



**Engineering progress
Enhancing lives**

Seize your window of opportunity.

How windows can unlock the potential of your commercial project



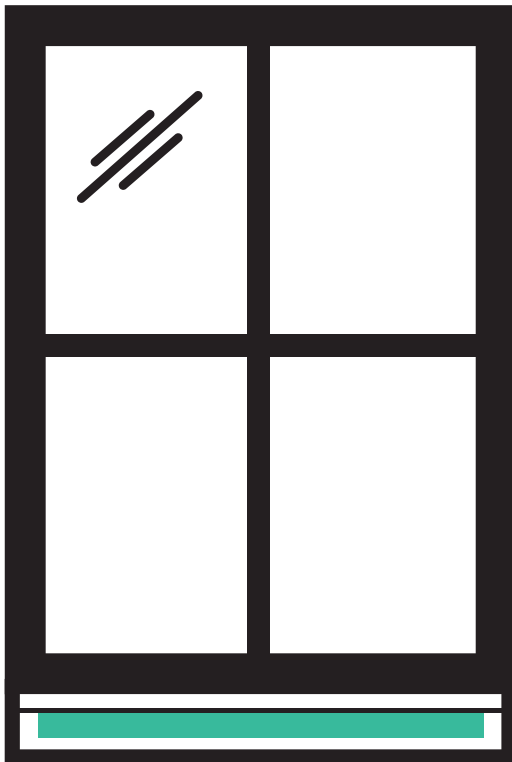
REHAU

Windows. Reinvented for modern life.



The vital role of windows in commercial project design

When it comes to the design, construction, and ongoing maintenance of large, commercial projects, a whole host of considerations need to be made. From the fabric that is key to the building's look, to the building services that ensure it performs to its full potential, countless factors go into making sure the users of a building are as pleased with its performance as they are with its appearance.



No product category typifies the need to balance form with function more than a **building's windows**. Architects will stress how important the choice of window is in achieving the desired look of a building, while consultants and specifiers will scrutinise a window's ability to **maintain key performance characteristics** ranging from **energy efficiency to fire safety**. To add further complexity, the priorities for a retrofit project will be different to those for a new build scenario.

The priority for replacement windows may be achieving a refreshed look with **enhanced performance** without having to reapply for planning permission, whereas new build projects generally have more specific criteria relating to occupant safety, ventilation levels, and daylight use. But with so many considerations to be made when it comes to selecting and installing the right window for a commercial building, how can we make sure those tasked with specifying windows make the most informed choice? That is where this guide comes in.

Over the next 10 pages, we'll cover the **key factors** that need to be considered for those tasked with selecting the **best windows** for their commercial build project. Read on to find out how **sound attenuation, premium insulation, occupant safety, desirable aesthetics** and that all-important **kerb appeal** can be achieved through the right choice of windows.

We hope you find this guide useful.

Malcolm Taylor, Commercial Product Manager at REHAU UK



A vital sound barrier

Here in the UK, the impact of sound on the buildings we live, work and sleep in has never been greater. A housing crisis and a shortage of available space means many developers are

building upwards – especially in our major cities. As a result, multi-residential schemes and multi-occupancy high-rise buildings need to be **designed to combat the impact of rising sound.**

So, which sound levels need to be achieved and how can the choice of window help?

Recommended noise levels

The World Health Organisation (WHO) guidelines for community noise recommend less than **30 A-weighted decibels (dB(A))** in bedrooms during the night for a sleep of good quality and less than **35 dB(A)** in classrooms to allow good

teaching and learning conditions. At the same time, the WHO guidelines for night noise recommend less than **40 dB(A)** of annual average (L_{night}) outside of bedrooms to prevent adverse health effects.

