# Klimaskaerm

# Competent tester scheme in Denmark

## Status and trends

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## What is Klimaskaerm?

- The Danish association for testing of building performance especially Air Tigtness Testing and Meassurement
- Independent non profit association with limited resources
- Founded 2006
- 50 member companies (surveyeing companies, testing equipment suppliers, manufacturers, institutes)
- Platform and society for the testing of building envelope with blowerdoor and/or infared camera
- Located at the Danish Construction Association in Copenhagen, Denmark
- Homepage www.klimaskaerm.dk

## Klimaskaerm - Areas of interest

- Building performance
- Airtightnes mesurement and dokumentation
- Infrared mesurement, interpretation and dokumentation
- Thermal performance of buildings
- Leakages in buildings
- Performance and protection of the envelope as a whole
- Quality Assurance of testing



## Klimaskaerm - Main activities

- Give third party information on building airtightness, thermal performance and testing as a whole
- Seminars, trainingcourses and education of testers
- Member metings
  - Communicate experience regarding testing
  - Forum for discussion and exchange of views and ideas to improve testing and quality of testing
  - Yearly held conference
- Develop tools (guidelines) for the administration of tests and quality assurance

## Klimaskaerm – Mission

- To achieve and promote the highest standards of air tightness testing in DK
- Platform for testing procedure, methodologies and information exchange
- Undertake training of testers
- Provide Good Practice testing and technical guidance
- Give information regarding airtightness testing for the public, builders, contractors, consultants, designers (architects) etc
- Platform for the registration and accumulation of airtightness data of buildings in DK



## What have Klimaskaerm achieved 2014?

- Paradigms (guidelines) preparred for
  - Quality assurance manual for the surveyer company
  - The testing with Blowerdoor in compliance with EN13829 for smal buildings, large buildings and passive houses (3 paradigms incl. common test reporting)
  - Local Authority handling of tested building airthigtnes and reports
- Prepared and executed a education programme for the certification of testers
- Prepared and promoted qualifikation and qualification procedures
- Prepared system for the registration and reporting of tests done and providing a database

## How to become a certified leakage tester

- Certification of air tighness testing is possible in DK through Byggeriets Kvalitetskontrol, Danish Standard Certification (DNV GL Business Assurance Denmark) or Bureau Veritas
- The tester company need to establish a quality system (manual) specific for testing in accordance with EN 13829
- The tester is certified on basis of
  - Proof of knowledge (certificate)
  - Examination of practical competence (knowdlege and experience)
  - Proof of equipment calibration



## What is Byggeriets Kvalitetskontrol?

- The Quality Assurance & Certification for Building and Construction in Denmark certifies businesses within the Danish building and construction sector.
- The certification is conducted in accordance with either ISO-standards or Danish national regulations and encompasses:
  - Authorisations
  - Voluntary quality schemes
  - Schemes for energy marking or review reports for buildings, e.g. air tightness tests

## The Certification process

- The company contact the an accredited auditor and enter a written certification agreement
- The company prepare a Quality Assurance System targeted for certification of air tightness testing in accordance with EN 13829
- The company submit its Quality Assurance System to the auditor
- The auditor evaluates the company Quality Assurance System and when appropriate, an audit of the company is executed
- When the Quality Assurance System is implemented an certification audit of the company, the testers knowledge, experience and equipment calibration and evaluation of selected reports will take place
- A certificate with a validity of 3 years shall be issued to companies that implement certification audit with a positive result



## Surveillance audit and recertification

- Within the next two years a conducted surveillance audit of the company will take place at intervals of 12 months
- After 3 years a full recertification of the company is nessasary

**Note**

The certification is voluntary and therefor not mandatory in Danish Building Regulation

## Kilmaskaerm - Training of testers is the key

To become a certified tester

- A tester must attend 2 day intensive course to understand the teoretical background of air tightness, building performance and testing
- A tester need to pass
  - a multichoise test to prove his understanding of air tightness
  - a practical test to prove his ability to perform a test in the right way and to handle his own equipment for the testing
- A tester must attend a recertification course and pass a new multichoise test every 3 years

