

# Passivhaus

## The Passivhaus in Ireland:

A certified Passivhaus is a building including dwellings, offices etc that meets certain predetermined energy and comfort performance targets.

At present there are only three certified dwellings in Ireland, with over 6,000 completed all over Europe, well monitored and are performing to within 10% of predicted performance targets. The Irish climate is ideally suited to the application of the Passivhaus principles.

A passive house standard is achieved using a well informed cyclical design process that involves energy modelling, careful detailing and finally exemplery construction standards. The analysis takes account of the building envelope, solar gains based on specific climatological data, heat gains from occupiers, efficiencies of HRV systems, energy used for white goods and appliances and many other factors influenced by building form, orientation, shelter, summer shading etc. Fresh filtered air and the complete absence of cool radiant surfaces provide comfort levels second to none and save on running costs by 90% in comparison to a standard dwelling complying with Building regulations

Achieving Certification requires interaction between the designer and the Passiv House Institute of Darmstadt approved certification body from an early stage in the Design and construction process.

Passive Certification criteria include:

Excellent indoor air quality using whole house Mechanical Heat Recovery and Ventilation system

Thermally efficient envelope having u-values < 0.15 W/(m²k)

Maximising solar gains through positive window energy balance

Air tight levels using latest techniques ( n50≤0.6 ac / h )

≤15 kWh/m²a Annual Space Heating requirement

≤120kWh/m²a Total Primary energy demand ( heat, light, water etc. )

Air leakage requirements are 10 times more stringent than best practice low energy housing levels. Opening windows in an Irish Passivhaus is not a problem, and can be encouraged outside the annual heating period. The air quality through filtration can reduce irritation for suffers from dust mite, pollen etc. The present regulations in Ireland limit air leakage to 10m³/m²/h. An EU funded AVASH study highlighted the fact that a 1950's dwelling with rendered walls and rattling windows already met this target - not enough progress

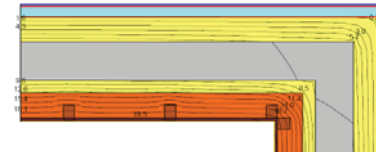
During the design stage calculation data and details are forwarded to the certification body who validate that the design solutions conform to standard and identify areas where improvements may be achieved. This cross checking of data is an invaluable process. The works are monitored in house to ensure that quality standards are being maintained and finally signed off by the certification body who visit the site and verify the works comply with the Passivhaus criteria.

In assessing the energy consumption, PHPP determines the energy



consumption based on 24 hours a day , seven days a week of the heating period with a temperature of 20°C maintained throughout the heating period, far more stringent than other energy assessment systems which are based on intermittent heating hours and do not require 20°C throughout the building.

Amendments to the 2002 EPBD require that all domestic buildings will need to be carbon neutral from 2013, with all commercial buildings Carbon Neutral by 2018. Achieving Carbon Neutral in the Irish climate is feasible and need not cost much more than a typical low energy dwelling. It will take far more analysis at the early design stage and will be more informed as better climatic models for particular regions are available. Though renewables will play a major part in enabling the construction industry



achieve these targets, the reduction of energy requirements in the first place is a more cost effective long term strategy. As Certified European Passivhaus Designers WMA understand how various design decisions and technical solutions can influence the energy performance in the building.

Our earlier low energy designs would readily come up to the mark with minor thermal envelope and general specification improvements.

Fundamentally the passive solar architecture which we practice integrates well with passivhaus solutions so our general design philosophy remains

unchanged, just better informed through the accreditation process.

We can apply our experience and technical ability to predetermine the performance of our designs, validating completed projects through monitoring and apply cost benefit analysis on the energy saving opportunities for a particular project.

Thermal bridges are where the thermal performance of the envelope (heat transfer ) is compromised by detail, sometimes but rarely unavoidable and are identified quantified and form part of the calculation process.

Extreme weather conditions in 2009 / 10 have highlighted the importance of thermal bridge free design and have exposed the potential for damage due to condensation, both surface and interstitial. Informed desktop study can design out these issues at an early stage. We are working closely with other Passivhaus designers particularly in the UK & Ireland to get a better understanding of the issues affecting the Passivhaus house in this region and have already identified some interesting phenomena relating to micro climates in coastal areas.

The implementation of the Energy performance in Buildings Directive EPBD throughout Europe is being met with varying degrees of success throughout Europe. Ireland and Portugal by November 2009 were the only ones with the directive implemented and are already seeing the results. In France recently enforced regulations require that 'Low energy' will have an annual space heating / lighting load of less than 50kWh/m²a whereas in Passivhaus <= 15kWh/m²a Annual Space Heating requirements are a prerequisite.

Having qualified from the first Certified Passivhaus European Designer Course and with our first Certified Passivhaus project due for completion this year we are embroiled in extensive research and development in the area.

We continue our commitment to offer our clients the benefit of the best practices in construction and design available.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Heating Degree Hours °C	5.0	2.1	0.0	8.8	17.3	4.0	3.8	3.8	4.4	5.2	8.4	12.2	88
Heating Degree Hours °F	5.8	6.4	0.0	8.8	6.4	4.0	4.0	3.8	4.4	4.8	4.0	5.5	61
Losses - Balance	1407	1310	1407	1240	1037	806	808	808	828	878	1108	1312	12143
Losses - Climate	168	181	200	167	146	146	146	150	146	180	195	184	2007
Sum Spec. Losses	8.6	8.1	8.8	8.0	6.0	3.6	2.8	2.8	3.2	4.2	5.8	8.1	68.0
Solar Gains - South	4	7	13	18	28	28	22	18	10	4	3	1	170
Solar Gains - East	24	36	71	105	137	132	131	78	47	28	17	6	605
Solar Gains - South	481	471	728	987	808	773	773	773	632	452	230	8041	
Solar Gains - West	10	13	25	38	48	45	44	38	21	12	6	3	352
Solar Gains - Horiz.	80	88	177	261	328	321	317	287	254	158	88	42	2270
Solar Gains - Other	0	0	0	0	0	0	0	0	0	0	0	0	0
Solar Gains - Opacity	382	345	382	309	302	302	302	302	302	302	302	302	4424
Sum Spec. Gains Solar	3.0	3.0	5.7	8.0	7.4	6.0	7.3	5.5	6.0	5.0	3.0	3.0	95.4
Utilisation Factor	100%	100%	30%	84%	69%	21%	34%	40%	63%	23%	100%	100%	71%
Annual Heat Demand	642	544	200	37	3	0	0	0	24	438	707	2545	
Spec. Heat Demand	2.6	2.2	1.6	0.2	0.0	0.0	0.0	0.0	0.1	1.8	2.8	3.8	33.8

