



## Norscot Windows & Doors

Engineered quality, extreme weather performance, enhanced thermal efficiency and exceptional security. All combined with a choice of materials, style, shape and size.

### A Guide To Design, Performance & Energy Efficiency

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## Introduction

When considering windows and doors the simpler the design the better they will perform. These days most windows and doors come with at least a 10 year guarantee. But, these products should have a life expectancy at least four times longer. It is therefore important to consider the long term implications.

It is unlikely any window or door will fail dramatically within the first 10 years. But, the easiest opt out of any guarantee is due to a lack of maintenance, notably cleaning and oiling moving parts - hinges, locks, handles, etc. Logically, the more openable lights, the more moving parts, the more maintenance that will be required and, if not properly maintained, the more likely such products will cause issues later on.

These issues are magnified in the case of timber windows and doors. Because timber is a natural material it is not only prone to movement with climatic changes but also requires regular painting / staining for protection. Aluminium clad timber windows and doors are less prone to movement because the timber is not exposed to the elements. They will also require less maintenance since external painting is virtually eliminated. In terms of overall performance uPVC windows and doors are likely to be the most reliable.

In our view these issues are further magnified in the case of patio / sliding and folding-sliding (or bi-fold, as they are commonly known) doors, especially the latter. These products have far more moving parts than any window or standard entrance door.

Any product which employs a threshold track will require very regular maintenance to ensure its smooth operation and, as we know, most people do not do maintenance! If tracks are not kept clean, doors will jam and the users exert too much pressure to open and close them. This will result in excessive wear / damage to rollers and hinges. Bi-fold doors, in particular, have so many rollers, hinges and locks that a lack of regular maintenance will render them virtually useless and/or result in considerable repair costs. Of greater concern is the reduction in weather performance if doors become out of alignment or weather seals become damaged.

There can be no doubt the admen have done a great job 'selling' the bi-fold door concept. You've seen the images - vast openings connecting plush open plan living spaces with the garden and nature. All very enticing and people are simply seduced by this image and give no thought to the practical issues.

The reality, of course, is completely different. Unless you live in the south of England, there will be very few days in the year when the weather is good enough, for long enough, that you would wish to open the doors. Then there are all the flies, wasps and other insects and birds which will fly in, making a nuisance of themselves and in the case of the latter leaving a fair mess through fright!

Nice idea but not very sensible. But, there are options. For most people it is the visual connection with their garden that they crave. This can be achieved by simple fixed panes of glass which will generally offer a lot less obstruction to the view than a closed bi-fold door. Also, most people can walk through a standard size door which can be closed behind them to avoid any 'intruders'.

The Norscot approach is fixed panes with adjacent single doors - simple and better - good views combined with superior weather performance and low maintenance. Fixed panes and single doors can be arranged in any configuration to fill any size of opening. As an added benefit they can be made to irregular shapes providing greater flexibility where glazed gables are required.

Norscot Joinery regards itself as a truly professional window and door manufacturer. Not content with simply supplying windows and doors, we like to be sure the right product has been provided in each and every situation.

As you would expect from Scotland's leading multi-product window and door supplier, all our products have a British Standard severe exposure rating. What is not readily understood, however, is that these standards and tests, as stringent as they are, are regularly exceeded by

the weather conditions encountered in some parts of the North of Scotland – see A Guide To Window & Door Design below.

Consequently, when considering the size and / or design of windows, full account must be taken of the site location, orientation and topography. Failure to do so may result in premature window failure.

When we are asked to quote for the supply of windows, we are not always told where they are to be sited. In these circumstances we can neither offer advice nor accept any responsibility if the windows supplied are inappropriate in terms of size and / or design.

So as to avoid this possibility, we offer a FREE window advisory service. If you forward us your building plans and elevations, together with a site plan, we will be pleased to confirm whether or not the proposed windows are appropriate and will be 'fit for purpose'.

This guide is based on Norscot's experience of supplying windows since 1984 and aims to inform building designers / specifiers and homeowners on the various aspects of selecting windows which will be fit for purpose and offer best value for money.