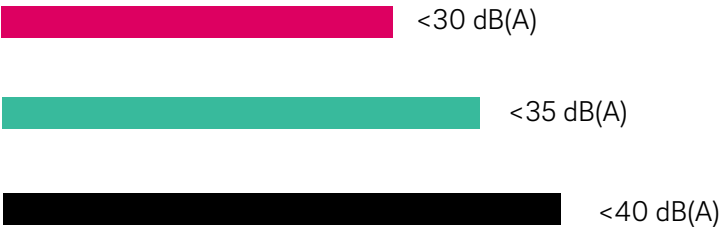
Conditions

Good quality sleep in a bedroom during the night

Good teaching and learning conditions in a classroom

Healthy living at night-time

Recommended noise level



Running alongside the WHO guidelines is Part E of the Building Regulations. While these may not relay our specific sound insulation requirements for windows, they do for walls and floors, so the impact of a window being fitted within a wall does need to be considered.

Window characteristics

Naturally, the constituent parts of a window all have a part to play in **reducing sound levels inside a building**. However, various considerations need to be made around each one to ensure the window performs as the **effective sound barrier** it is – in many cases – intended to be.

Glass

Generally speaking, the thicker the glass, the better the level of sound attenuation. A note of caution with this theory, however, is that thicker, heavier glass may not be suitable for certain types of window or installation.

Ventilation

The level of ventilation required within the building can also dictate a window's sound acoustic performance. Trickle vents, for example, will allow small amounts of ventilation through the window to avoid issues such as condensation, but will also allow a certain level of noise through as well. Similarly, modern buildings boasting a Mechanical Ventilation with Heat Recovery (MVHR) system, are more likely to have windows that don't open; making them much more soundproof.

Frame material

It can be easily forgotten that the window frame itself will tend to enhance the performance of the glass up to around 37-38dB, and this usually comes down to the hardness of the material. The solid nature of timber means it attenuates sound particularly well, whereas aluminium is a more flexible material and therefore more likely to conduct sound. Any reinforcement is also likely to reduce the potential sound attenuation so should be considered from the outset.

Installation quality

While every window will have its own performance characteristics, it will ultimately only perform as well as the quality of its installation. Sealing the window around its perimeter using an expanding foam will enhance both its energy and sound insulation properties.

While there will never be a universal approach to achieving a set sound level using a particular window type, it is vital that specifiers assess test data which considers the glass and frame installed together, rather than looking at the constituent parts separately.

Why wait to insulate?

The UK's bid to reduce its energy consumption is having a huge impact on building design, and a new building's ability to keep heat energy in can often be key to complying with building regulations.

Windows have a vital part to play in ensuring a building is suitably insulated, but as a set of materials which can not only insulate heat, but also open and close, specifiers need to know exactly what to take into account when recommending the best window for their commercial building.

About U-values

A U-value is essentially a measure of how effective (or ineffective) a building material is at transmitting heat between the outside and the inside of a building. The lower the U-value, the slower the rate that heat can transfer through the material in question, and therefore the better an insulator it is. The unit of measurement for a U-value is watts per square metre per Kelvin ($\text{W/m}^2\text{K}$).

Broadly speaking, when we combine all building fabric U-values together to form a collective figure for the whole building, the lower it is, the less energy is needed to maintain comfortable temperature levels inside.

So, what does this mean for window selection?

Windows as insulators

Part L of the Building Regulations state that developers should aim for a U-Value of 1.6 W/m²K for windows installed in a retrofit scenario, or 1.4 W/m²K in a new build dwelling. To put these figures in context, a white REHAU window with standard reinforcement can achieve a U-value of 1.2 W/m²K, making it perfectly suitable for an installation in any setting.

REHAU windows can accommodate a large array of glazing units including the most efficient triple glazed, insulated options, which can achieve a U-value of less than 1 W/m²K in some circumstances.