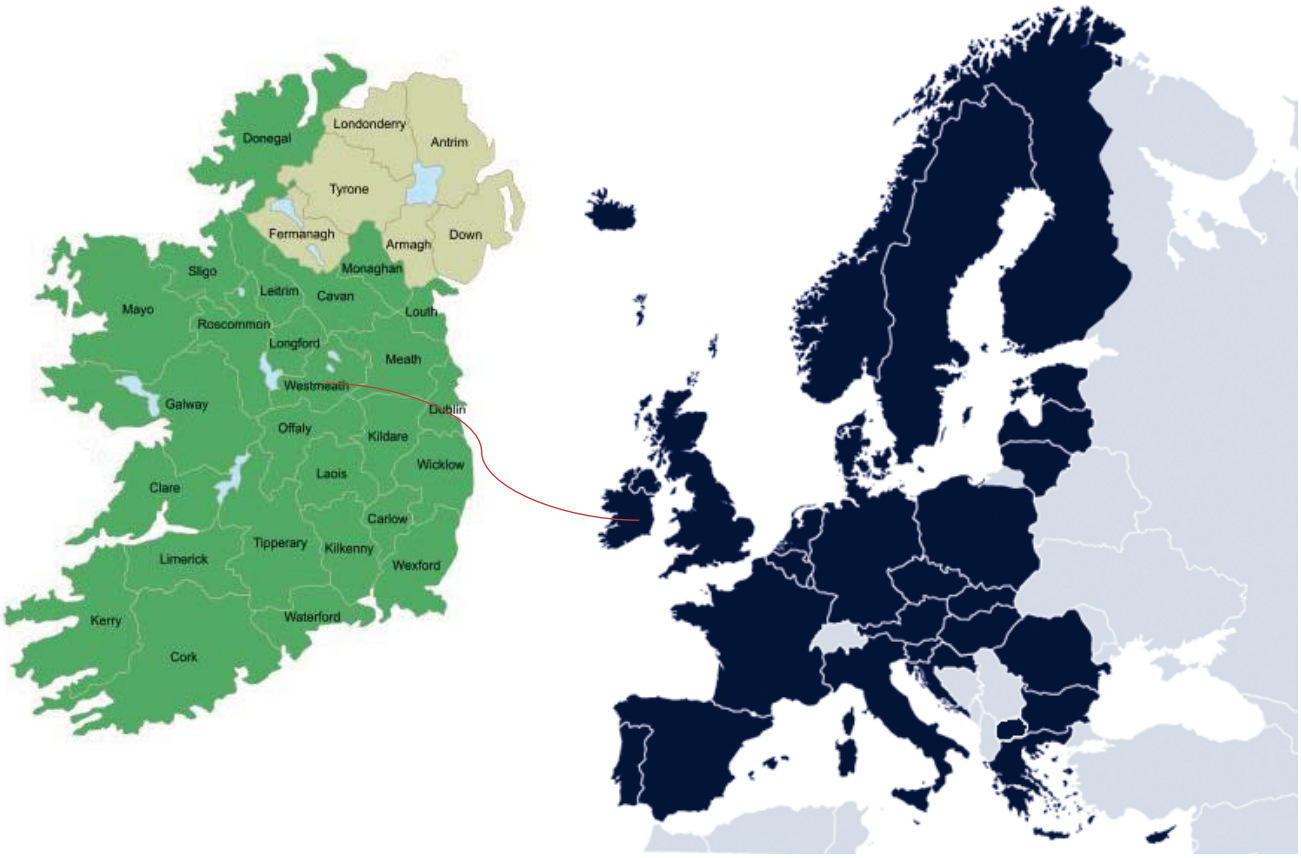


## Status

- Paradigms established to support the EN 13829
- Courses prepared and executed with succes
- 30 of 50 members have by now atended basic courses
- 10 members have been audited and are certified by 3rd party e.g. The Quality Assurance & Certification for Building and Construction in Denmark
- Discussions with Danish Energy Agency and Danish Building Research Institute on how to improve the quality of the testing of air tightness