## **A Guide To Window & Door Design**

Whether you plan to specify timber, uPVC or aluminium clad timber composite windows, the principles behind good window design are the same. You want a window to keep out wind and rain whilst conserving heat, resisting condensation, maximizing solar gain and assisting sound insulation.

Initially, there has to be an understanding of the possible restrictions imposed by the site location, orientation and topography. For example, an exposed west coast location must be viewed differently to a location in the middle of a town, where there is more shelter. An elevation facing south where there is the potential for solar gain must be viewed differently to a north facing elevation which sees very little sunlight. A property on raised ground will probably be subjected to greater exposure to the weather and must be viewed differently to a low lying location.

When specifying replacement windows for an existing house you are, in all probability, tied by the existing opening window sizes and the focus must be on selecting a suitable window type and style. When specifying windows for a new house there are no such constraints and herein lies the potential pitfall!

From the outset, orientation is of utmost importance. The sun rises in the east, passes through south and sets in the west. In winter months the arc of the sun will be narrower and lower than in the summer months. So, it makes sense to position large windows in elevations facing between south east and south west, to maximise the benefits of solar gain.

Typically, bedrooms will face east for early morning sunshine, dayrooms (kitchen / dining) will face south for sunshine through the day and the sitting room will face west for afternoon / evening sunshine. Bathrooms, utility, etc will face north, where there is no sunshine.

We generally advise against a big windows. If building in the countryside these will probably conflict with planning guidance, which generally requires a vertical emphasis to windows. A larger number of small windows will provide a better solution. This is always an issue when there is a good view to be captured. But, big panoramic windows will always have a potential for failure in extreme weather conditions.

This said, it is important to note that, to provide natural daylight in a habitable room, the total area of glass must exceed 1/15<sup>th</sup> of the floor area of the room. And, to provide natural ventilation, half (minimum 1/30<sup>th</sup> of the floor area of the room) should be openable. The latter

requirement may be circumvented by mechanical ventilation - refer to the Scottish Building Standards (<http://www.scotland.gov.uk/Resource/0041/00412253.pdf>).

Norscot manufactures three window types: casement, topswing and tilt and turn. The characteristics of these windows types are shown and described in Appendix 1.

The casement window provides the best weather performance because it opens out and has a double weather seal. This is followed by the topswing which also opens out but only has a single weather seal. The tilt and turn window also has two weather seals but, crucially, opens in meaning the opening sash is forced away from the frame in a strong wind.

These three window types are identified (on elevation drawings) by the dotted line symbols shown, which also indicate the opening sashes. It is imperative windows are drawn correctly, if the correct window is to be supplied.

Finally, it is important to note that first floor windows must be cleanable from the inside and, in the case of habitable rooms, provide means of escape in the case of fire - refer again to the Scottish Building Standards, as above.

Entrance doors generally provide less design issues and come as pre-hung door sets. Door sets may be a maximum of 1000mm wide x 2135mm high for single doors and up to 1800mm wide x 2135mm high for double French doors. Sidelights may be provided either one or both sides but are a waste of money if too narrow (less than 500mm wide).

These days Norscot only manufactures the tilt & slide style of patio door in uPVC, having experienced problems with all other variants in terms of weather performance. The maximum size is 2400mm wide x 2135mm high. But, doors may be joined together or coupled to sidelights, to provide wider glazed areas.

## **A Guide To Window Performance**

It is a technical requirement for modern windows to be tested, to determine their performance rating, prior to their introduction into the marketplace.

Norscot windows are tested by BM TRADA Certification Ltd (<http://www.bmtrada.co.uk/>). BM TRADA Certification is a leading multi-sector certification body accredited by UKAS (United Kingdom Accreditation Service - <http://www.ukas.com/>). UKAS is the sole national accreditation body recognised by government to assess, against internationally agreed standards, organisations that provide certification, testing, inspection and calibration services. Accreditation by UKAS demonstrates the competence, impartiality and performance capability of these evaluators.

Windows are required to meet the weathertightness requirements of British Standard 6375:Part 1:2009. This specifies the exposure categories related to test pressure levels for Air Permeability, Watertightness and Wind Resistance.

