

hether you're self building or renovating, creating a sun-soaked home that's bathed in natural light is likely to be somewhere close to the top of your project priority list. As well as playing a huge role in establishing the overall character and aesthetic of your dwelling, windows are an important part of the structural fabric. While broad swathes of glass can create a stunning design feature, it's essential to specify energy efficient fenestration to ensure that you aren't losing too much heat via the shell of your new home.

The basics

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There are plenty of advantages to investing in highly efficient fenestration, from creating a comfortable internal environment to cutting your energy bills. "An airtight arrangement also offers improved acoustic insulation," says Ryan Breslin, managing director at Cherwell. However, there can be a lot of jargon to get your head around when you first start hunting for suitable products.

U-values are the measure used to describe a window's thermal performance. "This figure indicates the amount of warmth allowed to escape through a window – in other words, heat loss," says Donna Muir, direct sales manager at Velfac. "When assessing a unit's ability to retain warmth, the lower the number the better." If you're building a new home, the Building Regs stipulate the U-value for whole windows and doors (frame and glazing) should be no higher than 1.8 W/m²K. If you're replacing the fenestration as part of a renovation, the required figure is 1.6 W/m²K.

It's important to bear in mind that this measure of thermal performance can be divided into two categories. The Ug-value refers to the glazed centre pane, while the Uw-value looks at the energy efficiency of the whole unit, including the frame. The latter is the figure you should be focusing on, as it's possible to get high-quality glazing

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Windows energy efficiency

From the type of glazing to frame materials, **Rebecca Foster** outlines the key factors to consider when selecting your home's fenestration

installed within a leaky frame. Therefore, it's vital that you ascertain which one your supplier is using and ask them for the Uw-value to be sure about the performance.

The Window Energy Rating (WER) provides another useful tool to assess the energy efficiency of various glazing products. Administered by the British Fenestration Rating Council (BFRC), units are ranked on a scale that runs from E at the low end to A++ at the top. This system takes U-values into account, in addition to g-values (the amount of energy absorbed from the sun) and ventilation.

The glazing

There are numerous ways to boost the energy efficiency of glass. The first is to create an extra thermal barrier by



Above: Kloeber's alu-clad range can be manufactured with double or triple glazing. You can also choose from a variety of paint and stain combinations to match the style of your home, internally and externally. Similar fixed glazing panels start at $\pounds360$ per m²

Above left: Wood is a natural insulator, so is often specified as a frame material in projects where energy efficiency is a high priority. These units were supplied by Internorm

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REFURBISHING WINDOWS IN A HERITAGE HOME

There's a plethora of heritage-style products to replace windows in period properties with convincing replica designs. However, if you want to preserve original fenestration's character, you can also refurbish existing units to boost their energy efficiency.

The first step is to check the perimeter of the window for cold and draughts. "You can switch out the glass for a more effective option and ensure the weather sealing between the window frame and sash is up to scratch. The join between the frame and the wall should also be checked," says Matt Higgs from Kloeber. Check out how Lisa and Alex Homer upgraded the fenestration in their Georgian home on page 43.

> trapping layers of air between two or three sheets, thus establishing double or triple glazed units. The former will typically attain whole-window U-values down to about 1.2 W/m^2K , while the latter can reach as low as 0.68 W/m^2K . This is good to know if you're looking to create a super efficient home, such as a Passivhaus. However, the extra expense involved may not be worth it unless the whole project is being constructed to a high green spec. Find out more at www.self-build.co.uk/triple-glazing.

Special finishes can also be applied to the glass to reduce heat loss. Low-E coatings, for instance, comprise a microscopically thin layer of metal or metal oxide. This is applied to the inner pane of double or triple glazed



Above: Clad in aluminium on the outside and pine on the inside, these made-to-measure windows were supplied by Velfac. The slim frame design maximises the amount of light flowing through the glass

windows and works to reflect warmth back into the room, rather than allowing it to escape through the glass.

Inert gas fillings can also be used to increase the energy efficiency of multi-pane units. Argon is the most widelyused option. "Its thermal conductivity is roughly 67% that of air and it's inexpensive," says Donna. Krypton gas has the edge in terms of performance, although this option is more expensive to manufacture.

Many high-spec modern products also feature Warm Edge technology, which is designed to reduce heat loss through the spacer bars that are used to keep the glass panes apart in double and triple-glazed windows. "These elements are traditionally made of aluminium, a highly conductive material," says Donna. "Warm Edge spacer bars are instead manufactured with an insulating plastic

composite that reduces heat loss and improves the thermal performance of the window as a whole."

Frame material

There are four main options when it comes to choosing the surrounds for your home's fenestration - wood, PVCu, metal and composite. Timber will combine traditional aesthetic appeal with innate insulating properties. "It's naturally more efficient than metal or PVCu," says Donna.

While metal offers sleek, minimal sightlines, it's typically outperformed by other materials. Lightweight and strong, aluminium is a popular choice - check that your units are thermally-broken to provide adequate energy efficiency.

Composite units offer the best of both worlds; excellent thermal performance and aesthetics. Featuring a timber face on the inside and an aluminium finish on the outside, this type of product comes with wood's natural insulation properties and aluminium's innate strength. However, this frame material is at the top end price-wise.

PVCu units have come on leaps and bounds thanks to advances in the manufacturing process. Multi-chambered frames are now incorporated to enhance performance. This cost-effective solution requires little upkeep and is available in an array of colours and woodgrain finishes.

Installation & design

Whether you're self building or renovating, it's worth adopting a whole house strategy if energy efficiency is one of your key project goals. For example, if your design incorporates expansive swathes of glazing, you can help to offset the potential heat loss by incorporating extra insulation elsewhere, such as in the walls, floors or roof.

It's also important to bear in mind that the thermal performance of your fenestration is only ever going to be as efficient as the installation itself. "If the perimeter of the frame is not packed, sealed and insulated correctly then you've compromised the overall airtightness and thermal performance the unit is able to achieve," says Matt Higgs, director and co-owner of Kloeber.

The position of the window within the wall is important, too. If the unit is fitted in a sub-optimal place, this could create a thermal bridge that leads to condensation on the inside of the window frame. "This would indicate that the surround is cold inside and is not performing correctly," says Matt. "In most scenarios it's better to have the frame sitting further back towards the internal side of the wall. Cavity closers should always be incorporated to close off the gap between the internal and external skin of bricks."

You can also liaise with your installer to double check what method will be used to seal the perimeter of the window when it's fitted. "Will it be a Compriband expanding tape or a minimum quality expanding foam?" says James Munro, technical manager of Internorm by Cherwell.

One way to help ensure your installation is up to scratch is to work with a professional who is registered with the Fenestration Self-Assessment Scheme (FENSA). If your contractor is not part of this scheme, you'll need to get the installation approved by a building control officer directly.

CONTACTS

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