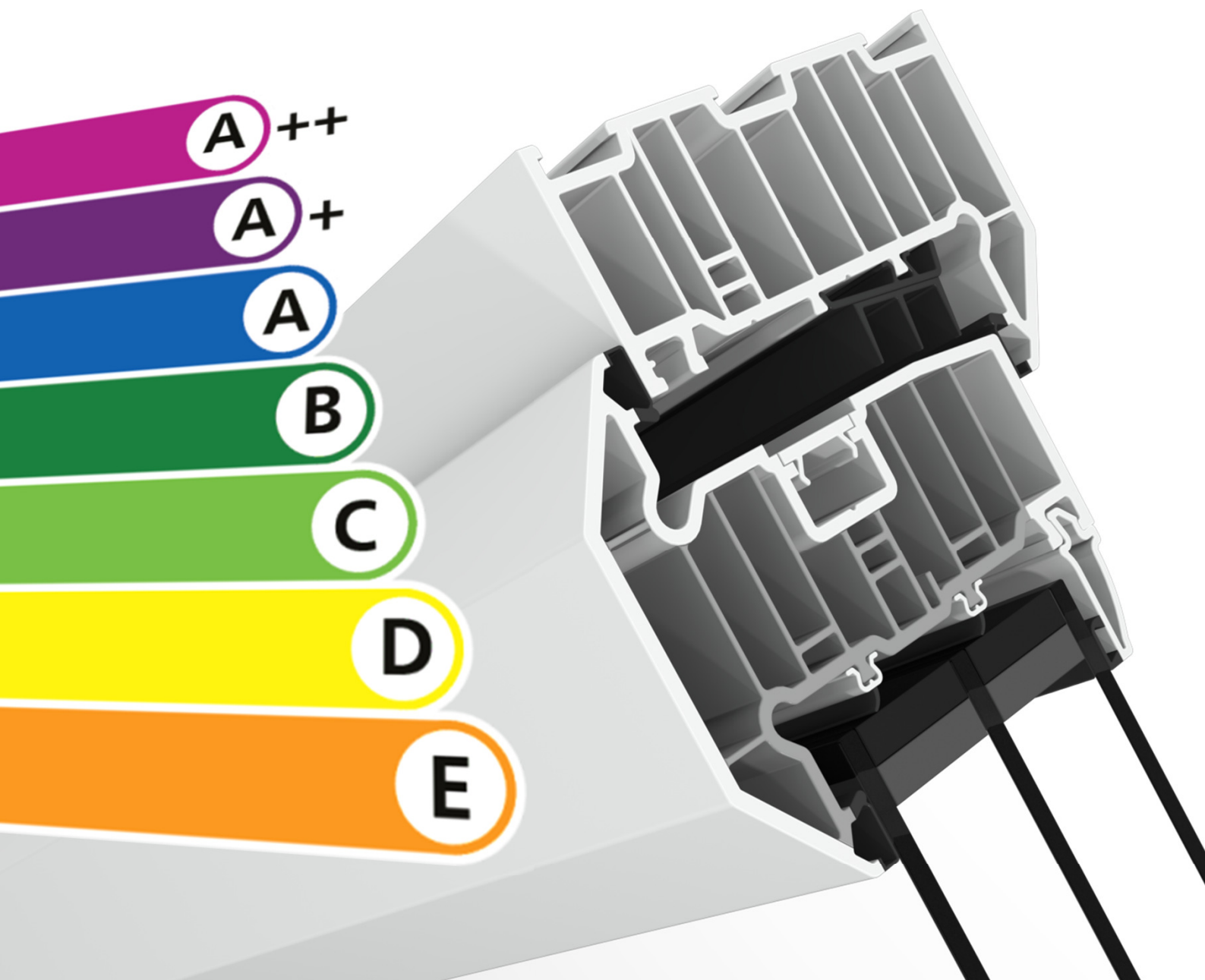


# Energy Performance HANDBOOK

REV. 1.0 - JULY 25





|                                          |           |
|------------------------------------------|-----------|
| Introduction.....                        | <b>4</b>  |
| Regulations.....                         |           |
| Approved Document L.....                 | <b>5</b>  |
| Approved Document O.....                 | <b>6</b>  |
| Approved Document Q.....                 | <b>7</b>  |
| U-values.....                            | <b>8</b>  |
| G-values.....                            | <b>9</b>  |
| Energy Ratings.....                      | <b>10</b> |
| Glazing.....                             |           |
| Configurations.....                      | <b>11</b> |
| Glass.....                               | <b>12</b> |
| Spacer Bars.....                         | <b>14</b> |
| Glossary.....                            | <b>16</b> |
| Appendix.....                            |           |
| GGF Sample Sizes.....                    | <b>17</b> |
| Specification Sheets.....                |           |
| 70mm Casement Window.....                | <b>18</b> |
| 70mm Tilt & Turn Window.....             | <b>20</b> |
| 70mm Flush Sash Casement Window.....     | <b>22</b> |
| 80mm Resurgence Flush Sash Window.....   | <b>24</b> |
| 70mm Reversible Window.....              | <b>26</b> |
| Zero 90 Casement Window.....             | <b>28</b> |
| Zero 90 Tilt & Turn Window.....          | <b>30</b> |
| Zero 90R Rebated Casement Window.....    | <b>32</b> |
| Zero 90R Rebated Tilt & Turn Window..... | <b>34</b> |

## INTRODUCTION

To comply with building regulations windows and doors must be supplied with evidence of energy and thermal performance. This can be supplied in two forms, U-values or energy ratings. This guide explains the relevant building regulations and energy performance relating to windows and doors. This will enable you to use the Liniar Energy Performance Calculator effectively to reach your desired product specification.

At the end of this handbook, you will find the specification sheets for each Liniar window system (from page 18). These have been created to guide you to achieve the following:

- The best U-value and energy rating possible for each system
- Comply to Part L for both replacement and new build dwellings

## FURTHER ENERGY PERFORMANCE RELATED ENQUIRIES

For any unanswered energy performance related questions contact [design@liniar.co.uk](mailto:design@liniar.co.uk)

There are also more resources available through the Liniar website and the Liniar Connect Vault.



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## Approved Document L: Conservation of Fuel and Power

Volume 1: Dwellings

Volume 2: Buildings other than dwellings

Latest edition: 2021, amended 2023

For more information, click [here](#) to access the document.

The table below lists the latest thermal requirements for windows and doors in both existing (replacement) buildings and new builds.

| PRODUCT TYPE                            | EXISTING DWELLINGS<br>(INC. EXTENSIONS)                                                               | NEW BUILD DWELLINGS |                           |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| -----LIMITING U-VALUE W/m²K-----        |                                                                                                       |                     |                           |
