringent conditions given in the ISO. Therefore a correction method is given in ISO-9869, which was applied to this case. The measured U-Value was  $0.87 \text{ W/m}^2\text{K}$  and the corrected value was  $0.72 \text{ W/m}^2\text{K}$ . In comparison, the simulated value was  $0.96 \text{ W/m}^2$ .

The measurements took place between the 20<sup>th</sup> April of and 4<sup>th</sup> of May. Therefore the non-constant climate conditions and the high outside temperatures during this time could result in the difference between measurement and simulation.



Furthermore, the climate conditions should remain constant, as the measurement method according to 9869 is based on stationary heat processes. In particular, it should be warmer inside the building, as is normally the case in autumn or winter.

Summarizing, it can be said that the gSKIN® U-Value Kit from greenTEG is a good instrument for measurement of U-Values. It is easy to use and the results were good even when the climate conditions were not the best. This device can be very helpful during the planning of an energetic renovation of a building.