The impact of ventilation

One feature which can compromise a window's U-value is its level of ventilation. Trickle vents are mandatory under Part F of the Building Regulations in each of the following scenarios:

- In new windows where the windows being replaced have trickle vents
- In windows being installed into an extension
- In windows being installed in a new build property

While a mandatory level of ventilation is a positive step towards achieving buildings which are better insulated, trickle vents can add to a window's U-value, which then starts to make it less attractive to the developer. For this reason, it has become more important than ever to compensate for this through the best possible glass and window profile.

A balancing act

Acknowledging the U-value of a window is a good starting point, but developers and housebuilders will generally look to achieve the lowest possible U-value from their window to offset potential shortcuts or compromises elsewhere. For example, designing a building with thinner walls to maximise usable space will naturally achieve a relatively high U-value, meaning the shortfall will have to be made up by either the windows or another building fabric.

The insulation properties of a building's windows are already vitally important and, with commercial buildings responsible for a vast proportion of the UK's emissions, this is only likely to grow as energy efficiency targets continue to rise.

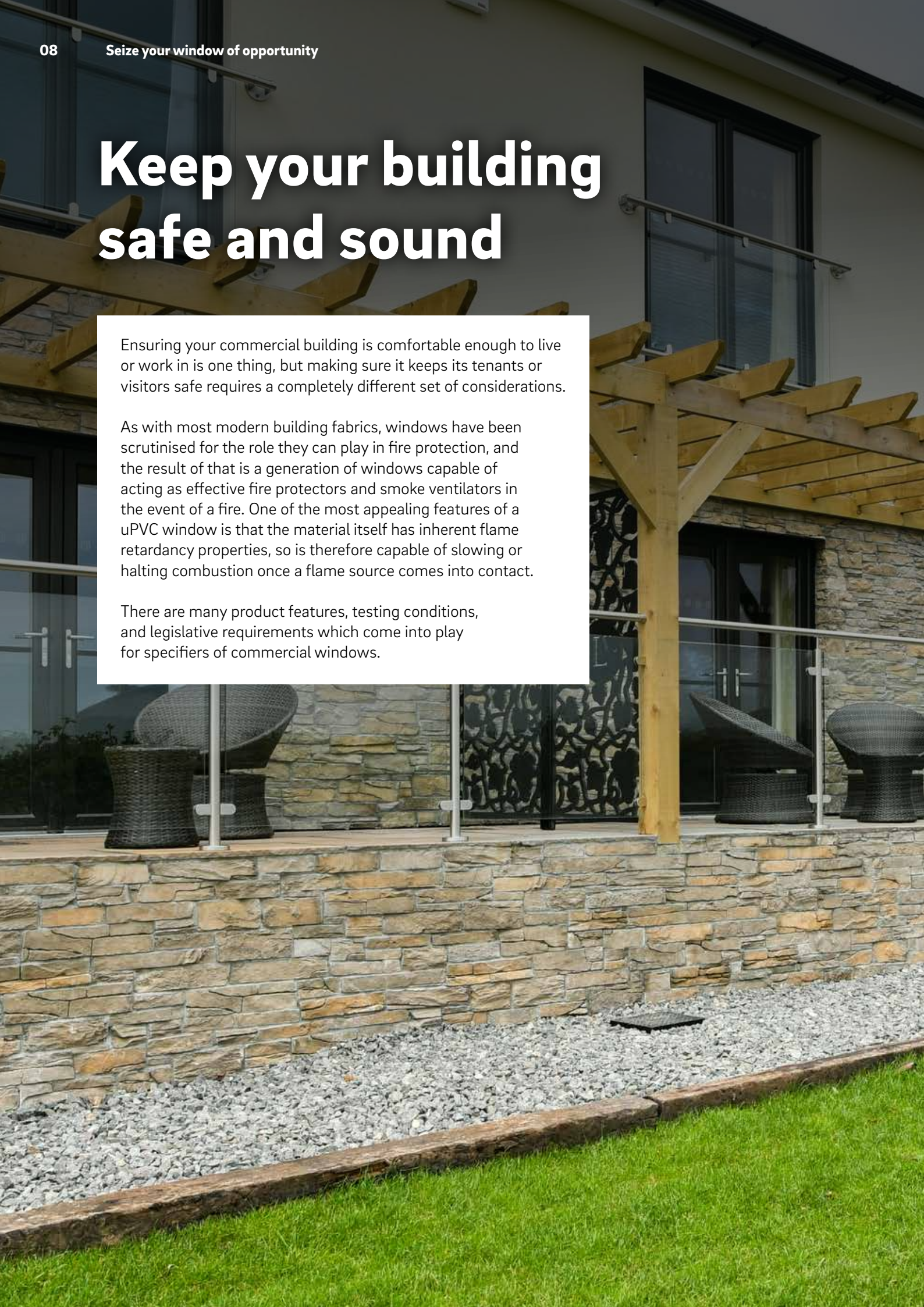


Keep your building safe and sound

Ensuring your commercial building is comfortable enough to live or work in is one thing, but making sure it keeps its tenants or visitors safe requires a completely different set of considerations.

As with most modern building fabrics, windows have been scrutinised for the role they can play in fire protection, and the result of that is a generation of windows capable of acting as effective fire protectors and smoke ventilators in the event of a fire. One of the most appealing features of a uPVC window is that the material itself has inherent flame retardancy properties, so is therefore capable of slowing or halting combustion once a flame source comes into contact.

There are many product features, testing conditions, and legislative requirements which come into play for specifiers of commercial windows.



What are Automatic Opening Vents (AOVs)?

An AOV is an electric system which automatically opens a window to release harmful smoke and fumes from the inside of a building in the event of a fire. Often connected to a Building Management System and/or its fire alarm system, the primary role of an AOV is to aid evacuation by enabling an actuator to automatically open the window in the event of a fire. This ultimately keeps escape routes free of smoke, prevents smoke inhalation, and allows the emergency services a clear and visible way through the building.