# Webinar, 20th November 2014 – Airtightness testing Part 3: Status & trends in competent tester schemes in Denmark, Ireland and Sweden

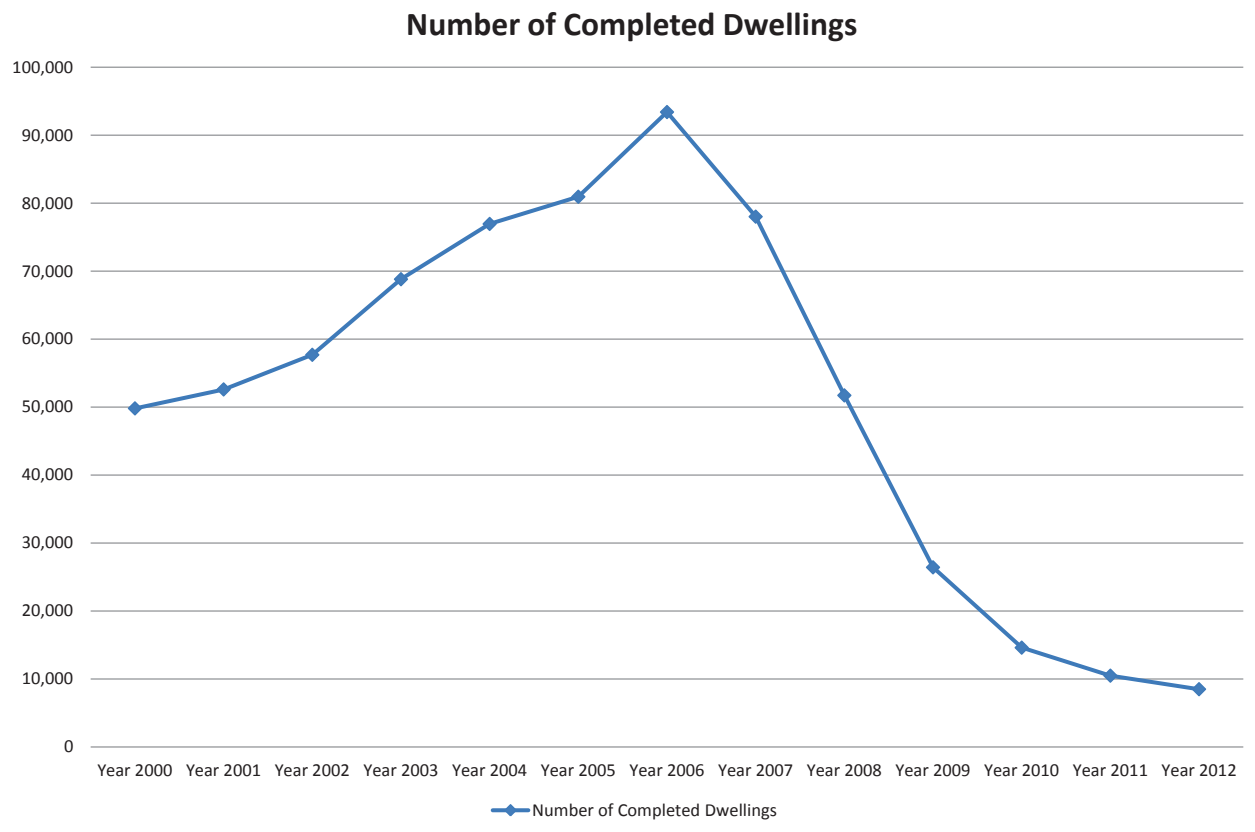
Mark A. Shirley, 2eva.ie



The National Building Regulations in Ireland are administered by the Department of Environment, Community and Development who through the Planning Standards section devise and implement the Building Regulations.

The Republic of Ireland is a relatively small island nation of 4.6 million persons and the
Building Regulations are set at a National level with no ability for regional variations.

Along with the rest of our economy the Construction Industry collapsed in 2007/08 - but due the over-reliance at that time on Construction the industry was hit very badly.

