

# QUALITY SYSTEM FOR AIRTIGHTNESS MEASUREMENT OF BUILDINGS

Oliver Solcher

*Fachverband Luftdichtheit im Bauwesen e.V.,  
Wissenschafts- und Technologiepark, Berlin Adlershof, Kekuléstraße 2-4, 12489 Berlin, Deutschland,  
Tel: +49 (0) 30 / 6392 - 5394, Fax: +49 (0) 30 / 6392 - 5396, E-Mail: info@flib.de, www.flib.de*

## **ABSTRACT**

In 2002 the Association for Air Tightness in Buildings (FLiB e. V.) established a certification procedure for airtightness testers in Germany. As airtightness tests are part of national implementation of EPBD but no qualification requirements for testers are defined FLiB e. V. took the lead and defined a procedure.

Part of the certification procedure is the proof of knowledge of airtightness testing. The tester shall be engineer, technician or a master craftsman. Furthermore the ability of testing must be proven by sending 5 test protocols acc. EN 13829 or by attending a FLiB approved education program.

The FLiB certification is recognised of several funding organisations in Germany that make it mandatory to have the airtightness test been performed by a certified tester as e.g. a tester with FLiB certificate.

## **KEYWORDS**

Certification, airtightness measurement, round robin test, leakage tester

## **INTRODUCTION**

With the EnEV 2002 the national implementation of EPBD airtightness of new buildings should not exceed certain values. The test shall be performed acc. EN 13289 without any qualification requirement for the tester.

The Association for Air Tightness in Buildings (FLiB e.V.) had worked out the qualification program before so with start of EnEV 2002 FLiB e.V. started its certification program for airtightness testers.

## NECESSITY OF CERTIFICATION

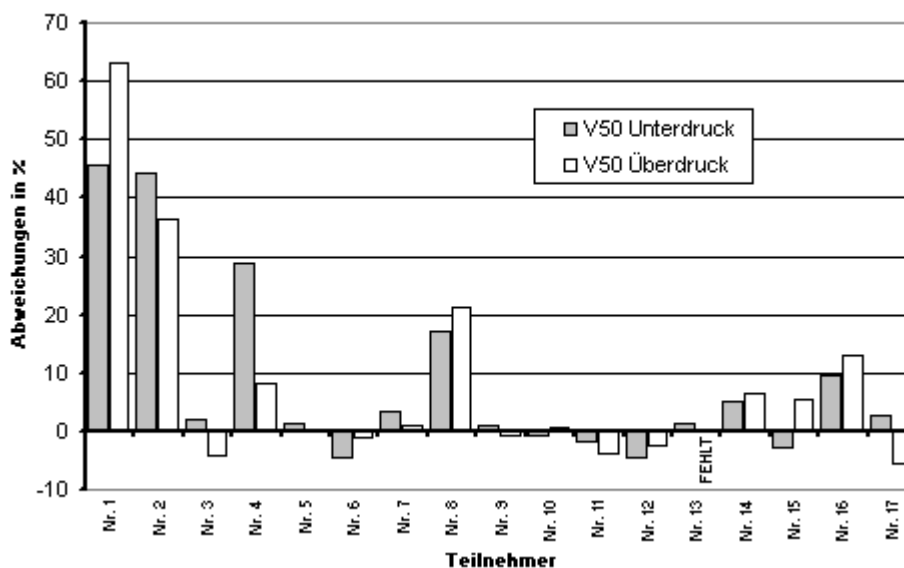


Figure 2. Variation of Leakage airflow during a round robin test [1]

The goal of certification of airtightness testers is to have unified test results that are comparable and reproducible. As different preparation of the building, calculation of the volume or handling of the test units produces different test results on the same building it is necessary to perform the test the same/right way in order to have reliable test results.

Especially for heating and energy demand calculations correct figures are needed, as a wrong  $n_{50}$ -value might lead to a false classification of the building or a wrong dimension of the heating system.

FLiB is working for several years to establish a checklist for building preparation as basis for leakage tests acc. EN 13829.

## EDUCATION OF TESTERS

As tests shall be performed according to the standards the testers must be able to understand how a building must be prepared and under which conditions the test must be performed to produce the needed figures.

To be able to pass the certification process of FLiB, leakage testers shall have a technical education as engineer, technician or master craftsman. Although there is a way for those to be certified who took a side entry to airtightness testing via a reasoned request to the examination board.

Testers shall proof their testing ability. There are two ways to do so. The easiest is to send 5 test reports acc. EN 13829 to the examination board. If those reports meet the requirements of the standard the tester is allowed to participate at the certification procedure.

The second way to proof their testing ability is to attend a FLiB approved education program.