|                                         |                                                                                                       | ENGLAND             | WALES, SCOTLAND & IRELAND |
| WINDOWS                                 | 1.4 or <div>WINDOW ENERGY RATING B</div>                                                              | 1.6                 | 1.4                       |
| DOORS WITH >60% OF INTERNAL FACE GLAZED | 1.4 or <div>DOORSET ENERGY RATING C</div> <div>SCOTLAND ONLY</div> <div>DOORSET ENERGY RATING B</div> | 1.6                 | 1.4                       |
| DOORS WITH <60% OF INTERNAL FACE GLAZED | 1.4 or <div>DOORSET ENERGY RATING B</div>                                                             | 1.6                 | 1.4                       |

### PLEASE NOTE

- Building regulations state that no window or door should perform worse than the product it's replacing.
- The values shown above are the maximum permitted for building regulations. For new build dwellings the SAP calculation may require lower U-values. Liniair recommends checking requirements for each dwelling.

## Approved Document O: Overheating

Latest edition: 2021

For more information, click [here](#) to access the document.

This has been introduced to focus on ensuring new residential dwellings are designed to mitigate the effects of high indoor temperatures (overheating). G-values are generally requested to be assessed to ensure that the amount of solar gain (heat from the sun) is adequate in relation to the following:

- Location area of dwelling
- Orientation and position of windows within dwelling (i.e. South facing)
- Ratio of glazing area to floor area

### **LIMITING SOLAR GAINS**

To adhere to Part O, the G-values requested will tend to be lower. A low G-value means less solar gain or heat transferred from the sun.

### **ADEQUATE VENTILATION**

Trickle vents may be used for ventilation but are not used in energy and thermal performance calculations.

### **HOW DOES THIS EFFECT U-VALUES?**

G-values aren't used to calculate a U-value, however:

- Lower G-values typically result in a better U-value
- Higher G-values typically result in a poor U-value

### **HOW DOES THIS EFFECT ENERGY RATINGS?**

G-values are needed in an energy performance calculation:

- Lower G-values result in a poor energy rating
- Higher G-values result in a better energy rating

## Approved Document Q: Security - Dwellings

Latest edition: 2015

For more information, click [here](#) to access the document.

Approved Document Q ensures that all easily accessible windows and doors are secure against physical attack from intruders / burglars. This includes front doors, rear doors, ground floor windows and accessible upper-floor windows and doors. It is only applicable to new build dwellings, not existing dwellings.

To adhere to Part Q, you would need to use laminate glass (min 6.8mm). Please note that 6.4mm laminate glass does not adhere to Part Q, however it would adhere to Approved Document K: Protection from falling, collision and impact.