Legislative guidance

Specifiers should consider three main regulations when ensuring a fully compliant set of windows.

Part B of the Building Regulations concerns fire safety, and lays out the areas within a building where AOVs should be used to prevent the spread of fire and aid evacuation.

Part F of the Building Regulations relate to smoke control and ventilation. Part F prescribes where ventilation is required based on factors such as the type of building, its layout, its number of occupants and how the upper floors are accessed.

While the legislation relating to fire safety and smoke control are the most important in terms of occupant safety, AOVs can also affect the U-values of windows. As such, it is also important to follow the guidance laid out by Part L of the Building Regulations.

Testing

Windows deemed suitable for fire protection should either carry a 30-minute or a 60-minute rating, which relates directly to the amount of time the window will withstand temperatures of up to 300°C before being breached.

Look out for

Misleading test results. Unfortunately, some windows are tested without their actuator fitted, which means that although the window material might be deemed fire resistant, there are no guarantees that the AOV will trigger in the event of a fire. Specifiers eager to leave no stone unturned when it comes to fire safety should speak to the windows manufacturer in order to confirm their testing conditions.



Regulation surrounding fire safety and ventilation continues to tighten, and as ever, requirements can differ between new build developments and existing buildings. Those tasked with finding the right windows for their commercial building should speak to the manufacturers they are considering.

Creating Kerb Appeal

A building's windows have to be able to perform to their full potential at all times, but as a part of the building fabric which are always on show, they also need to **contribute positively to the appearance of the building**. Architects in particular design buildings which are either particularly striking, functional, consistent with the local aesthetic, or a combination of all three. The building's windows can have a massive impact on how successfully its designer can achieve their goals.

So, if you're tasked with **designing a building**, how do you make sure you achieve your desired look?

Use colour to minimise sightlines

Architects will often be on the look-out for a window with minimal sightlines so that the break between the external building material and any expanse of glazing is reduced. Where this is the ultimate aim, two helpful hints should be taken on board.