The highest test performance classification achievable is an Exposure Category of 2000+. Typically, this will provide:

- Air Permeability Pressure Class of 300 Pa or better.
- Watertightness Pressure Class of 300 Pa or better.
- Wind Resistance Pressure Class of 2000 Pa or better.

*NB Pa being Pascals - a measure of pressure.*

A window achieving this test standard is generically known as 'High Performance'.

Norscot windows have achieved an Exposure Category of 2000+ with the following classification:

- Air Permeability Pressure Class of 600 Pa.
- Watertightness Pressure Class of 300 Pa.
- Wind Resistance Pressure Class of 2400 Pa.

Within the UK, the further north you are the more severe wind speed design criteria become, varying from 20 metres per second (m/s) in London to 29 m/s on the Isle of Lewis and Orkney Islands (see map below). These maximum gust speeds are only likely to be exceeded once in 50 years. The annual mean wind speed across the north of Scotland is about 10 m/s. This approximates to 22mph.

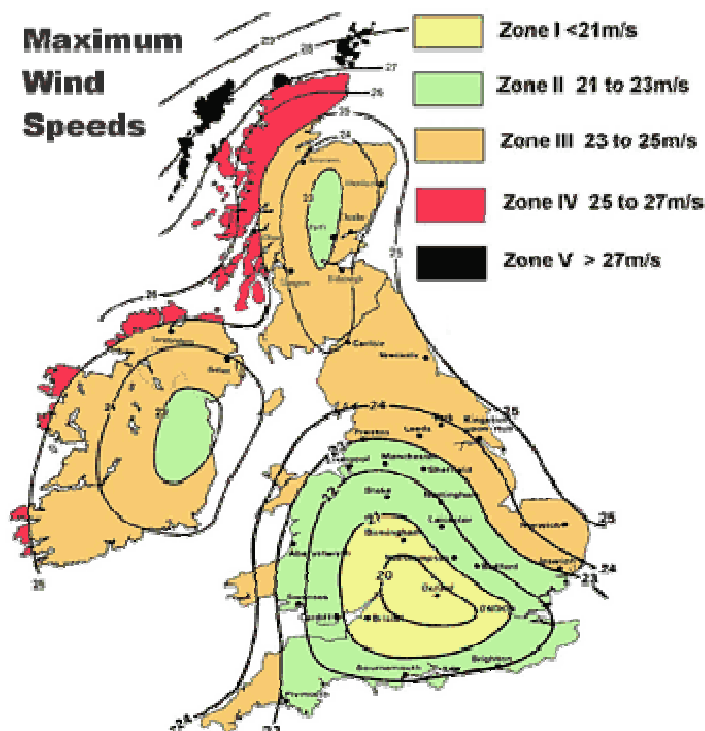
A wind speed of 29 m/s is equivalent to 65 miles per hour (m/h) or just over 540 Pa. So, a window achieving less than this, under any classification, is prone to failure.

By way of an example, a Watertightness Pressure Class of 300 Pa is equivalent to a wind speed of only 21 m/s or 48 m/h - Force 9 (47-54 m/h) on The Beaufort Wind Scale (see Appendix 2) - classified as a severe gale during which slight structural damage occurs (chimney-pots and slates removed). Similarly, an Air Permeability Pressure Class of 600 Pa is equivalent to a wind speed of 30 m/s or 68 m/h - Force 11 (64-72 m/h) - classified as a violent storm resulting in wide-spread damage.

This doesn't mean every window is going to leak immediately the wind exceeds Force 9. But windows facing the storm, often from a south-westerly (prevailing) wind direction are vulnerable.

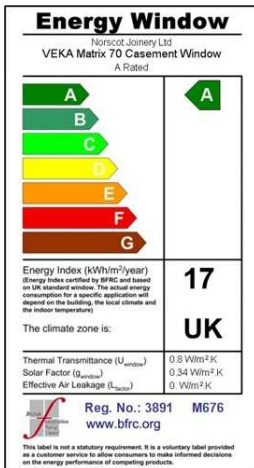
All High Performance Windows should have a test certification, proving they have achieved an Exposure Category of 2000 or better. However, as has been shown above, the weather to which windows are subjected in the Highlands & Islands (particularly on the west coast) often exceeds that upon which these tests are based. Consequently, in such instances, it is not inconceivable for any window, from any manufacturer, to suffer temporary failure.