### HOW DOES THIS EFFECT U-VALUES?

Laminate glass in some cases can improve thermal performance (U-value), in other cases it might not. This is all dependant on cavity widths and its relationship with glazing unit thicknesses.

### HOW DOES THIS EFFECT ENERGY RATINGS?

Using a laminate pane with a glazing unit will drop the G-value compared to a standard 4-20-4 glazing unit. This will negatively impact your energy ratings and may bring the band rating down.

## WHAT IS A U-VALUE?

U-values are a measure of how effectively a building element, like a wall or roof, resists heat transfer, essentially indicating its insulating properties. A lower U-value signifies better insulation, meaning less heat is lost through the element. It quantifies the rate at which heat flows through a building element for a given temperature difference. A lower U-value means the heat flow is slower, indicating better insulation.

U-values are crucial for assessing the thermal performance of buildings, impacting energy efficiency, comfort, and costs and are determined by the materials used, their thickness, and any insulation applied.

U-value calculations for windows and doors are based on GGF styles/sizes. Approved Document L states you can use the GGF styles/sizes for U-values. Please see page 17 for more information.

## U-VALUE DISPLAY FORMAT

The U-value suffix is  $W/m^2K$ , which translates to Watts per  $m^2$  Kelvin.

U-values are shown to 2 significant figures. If the value is  $>1.0$ , it would be rounded to 1 decimal place, e.g. 1.34 is rounded down to 1.3, and 1.36 is rounded up to 1.4. If the value is  $<1.0$ , it is always shown at 2 decimal places, e.g. 0.83 is kept as 0.83, it wouldn't be rounded down to 0.8.

## WHAT IS THE 25% RULE CALCULATION?

There is an option within the EPC for a 25% rule calculation. Approved Document L states that a window / door can be 25% larger than the standard GGF sizes. Because the window / door is 25% larger, there will be more glass, therefore the U-value will improve.

Please note that this is only applicable to U-values, not energy ratings. If you require an energy rating, you must use the standard GGF sizes. Please see page 17 for more information.

## CURRENT CONFORMITY

Compliance for self-certified U-values is via the mandatory requirements of BS 14351-1, the D.O.P (Declaration of Performance) in your UKCA/CE marking. You as the supplier of the finished product must provide a UKCA/CE mark.

## WHAT IS A G-VALUE?

In building design, particularly for windows and glazing, a G-value indicates the amount of solar heat gain (heat from the sun) that passes through a material. G-values are represented on a scale from 0 to 1, with higher values signifying greater solar heat gain.

A window with a G-value of 0.7 would transmit 70% of the solar heat, while a window with a G-value of 0.3 would transmit only 30%. Depending on where you live, the orientation and positioning of windows and doors, the G-value of your windows can impact how energy efficient and comfortable your home is.

Warmer climates would benefit from a lower G-value by blocking more solar heat and keeping the building cooler, whereas a cooler climate would benefit more with a higher G-value so that more solar heat is transmitted into the building to heat up the space.

## WHAT IS AN ENERGY RATING?

Window Energy Ratings (WERs) indicate how energy-efficient a window is. These ratings are determined by factors like heat loss, air leakage, thermal performance and solar gain. The most efficient windows receive an A++ rating, and the least efficient receiving an E rating.

Calculations for energy ratings are based on GGF size and style windows (see page 17 for more details).

Exactly like a WER, a Door Energy Rating (DER) or Doorset Energy Rating (DSER) indicates how energy-efficient a door is.