The first is that colour can actually be used to reduce the impact of sightlines. While a white window frame will almost always contrast with the building fabric or the glass, colour – darker shades in particular – appear much more subtle, which will reduce the impact of the window on the building's appearance.

Dispel the aluminium myth

The second hint is to avoid buying into the myth that aluminium windows achieve significantly better sightlines than uPVC. The reality is that there is very little between the two, and with uPVC windows now available in a host of colours – some of which have been designed to mimic the aluminium look – opting for a polymer-based window profile is as attractive an option as ever.



Darker shades
often appear
more subtle



We tend to find that the interiors market sets the trend for exterior colours, so could we see shades of navy or pewter emerge as developers' preferred options over the coming years?

Trends can talk

While anthracite grey is an extremely popular window colour among commercial building developers at the moment, the emergence of platinum bronze promises to shake-up the detail we can expect to see from some of the more striking commercial buildings we are likely to see around the UK over the coming years.

How sustainability gets the green light

We've already explored the role of the window in **maximising energy efficiency**, but the **sustainability credentials** of a project should be considered right from the sourcing of its materials. A growing number of developers are now looking to work with manufacturers and suppliers that take a **responsible approach to producing, delivering, or installing** the chosen products.

The 'plastic window' myth

In contrast to popular belief, uPVC or plastic windows can be among the most sustainable materials around. A point which is often missed is that uPVC can be recycled up to 10 times before showing signs of degradation, making it a perfectly viable material for developers looking to ensure a green thread runs through their commercial building.

Co-extrusion: a more sustainable supply chain

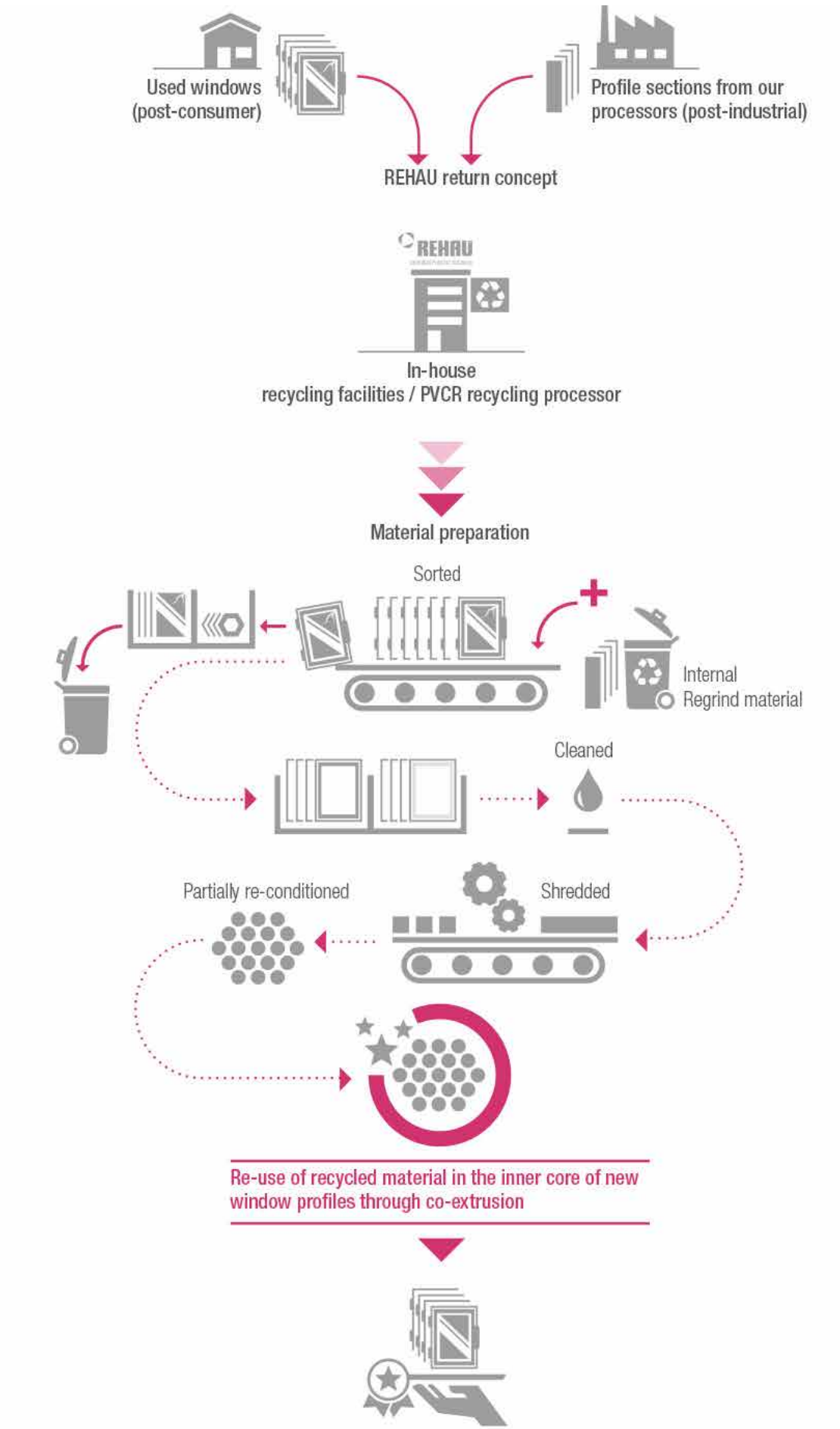
Co-extrusion is an innovative method of producing top-quality window profiles, enabling different PVC materials to be processed on the core of the profile and the outer skin. The use of recycled material means that valuable secondary raw materials can be re-used, which helps to protect the environment.

