WINDOWS

INFORMATION SHEET

WHAT TO LOOK FOR AND THINGS TO THINK ABOUT

Windows are an essential part of any home, but they account for considerable heat loss in winter. Secondary and double-glazing help reduce heat loss. Other benefits include noise reduction, improved airtightness and reduced condensation.

Window performance relies on a number of factors such as orientation, frame type, size, glazing elements and fabric window treatments. Window treatments are covered in Information Sheet **Curtains and Blinds**.

ORIENTATION

- **North-facing windows** can contribute significantly to the 'passive' heating of a home in winter. On sunny days they allow free solar heating for six to eight hours, but for the rest of the day and night they account for heat loss.
- **South-facing windows** receive no direct sunlight in winter, and therefore only cause heat loss from a home in winter.
- **East- and west-facing windows** may provide a small amount of 'passive' heating in winter, but are likely to be heat losers for 22 or more hours each day.
- **Large west-facing windows** have a tendency to overheat homes in summer and should be avoided or addressed with shade trees or pulling curtains or blinds in the late afternoon.

FRAME TYPE

The window frame material has a big influence on overall performance. (See Table 1).

- **Aluminium window frames** are great for low maintenance, but not for thermal performance.
- **Thermally-broken aluminium window frames** further reduce heat-loss of double glazing with aluminium window frames.
- **PVC window frames** offer increased performance combined with low maintenance.
- **Wooden windows frames** offer the best thermal performance, however they generally cost more and have increased maintenance requirements.

SIZE

With small windows the heat loss from the frame has a larger effect on window performance, but with large windows the glazing has a larger impact on performance.

GLAZING

The performance boost from secondary and double glazing comes from the layer of still air trapped between the glass/film and the properties of the glazing material.

High performance glass is one area where you can substantially boost performance relative to cost. Low E coatings let the sun's heat through the glass but act like a mirror to prevent it from leaving the room. This probably has the single most significant impact on the thermal performance of a window.

Laminated glass substantially reduces noise. Talk to your window supplier for advice on options.

AIR GAPS

Double-glazed windows have a gap between the panes of between 6mm and 18mm. The optimal size is 12 to 14mm for a standard double-glazing, and 16mm for windows with high performance glazing such as low-e coatings.

The air between the panes can be replaced with special gases, which are better insulators than air. Spacer bars hold the panes of glass apart. Thermal spacer bars further improve performance over standard aluminium spacer bars.

RETROFITTING EXISTING WINDOWS

Single-glazed windows can let out heat 10 times more readily than insulated walls. To reduce the performance gap between walls and single-glazed windows, there are three main options.

1. **Secondary glazing**

This might include a window insulation kit, acrylic sheets, or adding a second layer of glass. Research shows this approach is just as effective as double-glazing and is almost invisible if well-applied. It is most effective for retrofitting wooden frames, but can also reduce condensation on aluminium-framed windows.

Critical for secondary glazing is that the seals must be absolutely right or condensation can occur between the panes. In some cases opening such windows can be awkward.

2. **Retrofit double glazing**

This is where the existing glass is removed and a new double glazed unit is retrofitted into the existing frame. It is usually cheaper than replacing the complete window.

3. **Replacement windows**

Special consideration should be given to retrofitting timber windows rather than replacing them with new aluminium frames, because of the better thermal performance of timber frames. (See Table 1)

BUILDING NEW

If you're in the market to buy new windows, consider both the frame and glazing performance as discussed above.

The R-values in table 1 give a guide to thermal performance: the bigger the number, the greater the effectiveness. Note how the performance improves with better window frames and different glazing elements.

To put things in perspective, even the best glazing available in New Zealand (R 0.6) falls short of a standard insulated wall (R1.9).

Some companies offer a Window Energy Efficiency Rating System (WEERS) evaluation so you can compare performance gains for different options.

TABLE 1 - A COMPARISON OF TYPES OF WINDOWS

	Single glazing	**Standard double glazing**	**Double glazing with Low E glass**	**Double glazing with Low E glass plus Argon gas**
Aluminium frames	R0.15	R0.26	R0.31	R0.33
Thermally broken aluminium frames*	R0.17	R0.31	R0.40	R0.43
Timber/uPVC	R0.19	R0.36	R0.48	R0.53

* Stops transfer of heat and cold via window frames

Note 1: The above figures are from NZS 4218:2009. Figures for double glazing are based on 12mm space between panes.

Note 2: The above figures are based on a "standardised" window showing the minimum performance that would be expected. Depending on variables such as size, frame to glass ratios and glazing options often higher performance can be achieved. Use the WEER's system to model likely in-service performance of the various options.

RULES OF THUMB

- Ask for WEERS ratings to compare performance.
- Aim for the highest specification your budget can accommodate.
- When planning a new home, consider window placement carefully.

FOR FURTHER INFORMATION

Contact your nearest Eco Design Advisor
Visit our website ecodesignadvisor.org.nz

View helpful resources at:

- WEERS (Window Energy Efficiency Rating System)
- ecodesignadvisor.org.nz/wp-content/uploads/2018/01/passive-solar-2.pdf