

# **EuroPHit**

## **Outlines for training modules For Airtightness Installation and Measurement**

**Michael McCarthy  
Passive House Academy  
Dublin, Ireland**



Co-funded by the Intelligent Energy Europe  
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# The EuroPHit Project

# EuroPHit

With the EnerPHit Standard as the goal and Passive House principles as the basis, EuroPHit applies knowledge on deep energy retrofits to the oft-overlooked yet critical area of step-by-step refurbishments



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# Airtightness Installation and Measurement – Course Overview

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Module Title	Time	Description
1. Introduction to Airtightness	90 mins	Introduce the fundamental building physics of AT, the role AT plays in the PH Standard, definitions, consequences of poor AT and suitable materials. Also describe the correlation between AT level and Ventilation requirements
2. Airtightness Detailing	90 mins	Study of Exemplary AT Details in model/drawing form, analyse AT site installations, sketching exercises
3a. AT Installation Demonstration	60 mins	Practical Hands-On demonstration in the lab showing exemplar AT installation techniques and how to deal with a variety of challenging connection details



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Module Title	Time	Description
3b. Hands-On AT Installation	120 mins	Trainees practice the techniques demonstrated previously using lab based models in a controlled environment where the focus is on quality of installation
4a. Airtightness Testing EN 13829	120 mins	Define the requirements, testing procedures and calculations according to EN 13829. Introduce methods and techniques for leak detection testing and describe the additional PHI testing requirements and standards
4b. AT Testing Software	45 mins	Demonstrate how to use Blower Door Testing software and highlight the critical issues for both large and small building types (new and existing)



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5. Blower Door Test Demonstration	105 mins	Demonstrate a full Blower Door Test on a sample AT mini house including climate condition checks, building preparation, building measurements and calculations, blower door installation, leak detection, full pressurisation and depressurisation tests, software input and results generation
6. Practice Blower Door Testing	120 mins	Allow the trainees to practice all of the techniques and elements demonstrated in module 5 under the controlled lab conditions in preparation for the Site Visit and Project



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Module Title	Time	Description
7a. AT Site Visit	225 mins	Trainees are on site ideally at their chosen project or alternatively at any existing building. A full site Blower Door test is carried out as practiced In Module 6 and all results are retained for later analysis. This element can be carried out as a full class group or in smaller teams
7b. Site Visit Analysis	105 mins	Trainees return to the classroom for an analysis session in 4 smaller groups. Each group must analyse the site findings and come up with appropriate solutions so the required n50 can be achieved
7c. Site Visit Presentation	60 mins	15 minute presentation per group to the rest of the class reporting on their findings, analysis of current situation, critical leakage sites and their proposed AT solutions



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In this course we will cover the following topics:

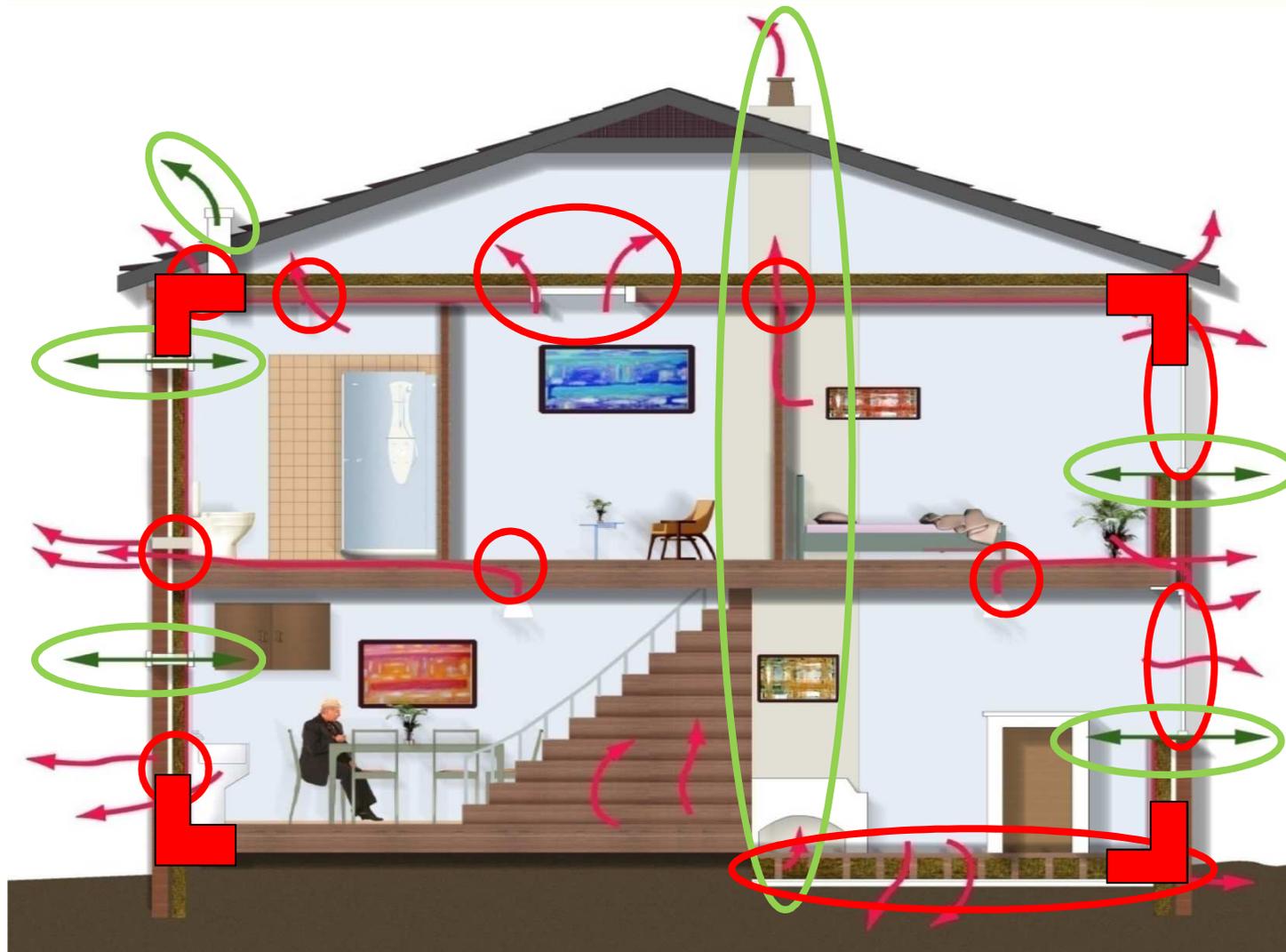
- Air Leakage in Buildings
- Definition of Airtightness
- AT in Passive Houses (New and EnerPHit)
- Designing and Detailing for Airtightness
- Materials – what to Use and what to Avoid
- AT and the influence on Ventilation
- Airtightness on Site – practical installation
- Leak Detection Testing – Why and When
- EN 13829 Blower Door Testing to find  $V_{50}$
- Calculation of Airtightness  $n_{50}$  and  $q_{50}$  ( $w_{50}$  and  $A_{50}$ )
- Calculation of  $n_{inf}$ , AT influence on SHD and Energy Cost



# Module 1 - Introduction to Airtightness

## Common Leakage Areas in Standard Construction

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# Module 1 - Introduction to Airtightness

## Airtightness – Definition

**Airtightness** is the process of **eliminating cracks, gaps and holes** in the fabric of the building envelope to achieve a measurable standard using specified materials that are durable and long lasting





# Module 3 – Airtightness Installation

## Airtight on Site – General

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A



B



C



D



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Source: Siga

# Module 3 – Airtightness Installation

## Airtight on Site – Window Inner Corner

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Source: Siga

# Module 4 – Airtightness Testing Methods

## Airtightness – The Standard

**Air Tightness Testing and Measurement** methods are described in:

**EN 13829 (ISO 9972)** Thermal Performance of Buildings –  
Determination of Air Permeability of Buildings – Fan Pressurization  
Method

**Two methods** of quantifying Airtightness levels:

- Method A: Air Changes (Volume)
- Method B: Air Permeability (Envelope Area)

Both methods are used to detect leaks in the building envelope and to determine the airtightness level. The PHI has specified **Method A** as the methodology for Passive Houses



# Module 4 – Airtightness Testing Methods

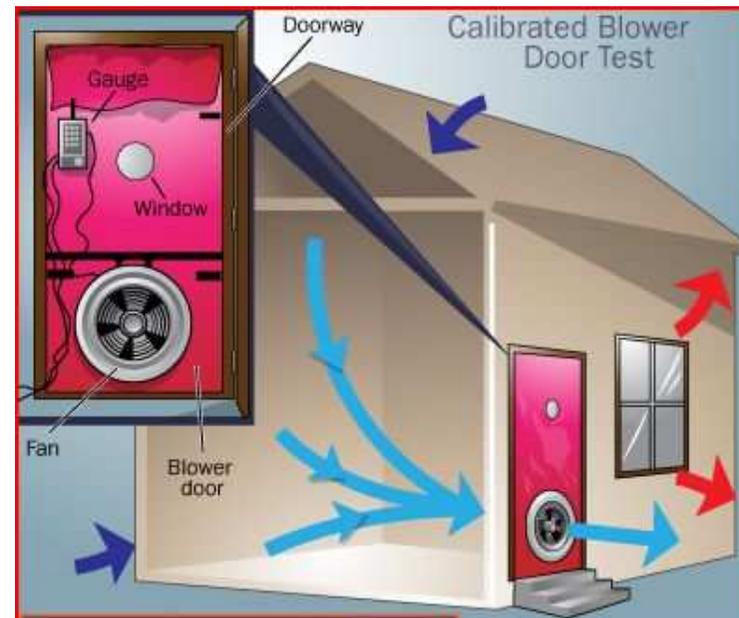
## Airtightness – Reference Pressure

As detailed in **I.S. EN 13829**, a fan is installed into the opening of a window or door with an airtight seal.