It is now possible to use modern co-extrusion methods to fulfil all of the demands met by conventional window profiles while providing the added value of enabling customers, and their end consumers, to play a role in protecting the environment, without paying more.

PVCR by REHAU

The people who both construct and use our buildings are becoming increasingly conscious of the impact their actions have on the planet. REHAU's response to this drive is a PVC Recycling (PVCR) concept developed to ensure fabricators and installers have access to a convenient, profitable, and socially responsible way to protect the environment. By using PVCR to recycle old PVCu windows and doors, businesses can not only manage their waste effectively, but can also minimise disposal costs – all while reducing their impact on landfill and feeding recycled material back into the supply chain.

As part of its strategic sustainability plan, REHAU will double its recycling output by 2020 and the investment will mean it is able to supply 100% of the recycled PVC required to support its co-extrusion production at the REHAU Window Production Plant in Blaenau, North Wales.





Marginal gains that **unlock your building's potential**

Over the course of this guide, we have taken a close look at some of the most important factors specifiers, architects and developers need to take into account when **designing commercial buildings** to stand the test of time.

While there can never be a cookie cutter approach to window specification in the commercial market, some common principles and key questions should be considered in order to ensure the window choice reflects the needs of the building and its users.

- **Sound attenuation:** can the window help to achieve healthy levels of quiet within the building?
- **Insulation:** do the u-values of the window help to ensure maximum retention of heat within the building?
- **Fire safety:** will the windows play their part in keeping the building's occupants safe in the unlikely event of a fire?
- **Aesthetics:** how effective are the size and colour of the window in minimising sightlines and making the building attractive to look at from the outside?
- **Sustainable supply:** does the windows manufacturer act in an environmentally responsible way that will reflect just as well on you as a specifier?

While the aim of this guide is to lay out a number of areas to explore during the specification process, we also boast a team of specialists who are on hand to offer guidance relating to a specific project. Why get in touch via our website and allow one of our team to contact you about your requirements? After all, windows really can unlock the potential of your commercial building.

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