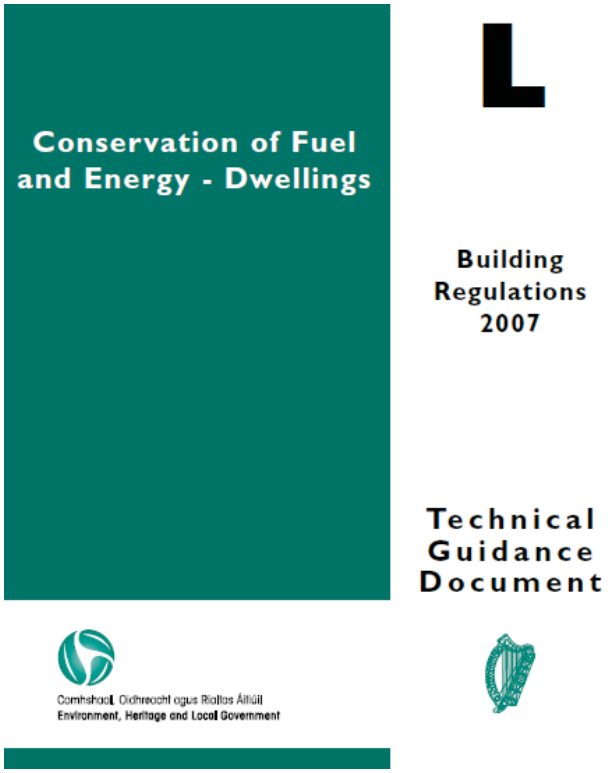


The authorities have since 2007 significantly improved the Building Regulations across all Parts which has coincided with the collapse of the Industry.

This has included recognition of Ireland's obligations under various EU laws including the EPBD and NZEBs.

It is part of a more than 10 year process towards 2020.

Air tightness up to 2008 was an aspiration but became <u>mandatory</u> with the 2008 Building Regulations and is covered under Part (L) Conservation of Fuel & Energy - Dwellings




The 2008 regulations set

*'a performance level of 10m³/(h.m²) represents a reasonable upper limit for air permeability'*

*Therefore the air permeability rate (q50) is the National Standard.*

| *Table 4* **Number of pressure tests per dwelling type** | |
|---|---|
| Number of units | Number of tests |
| 4 or less | One test |
| Greater than 4, but equal or less than 40 | Two tests |
| Greater than 40, but equal or less than 100 | At least 5% of the dwelling type |
| More than 100 | |
| (a) where the first five tests achieve the design air permeability | At least 2% (for dwellings in excess of first 100 units) |
| (b) where one or more of first five tests do not achieve the design air permeability | At least 5% of units, until 5 successful consecutive tests are achieved, 2% thereafter |

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All dwellings in Ireland now must be built to the 2011 Building Regulations.

*'a performance level of 7 $m^3/(h.m^2)$ represents a reasonable upper limit for air permeability'*

***'Where an air permeability value better*** *than the backstop value of 7 $m^3/(h.m^2)$ at 50 Pascals is claimed for use in DEAP, a test should be performed on each dwelling claiming that value'*

In other words for the EPBD calculation if the basis of the it is better than 7 $m^3/(h.m^2)$ then each and every dwelling must be tested.

There are 2 other important points relevant to air tightness in the Regulations:

'The tests should be carried out by a person certified by an <u>independent</u> third party to carry out this work,
e.g. National Standards Authority of Ireland certified or equivalent.'

