

# Status and trends in competent tester schemes - the Czech Republic

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ASOCIACE  
BLOWER DOOR\_CZ



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## situation

### airtightness requirements

- CSN 73 0540-2
- TNI 73 0329
- TNI 73 0330

compliance  
check  
not  
required

- EP programme  
„Green savings“

### test procedures

- CSN EN 13829
- no official guidelines  
beyond CSN EN 13829
- sampling method for  
multifamily resid. buildings  
(TNI 73 0330)



- no official intention to control the reliability of test results
- **no competent tester scheme**

➔ request for a quality guarantee x risk of incorrect practice

## Association Blower Door CZ (A.BD.CZ)



[www.asociaceblowerdoor.cz](http://www.asociaceblowerdoor.cz)

41 technicians

22 companies

2 companies accredited



- supervision and quality control of the professional activities of the members
- support of knowledge exchange and lifelong learning of the members
- development of measuring procedures and their implementation
- cooperation with state authorities

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## A.BD.CZ - control of tester competence

- members obligations:
    - observation of ethical code required
    - violations of ethical code = disciplinary procedure
    - observation of internal guidelines for test procedure...
    - **mandatory participation to round-robin tests**
- ↓
- membership plays a role of a competent tester scheme...

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## ensuring reliability of test results

- airtightness testing in the framework of EP programme Green Savings (cooperatin with state authorities)



- detailed gudelines specifying the test procedure beyond EN 13829
- common form of test report

|    |                                     |                      |                    |                  |           |
|----|-------------------------------------|----------------------|--------------------|------------------|-----------|
| 14 |                                     |                      |                    |                  |           |
| 15 |                                     |                      |                    |                  |           |
| 16 |                                     |                      |                    |                  |           |
| 17 |                                     |                      |                    |                  |           |
| 18 |                                     |                      |                    |                  |           |
| 19 |                                     |                      |                    |                  |           |
| 20 | podrobné provedení měření tlaku     | AP                   | test               |                  |           |
| 21 | podrobné provedení měření tlaku     | AP                   | test               |                  |           |
| 22 |                                     |                      |                    |                  |           |
| 23 | <b>měření zařazení</b>              |                      |                    |                  |           |
| 24 | úroveň                              |                      |                    |                  |           |
| 25 | úroveň                              |                      |                    |                  |           |
| 26 | úroveň                              |                      |                    |                  |           |
| 27 |                                     |                      |                    |                  |           |
| 28 | <b>příprava budovy před měřením</b> |                      |                    |                  |           |
| 29 | průvzdušnost podle ČSN EN 13829     |                      |                    |                  |           |
| 30 | podrobnosti od autorizované osoby   |                      |                    |                  |           |
| 31 |                                     |                      |                    |                  |           |
| 32 |                                     |                      |                    |                  |           |
| 33 |                                     |                      |                    |                  |           |
| 34 |                                     |                      |                    |                  |           |
| 35 | prvek                               | plánováno v projektu | provedeno v budově | zodpovědná osoba | kommentář |
| 36 | průvzdušnost                        |                      |                    |                  |           |
| 37 | průvzdušnost                        |                      |                    |                  |           |
| 38 | průvzdušnost                        |                      |                    |                  |           |
| 39 | průvzdušnost                        |                      |                    |                  |           |
| 40 | průvzdušnost                        |                      |                    |                  |           |
| 41 | průvzdušnost                        |                      |                    |                  |           |
| 42 | průvzdušnost                        |                      |                    |                  |           |
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| 48 | průvzdušnost                        |                      |                    |                  |           |
| 49 | průvzdušnost                        |                      |                    |                  |           |
| 50 | průvzdušnost                        |                      |                    |                  |           |
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| 55 | průvzdušnost                        |                      |                    |                  |           |
| 56 | průvzdušnost                        |                      |                    |                  |           |
| 57 | průvzdušnost                        |                      |                    |                  |           |

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## round-robin tests

- comparison of test results given by:
  - different technicians
  - different measuring devices
  - under similar conditions



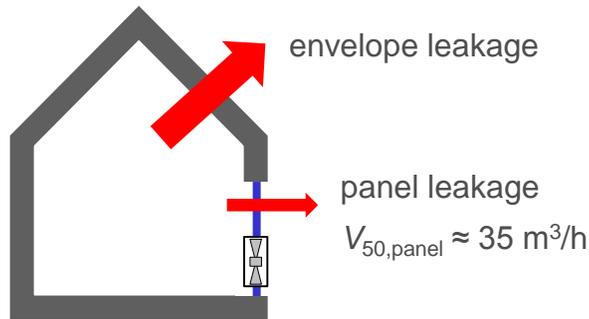
- control of the equipment...
- control of the technicians competence
- rough estimation of reproducibility of test results
- ... good mean to understand the source and nature of measurement errors



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## round-robin tests - equipment control

- leaky blower door panel

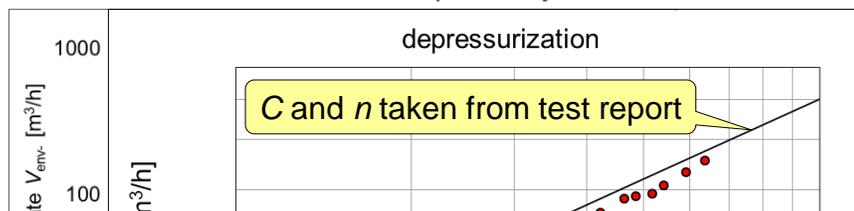


- standard single-family house:  $V \approx 400 \text{ m}^3$
- error in  $n_{50}$  due to panel leakage:  $\delta_{n_{50}} \approx 0,09 \text{ h}^{-1}$