## Maximum Wind Speeds in UK



## A Guide To Window Energy Efficiency

**So what exactly are Energy Efficient Windows?** They are windows that help to contain and conserve heat within the home keeping out wind and rain, resisting condensation and yet allowing natural “free” energy - the warmth of the sun - to heat the home. They can be made using any frame material - timber, uPVC or aluminium clad timber composite.



A Window Energy Rating (WER) is a label issued by the British Fenestration Rating Council (BFRC - <http://www.bfrc.org/>). The BFRC Scheme is the UK's national system for rating the energy efficiency of windows and is recognised within the building regulations as a method to show compliance for window installations.

The WER uses a consumer-friendly, traffic-light style A-E ratings guide similar to that used on 'white' goods (such as fridges, freezers, washing machines etc.). This ratings label allows the end user to make more informed choices about the energy efficiency of their windows.

With carbon emissions high on the global agenda and the current high cost of fuel, energy efficiency is a major consideration.

Each window rated by the BFRC has a unique label. This label will display the following information:

- The rating level – A, B, C, etc...
- The energy rating eg. -3kWh/(m²·K) in this example the product will lose 3 kilowatt hours per square metre per year.
- The window U value eg. 1.4W/(m²·K)
- The effective heat loss due to air penetration as L eg. 0.01 W/(m²·K)
- The solar heat gain eg. g=0.43

Simply put this will determine how well a product will perform the functions of:

- Helping you contain and conserve heat within your building in the winter
- Keep out the wind
- Resist condensation
- Contribute to improved sound insulation

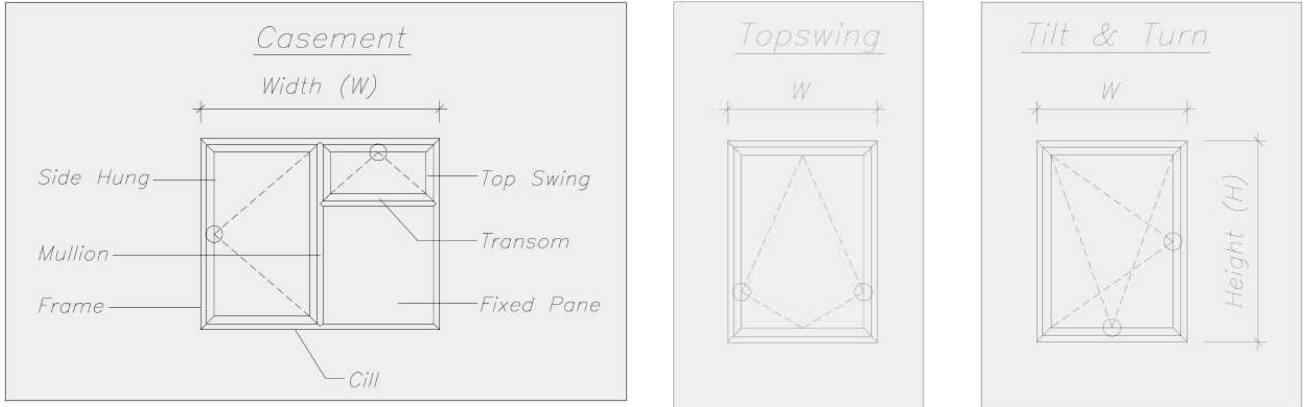
Window energy ratings are a hot topic at present, with different window companies trying to outdo each other by claiming to have the best. The reality is much different. Most premium window products, such as those supplied by Norscot, achieve a C rating as a minimum.

Companies offering the better A rated windows are unlikely to offer this as standard, due to the additional cost involved. Also, they are unlikely to be able to offer an A rated window in all styles, due to restrictive technical parameters.

A B rated window is achievable across all styles. But, an A rated window might only be available as a casement style, for example. In reality the difference between B and A rated windows, in terms of the added benefit, is so small that it would be difficult to justify the additional cost.