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**Register of Airtight Testers**

I.S. EN 13829:2000 - Thermal Performance of Buildings - Determination of Air Permeability of Domestic Buildings – Fan Pressurization Method.

| Company Name | County | File Number | Certified Air Tightness Tester<br>Company Contact |
|---|---|---|---|
| Greenbuild Energy Rating & Building Information T/A Greenbuild | Co. Wexford | 1.91.003 | Gavin O'Sé<br>contact@greenbuild.ie |
| 2Eva.ie | Co. Carlow | 1.91.006 | Mark A. Shirley<br>mas@2eva.ie |
| Bercerts.ie | Co. Meath | 1.91.007 | Joe Kearney<br>joseph@bercerts.ie |
| Annaholty Energy and Engineering Service | Co. Clare | 1.91.008 | John Hickey<br>annaholtyenergy@yahoo.ie |
| Navitus Ltd | Dublin 15 | 1.91.009 | Oliver Walsh<br>ollie@navitus.ie |
| Irish Energy Assessors | Co. Sligo | 1.91.010 | Martin Cooney<br>info@irishenergyassessors.com |
| Clean Energy Ireland Ltd | Co. Cork | 1.91.011 | Con Dempsey<br>Con@cleanenergyireland.ie |
| Newtown Energy | Co. Wexford | 1.91.012 | Seamus McQuaid<br>info@newtownenergy.ie |
| Gilroy Energy Services | Co. Sligo | 1.91.013 | Donal Gilroy<br>donal@gilroyenergy.ie |
| Sheehan Energy Services | Co. Kerry | 1.91.017 | Bernard Sheehan<br>bernard@airtightnesstesting.ie |
| Evolved Energy Solutions Ltd | Co. Dublin | 1.91.019 | Brian Sweeney<br>brian@evolvedenergy.ie |
| ABUILD | Co. Donegal | 1.91.022 | John Curran<br>info@abuild.ie |
| 2EVA.IE | Co. Clare | 1.91.023 | Eoin McGann<br>emg@2eva.ie |

# Competent Tester Scheme in Ireland – currently a total of 13 registered testers.

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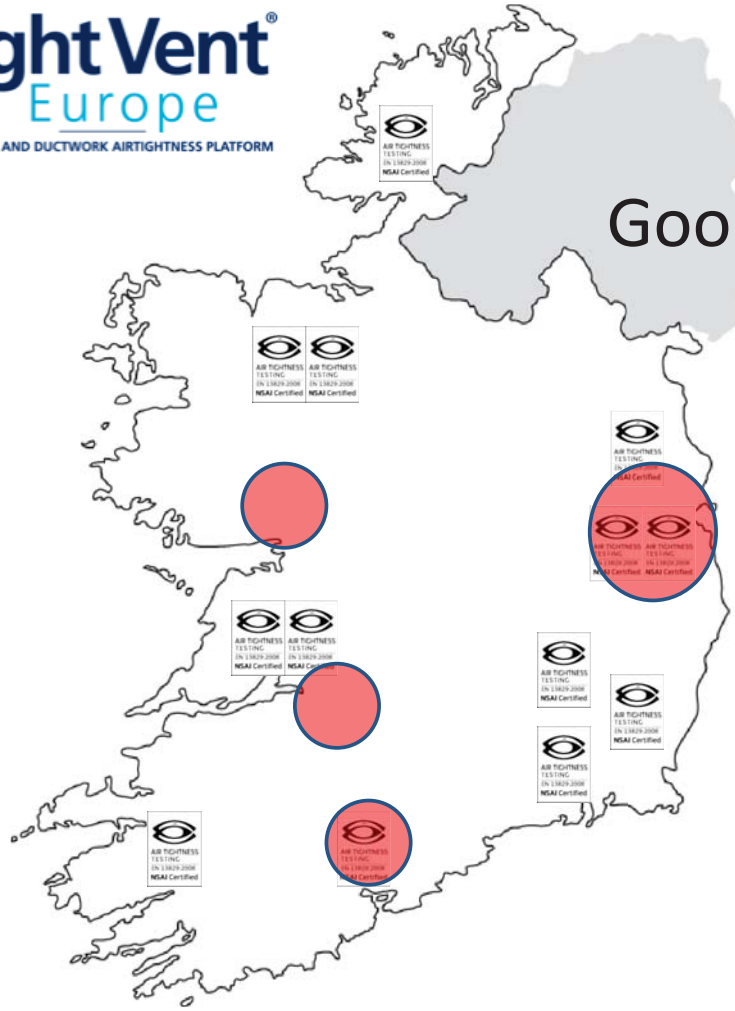

