What is passivhaus: (Passive House)

A passive house is an energy-efficient building that has year-round comfort and good indoor climate without the use of active space heating or cooling systems. The space heating requirement is reduced by means of passive measures to the point that there is no longer any need for a conventional heating system. Low energy, low carbon, low impact design standard, based upon over 20 years of research and development with over 30,000 buildings completed to this standard in Europe.

A passive house provides very high levels of thermal comfort and an even temperature throughout the building. Passive houses are usually light and bright due to large glazed areas designed to optimise solar gains, and are healthy to live and work in due to fresh air supplied by the ventilation system.

The appearance of a passive house does not need to differ from a conventional house.

Passive house dwellings:

- use efficient components and a whole house ventilation system to achieve exceptionally low running costs
- are comfortable, healthy and sustainable
- typically achieve an energy saving of 90% compared to existing
- typically achieves a carbon dioxide reduction of 90%
- constant fresh, filtered, pollen free air in all rooms
- Protects against rising fuel costs and fuel poverty

Glazing to achieve Passive House Standards

To build Passive Houses, highly efficient windows have to be used. The type of glazing and frames will depend on climate, however. In the Central European climate there are three essentials:

- Triple glazing with two low-e-coatings (or another combination of panes giving a comparable low heat loss containing heavy inert gas
- "Warm Edge" – spacers which act as a thermal break inside the unit, stopping the transfer of cold air into the room, and warm air out of the room, most of the heat lost from a window, travels through the edge of the glass, the warm-edge spacer not only helps, as its name suggests, keep the edge of the unit warmer, but also improves the acoustic qualities of the unit.
- Inert Gases – Triple Glazed Unit cavities are filled with inert gases, such as Krypton or Argon, which helps create insulating pockets, thus improving levels of insulation.

- Super-insulated frames - Traditionally Timber, or Timber Aluminium Composite/hybrid windows.

These components harmonize in a way that the total heat loss of such a window is only half as high as compared to a conventional window. But direct and indirect solar gains are collected through the glazing, too. Therefore, it has been demonstrated that by using these highly efficient windows, the result will be a positive energy balance even in the Central European winter period, as long as the orientation is suitable and the shading not excessive.

The thermal loss coefficients, Uw, of such Passive House windows are lower than 0.8 W/(m²K) according to the new European standard (EN 10077). One consequence of such a low heat loss is that the interior surface temperature of such a window, even in cold European winter nights, will exceed 17 °C. This results in excellent thermal comfort even near the window: There will be neither trouble with "cold radiation" from the window nor an unpleasant lake of cold air at the floor.

The 17 °C condition for minimum internal surface temperatures of windows in a Passive House is the defining requirement for Passive House windows in any given climate.

Tested quite extensively in Germany, below are the results. with a O°C outside and 21°C inside Single Glazed

	Pre “k” glass Double Glazing	“C” rated Double Glazing	Triple Glazing
1°C	11°C	16°C	18°C

Treforest Glass produce units to any thickness of triple glazing or quadruple glazing.

We use the heavy inert gas: krypton in thinner cavities, and argon gas in cavities of 12mm and upwards, in a unit in excess of 28mm thickness overall, we can achieve a 0.4 centre pane u-value using 2 x softcoat panes mixed with a low iron for thermal gain and krypton and a 0.3 W/m2k in quadruple units.

Please do not hesitate to contact us if you have any special requirements to achieve.