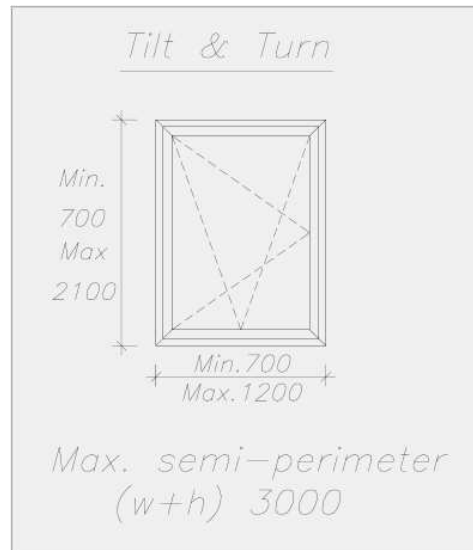
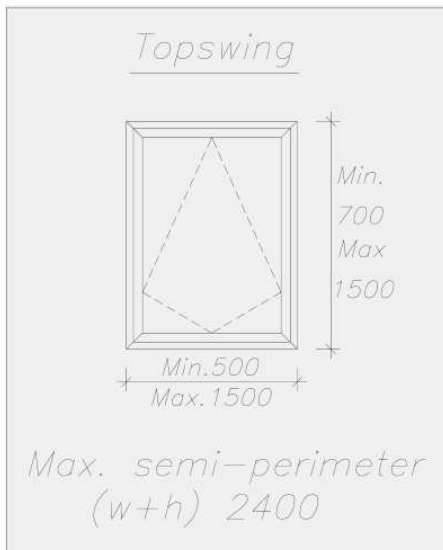
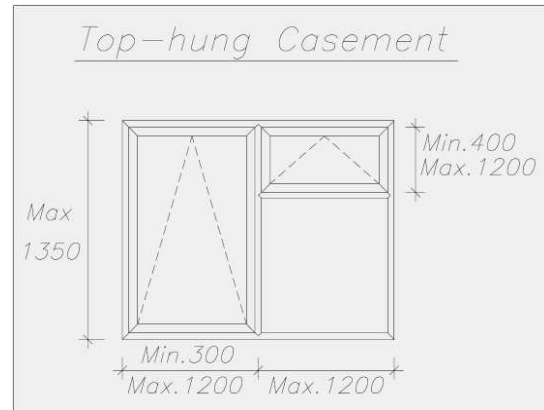
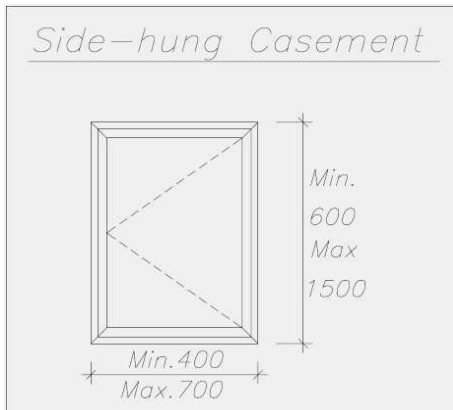
Energy Efficient Windows are easy to recognise - simply look for the BFRC Label.

## Appendix 1A - Window Terms & Symbols



⊗ Indicates hinge positions and determines handing i.e right or left hand, except top swing which rotates.

## Appendix 1B - Window Design Limitations



## Appendix 2 - Beaufort Wind Force Scale

Beaufort Wind Force	Wind speed		Wind Description
	MPH	m/s	
0	<1	<1	Calm
1	1-3	1-2	Light air
2	4-7	2-3	Light breeze
3	8-12	4-5	Gentle breeze
4	13-17	6-8	Moderate breeze
5	18-24	9-11	Fresh breeze
6	25-30	11-14	Strong breeze
7	31-38	14-17	Near gale
8	39-46	17-21	Gale
9	47-54	21-24	Severe gale
10	55-63	25-28	Storm
11	64-73	29-32	Violent storm
12	74+	33+	Hurricane