## Good geographical distribution

AIR TIGHTNESS TESTING
EN 13829:2008
**NSAI** Certified

## Fees and further information

For further information or an application form for on this scheme please contact patricia.walsh@nsai.ie

| Certified Air Tester Scheme - Registration Fees | | | |
|---|---|---|---|
| | Initial Application Fee[1] | Annual Registration Fee[2] | Initial Audit / Annual Audit |
| Single Fan | Waived | €440 | €1,100 |
| Add additional Single Fan registered tester from the same company[3] | Waived | - | €300[4] |
| Single & Multi Fan | Waived | €440 | €1,650[5] (€1,100+€550) |
| Adding Multi Fan to Single Fan Registration | Waived | - | €1,100 (or €550[6]) |

# Next Steps…

Continued registration by new testers

Core group of long standing, professionals testers

Inclusion of the ability to tester commercial buildings using a single fan

Multifan testing

Competent Testers Association

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# QUESTIONS?

# Status in Sweden and the new diploma for airtightness testers

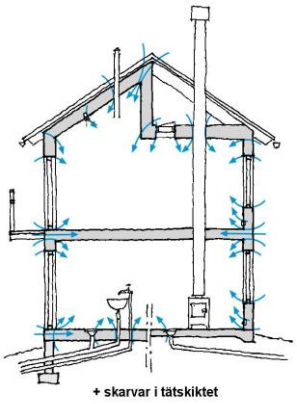
**Eva Sikander, SP Technical Research Institute of Sweden**

SP Technical Research Institute of Sweden

## Situation in Sweden

Swedish Building Code

- Requirements concerning energy use, no specific requirements concerning airtightness.
- Only for small buildings (less than 100m2) the requirement is specific
- Testing is mandatory in Sweden

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## Situation in Sweden

The developer

- has the responsibility to fulfil these requirements on energy
- is the actor who can formulate the requirement of the future building´s airtightness (better than the assumed airtightness in the energy calculation)
- has contracts with different actors to make sure that these requirements or even more specific and demanding requirements are fulfilled.
- Decide if the building is going to be tested, and in that case - when and how.

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## Why do we need the diploma for airtightness testers?

- The building industry (developers/designers/contractors) have a increasing awareness about the importance of airtight building envelopes!
- For Swedish Passivehouses there is a demand – on a volontary basis (0,3 l/m2s at 50Pa pressure difference)
- More consultants offer the service to do the airtightness tests

- Until this year there was no education or diploma which validates the consultants competecs and ability to do a correct airtightness test
- The first diplomas for airtightness testers were sent in january 2014.
- Today there are 20 (soon 25) diplomas in Sweden.

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## Diploma for airtightness testers

The diploma shows that the consultant has qualifiactions to

- do a airtightness test according to EN13829 (mostly according to method B).
- be the expert to help the client to reach the requirement using the method ByggaL.

Pre-qualifications:

- Experience during 5 years from designing/construction

or

- Educational background from 3 years at University (building)
- More than 5 airtightness tests

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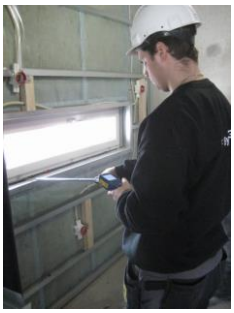
## Tester competence - Training and validation



**Education content during 2,5 days:**

- Why airtight building envelopes?
- The position/role as a diplomed tester
- The standard EN 13829
- building preparation, calculation areas, calibrations…
- The steps of the test and use of equipment on site
- Identify laeakage on site
- How to write a report
- The building process and priciples and actions for airtightness
- Requirements
- Method – ByggaL

**Validation/evaluation:**

- Theoretical examination
- Practical testing with the own equipment including test report

## The diplomed airtightness tester and the buildings process:

- The diplomed airtightness tester also get education to follow a method to ensure airtightness during the building process
- This gives the consultant a possibility to give extra value to the client
- The method - ByggaL