## FLiB approved education

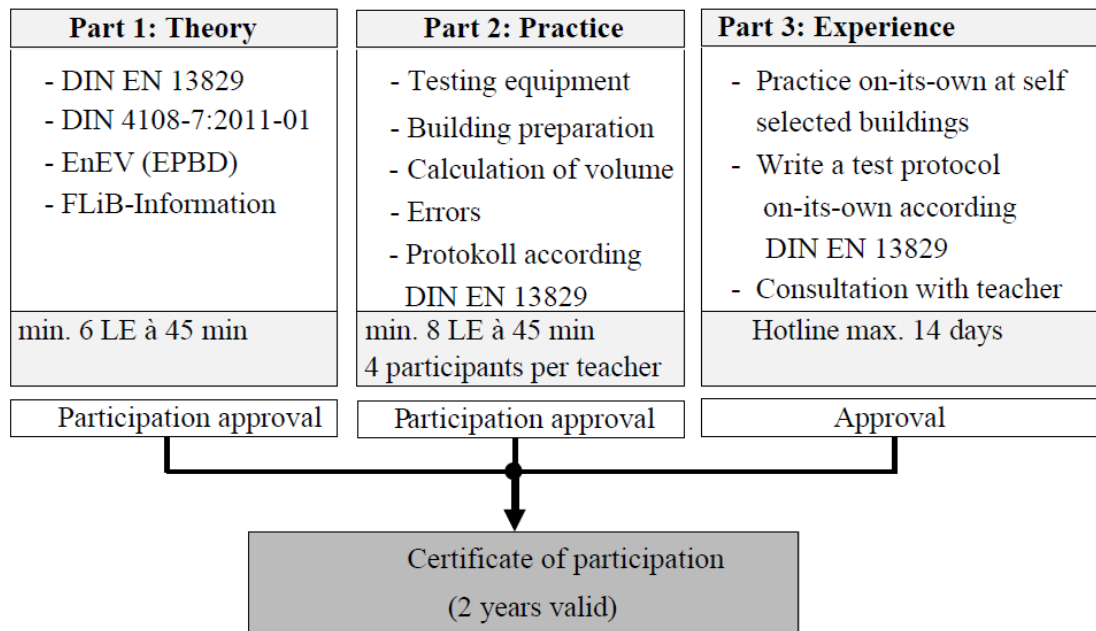


Figure 2. FLiB approved education

In Germany we have three training facilities that have the FLiB approval: Energie und Umweltzentrum (euz) in Springe (since 2003), Zentrum für umweltbewusstes Bauen (ZUB) in Kassel (since 2003) and Kerschsteiner Schule in Reutlingen (since 2011).

### CERTIFICATION

Certification procedure contains of two parts:

- Theoretical test
- Practical test

Certificate can only be issued if both parts were past.

#### Theoretical test

Test contains around 30 questions, partly multiple choices. The questions are about the following themes:

- Part of the building that needs to be tested
- Convenient time of testing
- Building preparation
- Requirements on weather conditions
- Test procedure
- Test equipment
- Function and inspection of test equipment
- Limitation and error possibility of the used test equipment
- Layer and sections of air tightness
- What must be checked - what could go wrong during test?
- Necessity of building inspection
- Evaluation of leakages
- Test report

- Calculation of building volume
- Specifications  $n_{50}$ ,  $q_{50}$ ,  $w_{50}$ ,
- Standards
- FLiB-Information to EN 13289
- Knowledge of typical errors and its sources
- How to avoid systemic errors
- Knowledge of its own limitation
- Basic knowledge of building physics to humidity, dew point, etc.

Test is performed usually direct before practical test under the survey of the commissioner and one attendant. Testers must have 60 % of the available points to pass the test. The test is checked from the commissioner and one member of the examination board. In critical cases a third check is performed.

### **Practical test**

The practical test is performed at a building or part of a building one tester at the time. The tester received the buildings drawings in advance to prepare the volume calculation. The tester shall bring its own equipment; test can be performed with any available and usable measuring device. The commissioner interviews the tester during he/she performs the test. The tester shall show that he is able to work with his/her test equipment, to prepare the building all right and to find the leakage by performing a leakage test. The commissioner judges the test quality and the testing ability of the tester.

### **Recertification**

The certificate is valid for 3 years. It can be extended for 3 more years each time. The request must be send to the examination board with a proof of their ability. This can be:

- Attendance at a seminar
  - Advanced education
  - Training
  - Symposium
- Seending in 5 test protocols according EN 13829

### **CERTIFICATION IN THE FUTURE**

Some other certification procedures have been established in Germany after the FLiB but FLiB certification is one with a very high reputation. .So it's recognised of several funding organisations in Germany that make it mandatory to have an airtightness test been performed by a certified tester such as a tester with FLiB certificate.

Other certificates are available: Some are given out after a short education from some manufactures. Some others are more sophisticated and follow the rules that have been established by the FLiB.

To give an overview of certification procedures that produce well educated leakage testers FLiB e.V. decided to check out other systems. To have an independent classification of the different certificates, other certification institutes can have their certification procedure been checked by the FLiB e.V.. In case the procedure meets the standards set by FLiB testers are able to recertify at the FLiB.

## **FIGURES**

Since 2002 150 FLiB certificates have been passed out. The figures varied over the years and in 2010/11 there is a strong increase in requests. Certification procedure costs are about 1.900,- EUR including the education program at the training facilities; certification alone is 770,- EUR.

## **CONCLUSION**

As neither the leakage test nor a certified leakage tester is mandatory in Germany but test results still vary a lot (see above) FLiB feels there is still a lot work to do in achieving a good testing ability of leakage testers. FLiB-certification is a good way in securing well educated leakage testers.

Certified testers are often requested as legal experts as testing building leakage, giving a dependable report on the test and to identify the quality of the building needs more than the ability to run a test program.

In certifying and recertifying process testers are checked over the years and give a very positive response when discussing the given test protocols with the examination board. A lot of knowledge is lost or buried over the years of constant testing and to have somebody else looking its work over is appreciated a lot.

## **REFERENCES**

- [1] S. Rolfsmeier, K. Vogel, T. Bolender, Ringversuche zu Luftdurchlässigkeitsmessungen vom Fachverband Luftdichtheit im Bauwesen e.V. - Round robin tests to leakage tests in buildings of Association for Air Tightness in Buildings (FLiB e. V.)