The airtightness of a building is **always** (method A and method B) measured with a set differential pressure created between inside and outside using the speed-regulated fan.

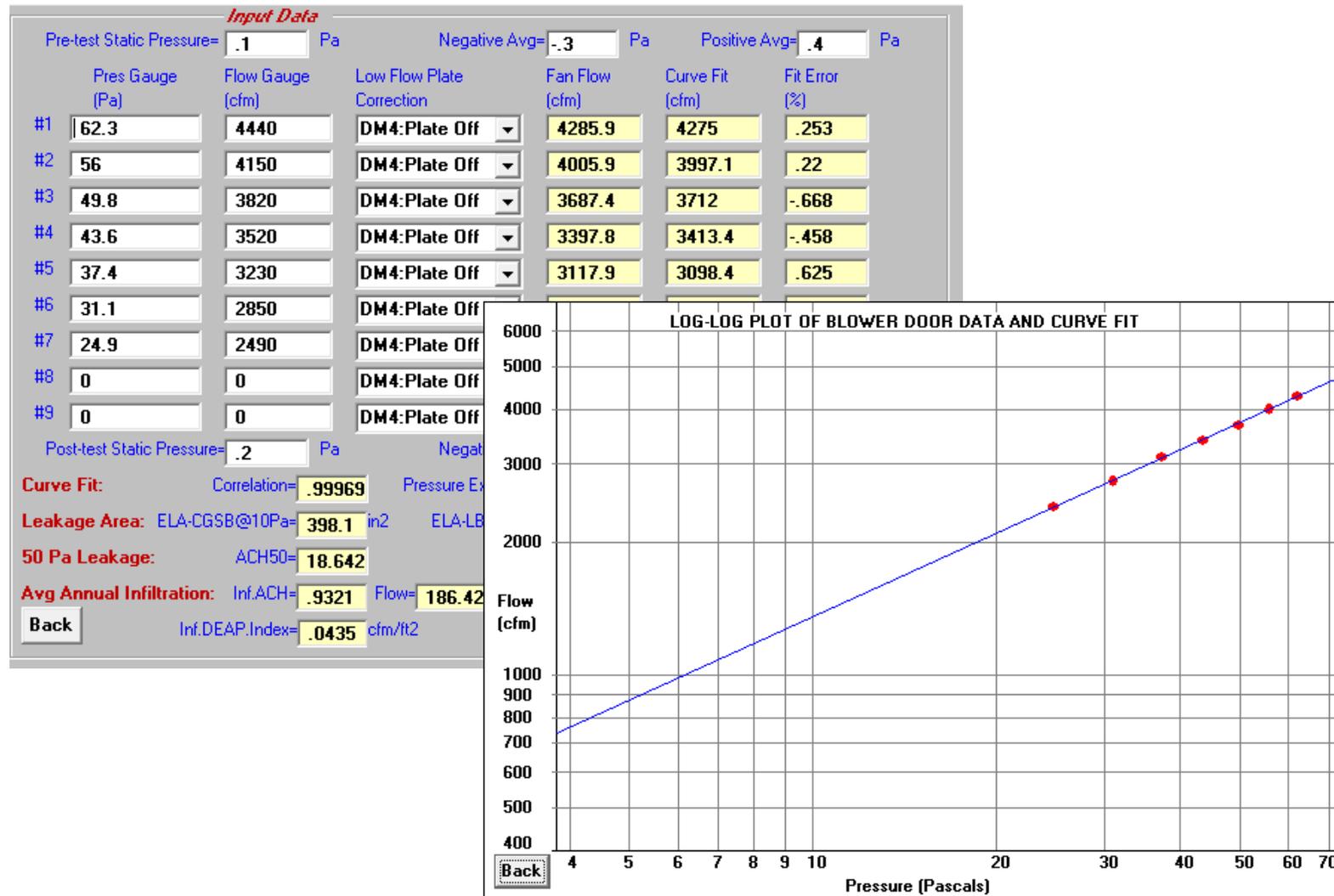
The reference pressure is:

**50 Pascals (Pa)**



# Module 4 – Airtightness Testing Methods

## Airtightness – Blower Door Software



# Modules 5 and 6 – Demonstration and Practice Airtightness Testing and Measurement

## Measurement

### Blower Door:

Used to measure and certify Airtightness level (v50, n50, q50, A50, w50)



# Modules 5 and 6 – Demonstration and Practice Airtightness Testing and Measurement

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# Modules 5 and 6 – Demonstration and Practice Weather Conditions - Equipment

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## Module 7 – Project Airtightness

- (a) Site Visit and Test
- (b) Site Visit Analysis and Report
- (c) Site Visit Presentation



## Thank you for your attention

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