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## round-robin tests - equipment control

- an error in test evaluation – probably a software error



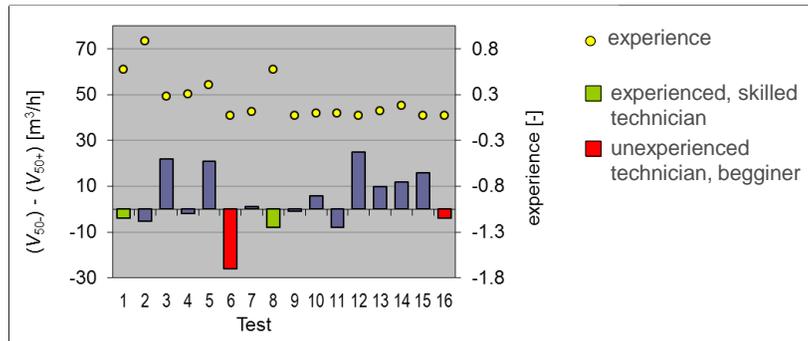
**1 accredited company (CSN EN ISO 17025) uses a measuring device with this sw!  
(limits of accreditation process...)**

— linear regression      • measured data

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## round-robin tests - competence control

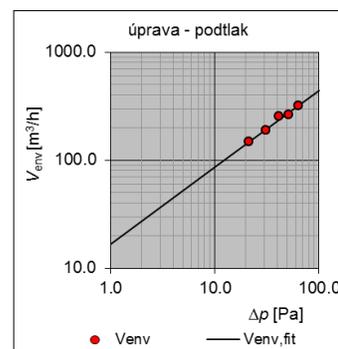
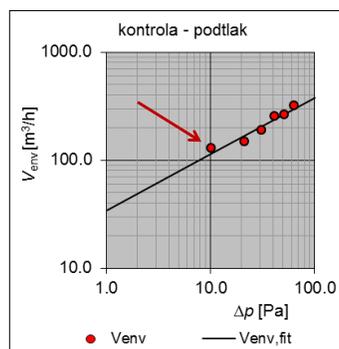
- influence of technicians skills on the test results
- assumptions:
  - competence and skills grow with experience
  - experience grows in time and with the number of tests



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## round-robin tests - competence control

- evaluation of test reports - lack of knowledge:
  - values out of physical limits (e.g.  $n < 0.5$ )
  - zero-flow  $\Delta p$  limits exceeded
  - outlying points



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## round-robin tests - results



measured air flow rate  $V_{50}$  [m<sup>3</sup>/h]:

|                           | 2010       | 2012       |
|---------------------------|------------|------------|
| min. value                | 231        | 254        |
| <b>average value</b>      | <b>250</b> | <b>277</b> |
| max. value                | 285        | 304        |
| <b>standard deviation</b> | <b>20</b>  | <b>15</b>  |

- rough estimation of reproducibility:  $\pm$  OK...
- control of equipment: questionable
- test results may be influenced by changing conditions
- conditions are similar, but still changing...

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## lessons learnt

- common form of test report:
  - easy check (can be automated)
  - easy data collection (database)
- control of equipment
  - pressure gauges calibration– necessary but not sufficient
  - other parts of measuring apparatus should be checked as well (including sw)
  - influence of changing climatic conditions should be avoided (round robin in lab. conditions)

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## lessons learnt

- control of technicians competence:
  - control of practical execution of a test (skills)
  - control of evaluation of measured data

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## quality control scheme

- certification of persons (technicians)
- certification body – A.BD.CZ + independent third party
  - the third party examines the competence of the applicant
  - A.BD.CZ confers its certificate („mark“) to the successful applicant
- the validity of the certificate will be limited in time (recertification necessary)
- the third party – VÚPS Certifikační společnost s.r.o.:



- accredited certification body
- accredited laboratory – airtightness testing of building components

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## quality control scheme

- 1st certification:
  - evaluation of test reports
  - examination – theoretical background
  - examination – practical competence
  - proof of equipment calibration
- recertification:
  - evaluation of test reports
  - examination – practical competence (random control at building site)
  - participation to the round-robin test (in a laboratory facility?)
  - proof of equipment calibration

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## quality control scheme

- other obligations (the same as the A.BD.CZ membership):
  - observation of ethical code
  - observation of test procedure guidelines
  - use of the common test report form
  - supply the test results to a database

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## conclusions

- consistent quality of testing practice and reliable results need
  - well defined rules - test procedures
  - control of compliance with the rules – a competent tester scheme
- the competent tester scheme proposal:
  - provides with detailed guidelines
  - covers the important aspects of quality control (equipment, practical skills, knowledge, follow up, ...)
- barriers to its implementation:
  - it is an ambitious project...
  - its credibility is not guaranteed by state authorities...
  - how to convince the market that it represents real quality?
  - no training programme...

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thank you for your attention...

...questions?

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