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Licence to use the Irish Standard Mark

on or in connection with

Thermal Performance of Buildings - Determination of Air Permeability of Domestic Buildings – (Single) Fan Pressurization Method.

to indicate conformity to

I.S. EN 13829:2000

Donal Gilroy
Gilroy Energy Services

Streedagh
Grange
Co. Sligo

The NSAI, in exercise of the power conferred on it by subsection (1) of Section 21 of the National Standards Authority Act (No. 28 of 1996) hereby grants a licence to use the Irish Standard Mark on or in connection with Certified Air Tightness Tester Donal Gilroy to indicate conformity to I.S. EN 13829:2000 to the above mentioned company.

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Approved by
Maurice Buckley
CEO NSAI

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IBCI Building Control Conference, Sligo
Passive House, Part L and Airtightness

Roman Szypura
clíoma house ltd

„When I worked on Passivhaus, the inspection reports that were carried out to ensure thermal bridging and airtightness on site, would exceed the documents needed to show due diligence for BCAR.
(...)
Passive House standard and BCAR are very mutually beneficial objectives“

Archie O`Donnel, Passive House Consultant, i3pt building control

CERTIFIED PASSIVE HOUSE TRADESPERSON
TRADESPERSON

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Why Airtightness?

From Part L Building Regulations

"1.3.4 Building envelope air permeability
1.3.4.1
To avoid excessive heat losses, reasonable care should be taken to limit the air permeability of the envelope of each dwelling. In this context, envelope is the total area of all floors, walls (including windows and doors), and ceilings bordering the dwelling, including elements adjoining other heated or unheated spaces.
High levels of infiltration can contribute to uncontrolled ventilation. Infiltration is unlikely to provide adequate ventilation as required in the correct location. It is important as air permeability is reduced that purpose provided ventilation is maintained."

From TGD L / Acceptable Construction Details

"Air leakage is defined as the flow of air through gaps and cracks in the building fabric.
Uncontrolled air leakage increases the amount of heat loss as warm air is displaced through the envelope by colder air from outside. Air leakage of warm damp air through the building structure can also lead to condensation within the fabric (interstitial condensation),which reduces insulation performance and causes fabric deterioration"

It is known and anchored in the Building Regulations:

Build tight -> Ventilate right!

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Airtightness Standards

N50 : Airchange per hour at a pressure difference of 50 Pascal
Q50 : Cubicmeter per squaremeter at a pressure difference of 50 Pascal

Source wikipedia.org

Country	Airtightness requirements	Additional comments
UK	q50 10 $m^3/hr/m^2$@50Pa	
Ireland	q50 7 $m^3/hr/m^2$@50Pa	Building Regulations Part L
Germany	n50 3.0 ac/h@50Pa n50 1.5 ac/h@50Pa	New build / No Mechanical Ventilation New build / With Mechanical Ventilation
Canada	n50 1.5 ac/h@50Pa	Voluntary Super E Standard
Passive House	n50 0.6 ac/h@50Pa	

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Comparison of energy saving by increased airtightness

A 208m² TFA Passive House and the impact of airtightness on energy savings by using the PHPP (Passive House Planning Package)

As built

Specific building demands with reference to the treated floor area

				Requirements	Fulfilled?*
	Treated floor area	190.1	m²		
Space heating	Heating demand	13	kWh/(m²a)	15 kWh/(m²a)	yes
	Heating load	8	W/m²	10 W/m²	yes
Space cooling	Overall specif. space cooling demand		kWh/(m²a)	-	-
	Cooling load		W/m²	-	-
	Frequency of overheating (> 25 °C)	16.7	%	-	-
Primary energy	Heating, cooling, auxiliary electricity, dehumidification, DHW, lighting, electrical appliances		kWh/(m²a)	120 kWh/(m²a)	
	DHW, space heating and auxiliary electricity		kWh/(m²a)	-	-
	Specific primary energy reduction through solar electricity		kWh/(m²a)	-	-
Airtightness	Pressurization test result n_{50}	0.2	1/h	0.6 1/h	yes

