

What is Passivhaus

The Passivhaus Standard is a building standard developed by the Passivhaus Institute in Germany in the 1990's. It's primary focus is directed toward creating a comfortable, healthy low energy building, optimised for efficiency. Its thermally efficient envelope reduces the space heating demands of a typical new build by 80% resulting in a comfortable building year round.

The standard can be met using a variety of designs, construction methods and technologies and is applicable to any building type, not just houses.

Passivhaus Principles

- Efficient Shape
- Super Insulation
- Minimal Thermal Bridges
- Super Efficient Windows
- Draft Free Detailing
- Good Solar Orientation
- Efficient Mechanical ventilation with heat recovery

Key Principles of Passivhaus Design

One of the main advantages of Passivhaus design is **COMFORT**. High comfort levels and healthy buildings are achieved by reducing heating losses to a minimum through efficient design and meticulous attention to detail.

Passivhaus adopts the principle of a thermos by encasing the building in insulation, which helps prevent heat from escaping through inadequately insulated walls, floors, ceilings, and windows. Air infiltration is controlled by reducing losses through leaky construction such as poorly fitted windows and services penetrations to 80% less than current building regulation requirements. Additionally, all rooms receive fresh, filtered air through the use of highly efficient Mechanical Ventilation with Heat Recovery (MVHR) systems.

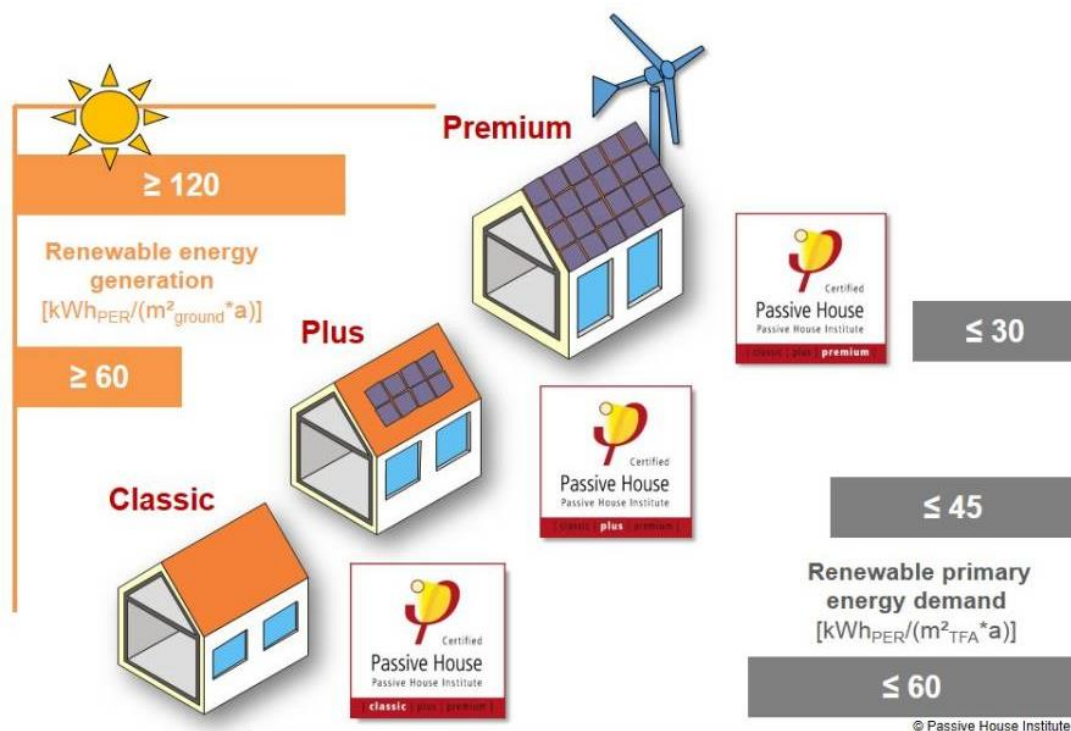
Key Principles of Passivhaus Classic

- Specific space heating demand $\leq 15 \text{ kWh}/(\text{m}^2\text{a})$
or Heating load $\leq 10 \text{ W}/\text{m}^2$
- Specific space cooling demand $\leq 15 \text{ kWh}/(\text{m}^2\text{a})$
- Specific primary energy demand $\leq 60 \text{ +/- } 15 \text{ kWh}/(\text{m}^2\text{a})$ (up to 75 kWh/(m2a) with additional renewables)
- Air changes per hour $\leq 0.6 @ n50$

Passivhaus Classes

As awareness of zero carbon goals grows and technology advances, the Passivhaus Institute now offers 'Passivhaus Plus' and 'Passivhaus Premium' certifications, beyond the Classic standard.

Passivhaus Plus buildings generate nearly as much renewable energy as they use, while Passivhaus Premium buildings produce more energy than they need for heating and operation.



EnerPhit: The Retrofit Counterpart

As the retrofit equivalent of the Passivhaus standard, EnerPhit is specifically tailored to upgrade existing buildings, a task often laden with unique challenges and constraints.

Tailored approach for existing structures

- **Assessment of the Original Building:** EnerPhit involves a detailed analysis of the existing structure, considering its age, construction materials, historical value, and current energy performance.
- **Customised Energy Solutions:** Each retrofit project under EnerPhit is unique. Solutions are customised to the building's specific needs, balancing energy efficiency with architectural preservation.

Key Principles of EnerPHit

- Specific space heating demand ≤ 25 kWh/(m²a)
- Specific space cooling demand ≤ 25 kWh/(m²a)
- Specific primary energy demand ≤ 60 +/- 15 kWh/(m²a) (up to 75 kWh/(m²a) with additional renewables)
- Air changes per hour ≤ 1.0 @ n50

Key retrofitting measures in EnerPhit

- Enhanced Insulation
- Upgrading Windows and Doors
- Addressing Thermal Bridges
- Improving Airtightness
- Ventilation Systems

Challenges and considerations in EnerPhit retrofitting

- Structural Limitations
- Preservation of Character
- Cost Implications
- Planning and Permissions



Key Differences Between EnerPhit and Passivhaus

Passivhaus targets new constructions, emphasising energy efficiency from the outset, incorporating energy-saving features into the design for optimal energy conservation.

EnerPhit, conversely, focuses on upgrading existing buildings to meet standards close to Passivhaus, acknowledging the challenges of retrofitting with a slightly less stringent criteria to accommodate structural and historical constraints.

EnerPhit's flexibility allows for customised energy improvement solutions, respecting the building's originality. Retrofitting costs under EnerPhit can surpass those of constructing a new Passivhaus due to the complexities of modifying existing structures, including integrating modern insulation and updating windows and ventilation while preserving architectural integrity.

This document was written by Architect & Passivhaus Designer Alida Calistru for ELITE Renewables LTD

Sources:

https://www.passivhaustrust.org.uk/what_is_passivhaus.php

https://passiv.de/en/02_informations/01_whatisapassivehouse/01_whatisapassivehouse.htm