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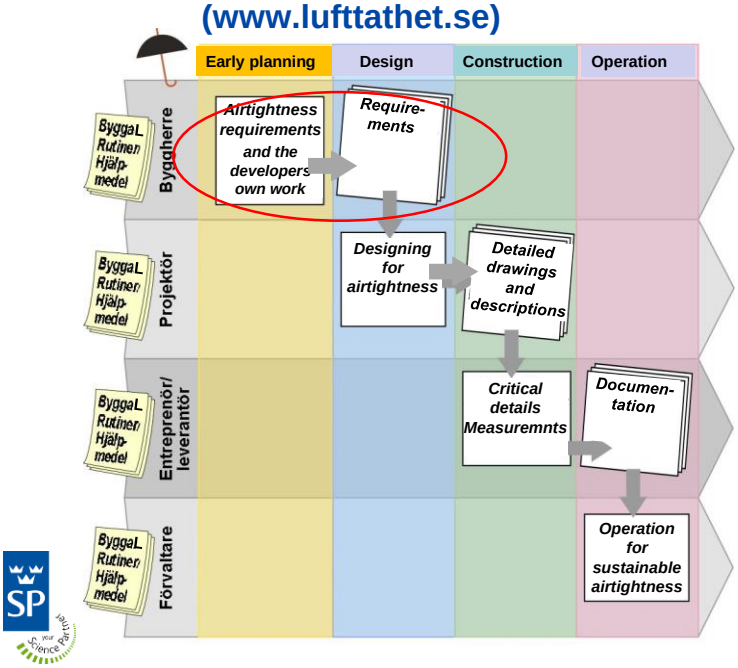
## Introduction to the method/guideline (www.lufttathet.se)




**Covers the whole building process**

**Routines Checklists**
- **Developer**
- **Designer**
- **Contractor**
- **Operator**

## Developer´s requirements for good airtightness

### Quantify the requirement

Ex. 1: Air leakage < 0,2 l/m²s

Ex. 2: Air leakage < 0,3 l/m²s

Ex. 3: Air leakage < 0,4 l/m²s

m² area of the building envelope

### Verify by measurements

At an early stage in the building process (improvements can still be done to a lower cost)

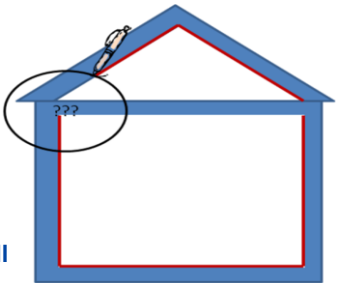
When the building is completed



## Developer´s requirements concerning activities for good airtightness

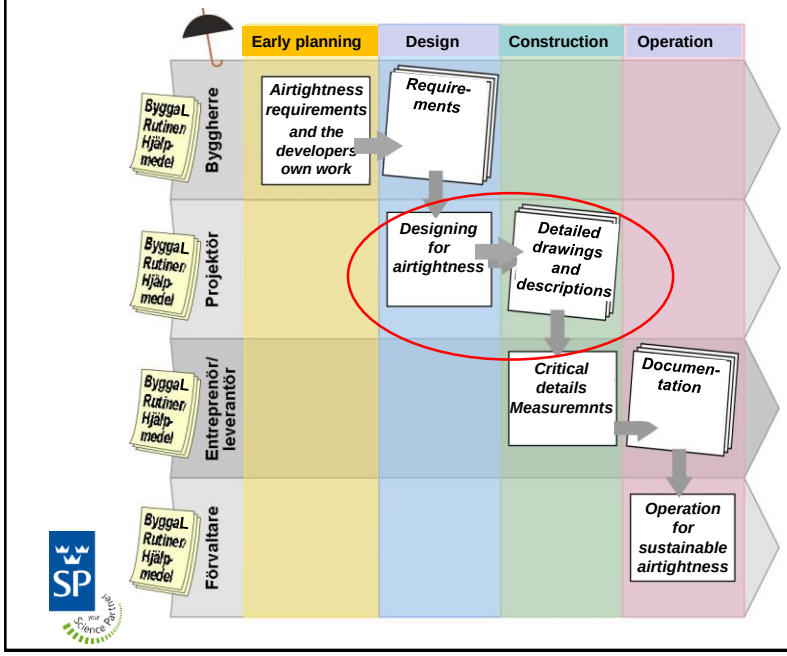
### During the design stage the designer shall