* empty field: data missing; '-': no requirement

As required by Passive House standard

Specific building demands with reference to the treated floor area

				Requirements	Fulfilled?*
	Treated floor area	190.1	m²		
Space heating	Heating demand	14	kWh/(m²a)	15 kWh/(m²a)	yes
	Heating load	9	W/m²	10 W/m²	yes
Space cooling	Overall specif. space cooling demand		kWh/(m²a)	-	-
	Cooling load		W/m²	-	-
	Frequency of overheating (> 25 °C)	12.3	%	-	-
Primary energy	Heating, cooling, auxiliary electricity, dehumidification, DHW, lighting, electrical appliances		kWh/(m²a)	120 kWh/(m²a)	
	DHW, space heating and auxiliary electricity		kWh/(m²a)	-	-
	Specific primary energy reduction through solar electricity		kWh/(m²a)	-	-
Airtightness	Pressurization test result n_{50}	0.6	1/h	0.6 1/h	yes

* empty field: data missing; '-': no requirement

To Building Regulations

Specific building demands with reference to the treated floor area

				Requirements	Fulfilled?*
	Treated floor area	190.1	m²		
Space heating	Heating demand	52	kWh/(m²a)	15 kWh/(m²a)	no
	Heating load	33	W/m²	10 W/m²	no
Space cooling	Overall specif. space cooling demand		kWh/(m²a)	-	-
	Cooling load		W/m²	-	-
	Frequency of overheating (> 25 °C)	0.0	%	-	-
Primary energy	Heating, cooling, auxiliary electricity, dehumidification, DHW, lighting, electrical appliances		kWh/(m²a)	120 kWh/(m²a)	
	DHW, space heating and auxiliary electricity		kWh/(m²a)	-	-
	Specific primary energy reduction through solar electricity		kWh/(m²a)	-	-
Airtightness	Pressurization test result n_{50}	8.8	1/h	0.6 1/h	no

* empty field: data missing; '-': no requirement

Building Regulations: 52 kWh/(m²a)
Passive House : 14 kWh/(m²a)

Space heating demand up by 370% just by changing the airtightness level from Passive House standard to Building Regulations

Please note that a N50 of 8.8 on this house is equivalent to a Q50 of 6.93

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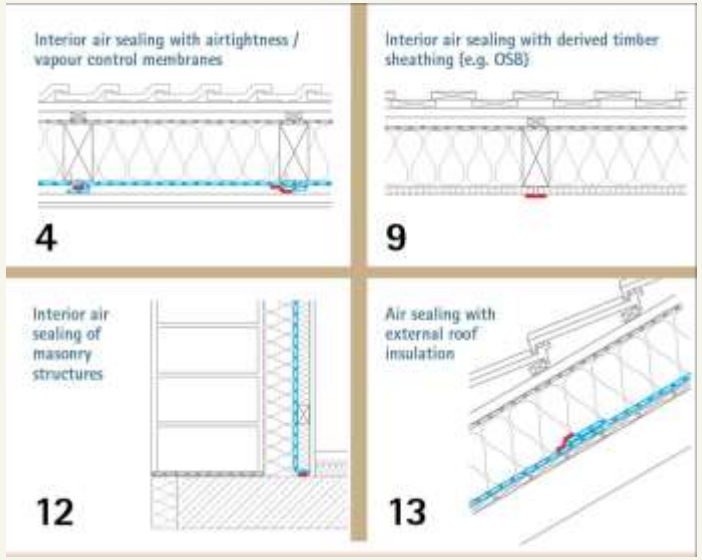
Planning for airtightness

Planning and detailing of airtightness is key and loads of informations are available from:

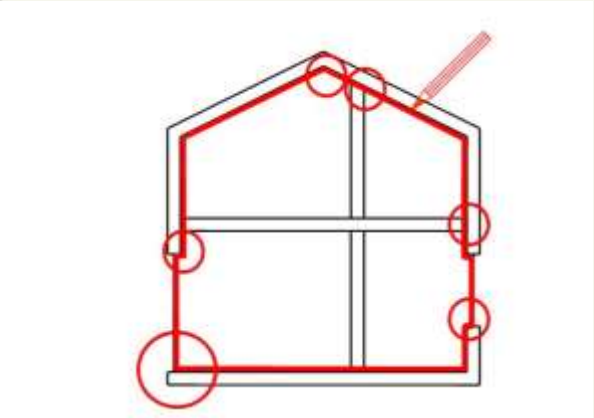
- Acceptable Construction Details
- Part L & F Building Regulations
- Manufacturers & distributors details and courses
- QualiBuild
- Specialists
- Internet
- videos

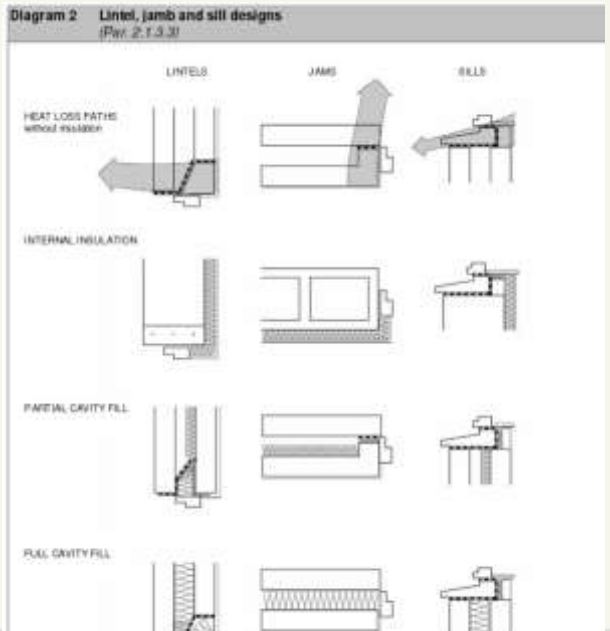
Courses



Manufacturers details

Design





ACD`s

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Airtightness on various projects

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Areas are easy, it is the details that make the difference!

Pre installed strips of airtight membrane during erection of timberframe structure where internal walls meet the external walls.

Details should be identified and agreed at design stage to achieve cost effective and good levels of airtightness.

Membrane sealed to concrete raft before installing the soleplate of internal wall

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Airtightness detailing

Plaster to wall joint

Window detail

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Airtightness detailing

Sealing floor to walls

Sealing more complex junctions, floor to wall and
Pre installed strip at internal wall

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Airtightness Details

Pre installing strip of membrane to wrap
Intermediate floor to wall joint

timberframe

Block build

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Airtightness details

Continued plaster to chimney where it crosses intermediate floor

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Airtightness details

Leaky strip foundation needs attention

Detailing on chasings / conduits

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Airtightness detailing

Attention to well applied plaster for airtightness

Sealing around socket boxes and chasings on block build

Airtightness details

Designed solutions for
Pipes, cables, recessed lights,
sealing beams

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Airtightness details

Sealing around flue and external air supply for stove

Sealing around collar ties / joists

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Airtightness details

Ventilation duct sealed with EPDM grummet

Airtight channel to keep ventilation ducts within airtight envelope

Mechanical Heat Recovery Ventilation

- The actual unit sits in a „warm box“ in the attic
- All ducts are installed inside the airtight and insulated envelope of the building

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Mechanical Heat Recovery Ventilation

Airtight channel for MHRV ducts

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Airtightness details

Early preperations for airtightness on a retrofit project
Strip of lime plaster at ceiling level and creation of pockets where supporting beams are installed at a later stage.
We used diffusionopen but airtight Solitex Plus membrane