- Appoint someone to be responsible
- Perform information/training of designers
- Ensure durable solutions
- Ensure that solutions can be constructed
- Specify and describe details - documentation




### During the construction stage the contractor shall

- Appoint someone to be responsible
- Plan the work, together with the designers
- Information/training in the building site.
- Make inspections
- Measure airtightness performance and trace leakage at an early stage
- Measure airtightness when the building is completed
- Documentation

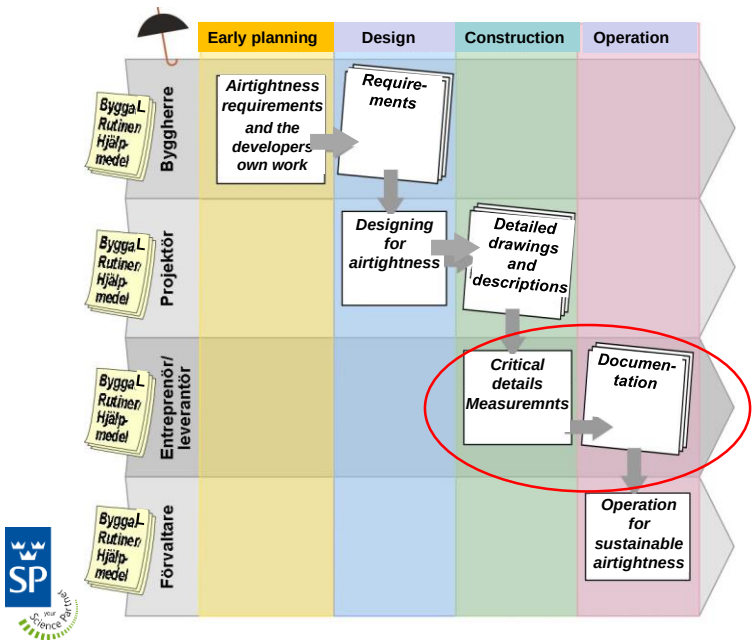



## Designer´s work during design stage - routines


- Appoint someone to be responsible
- Go through and agree on the requirements
- Internal information / training - material is available.
- Design and documentation
- Internal reviews
- Go through and check the completed documents with contractors
- Identify critical production stages together with contractor - checklist
- Record all information and results
- Hand over results and documentation to contractor

## To be considered during design stage - examples

- The airtightness of the materials
- Durability of solutions
- Minimise the number of joints
- Minimise the number of penetrations
- Plan details of airtight penetrations, such as ventilation ducts, chimneys, electrical installations etc
- Plan window and door connections
- Plan connections to walls / floors / ceilings



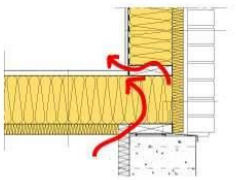
## Contractor´s work during construction stage - routines


- Appoint someone to be responsible
- Go through documents with the designers concentrating on critical details and work
- Prepare and follow an inspection plan
- Internal information, should include sub-contractors – education material is available
- Work planning (working methods, materials and critical solutions before each new workmoment)
- Measurements of airtightness at an early stage – work description is available. Measurements and detection of leaks should allow involved on the buildingsite to take part – improves the knowledge about airtight solutions
- Do final airtightness tests
- Documentation
- Feed back of experience to the designers

## Future actions in Sweden

- There is a need to define some recommendations and guidelines in connection to EN13829 in the swedish context (areas in multi-family buildning for example)

- Experience-meetings for diplomed airtightness testers is planned once a year to support knowledge exchange and communication of new information. Starting in 2015.



## Thank you for your attention!

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