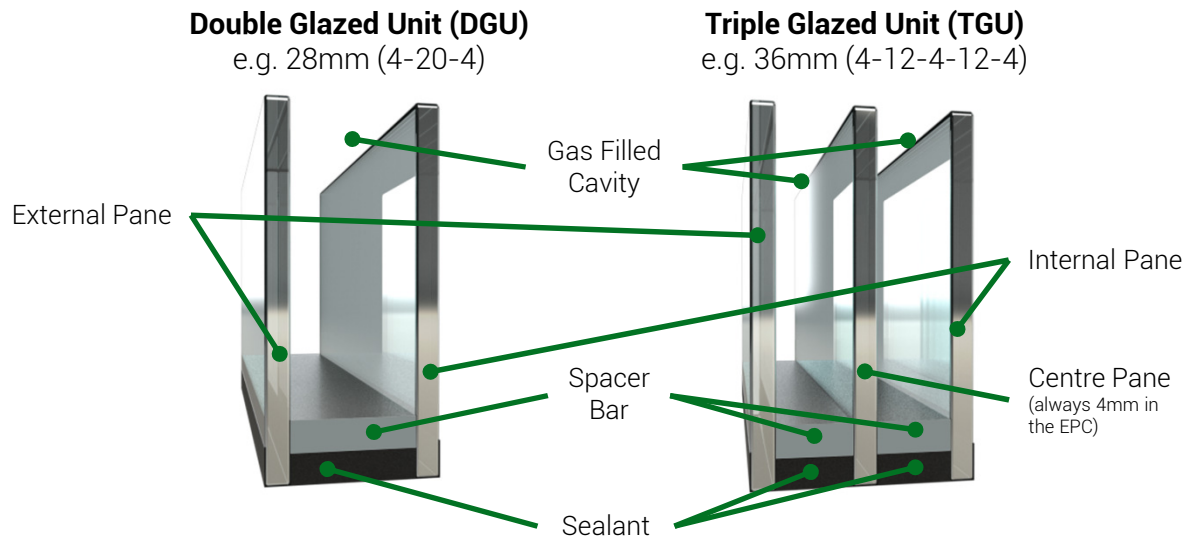


## CURRENT CONFORMITY

An energy rated window or door brought to market must be registered by the relevant WER/DER scheme (i.e. BFRC or ER Certification Ltd). The final manufacturer will need to become a WER/DER licence holder.

## Glazing Configurations

There are many different possible configurations of glazing unit, the EPC includes the most common configurations for double and triple glazed units. Liniar's window and doors are compatible with 28mm, 36mm, 40mm, 48mm and 56mm units.



Typical unit examples:

- 28mm DGU: 4-20-4 (e.g. 4mm external pane, 20mm cavity, 4mm internal pane)
- 36mm TGU: 4-12-4-12-4 (e.g. 4mm external pane, 12mm cavity, 4mm centre pane, 12mm cavity, 4mm internal pane)

The table below shows the most common glazing configurations, all available on the Energy Performance Calculator.

|               | 28MM DGU             | 28MM TGU                   | 36MM TGU                       | 40MM TGU                       | 48MM TGU                       | 56MM TGU                       |
|---------------|----------------------|----------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| NON-LAMINATED | 4-20-4               | 4-8-4-8-4                  | 4-12-4-12-4                    | 4-14-4-14-4                    | 4-18-4-18-4                    | 4-22-4-22-4                    |
|               |                      |                            |                                |                                |                                |                                |
| LAMINATED     | 6.4-18-4<br>6.8-18-4 | 6.4-6-4-8-4<br>6.8-6-4-8-4 | 6.4-10-4-12-4<br>6.8-10-4-12-4 | 6.4-12-4-14-4<br>6.8-12-4-14-4 | 6.4-16-4-18-4<br>6.8-16-4-18-4 | 6.4-20-4-22-4<br>6.8-20-4-22-4 |
|               |                      |                            |                                |                                |                                |                                |

## Glass

The tables below show the glass types available on the Energy Performance Calculator. They have been split into the four main glass suppliers, Pilkington, Saint-Gobain, Guardian and AGC. The lower the emissivity value, the better it will perform thermally.

### PILKINGTON

| TYPE             | NAME               | COATING | EMISSIVITY | U-VALUE | G-VALUE   | ENERGY RATING |
|------------------|--------------------|---------|------------|---------|-----------|---------------|
| Float            | Optifloat™         | N/A     | 0.89       | ★       | High      | ★★★           |
| Float (Laminate) | Optilam™           |         |            |         | Very High | ★★★★★         |
| Low Ion          | Optiwhite™         |         |            |         |           | ★★★★★         |
| Low E            | K Glass™           | Hard    | 0.14       | ★★      | Moderate  | ★★            |
|                  | K Glass™ A         |         | 0.11       | ★★★     |           | ★★★           |
|                  | K Glass™ S         | Soft    | 0.05       | ★★★★★   | Low       | ★★★★★         |
|                  | Optitherm™ S1 Plus |         | 0.01       | ★★★★★   |           | ★             |

### SAINT-GOBAIN

| TYPE             | NAME                  | COATING | EMISSIVITY | U-VALUE | G-VALUE   | ENERGY RATING |
|------------------|-----------------------|---------|------------|---------|-----------|---------------|
| Float            | Planiclear            | N/A     | 0.89       | ★       | High      | ★★★           |
| Float (Laminate) | Planilam              |         |            |         | Very High | ★★★★★         |
| Low Ion          | Diamant               |         |            |         |           | ★★★★★         |
| Low E            | Planitherm® Total+ FG | Soft    | 0.05       | ★★★     | Moderate  | ★★★★★         |
|                  | Planitherm® Ultra N   |         | 0.03       | ★★★★★   |           | ★★★★★         |
|                  | Planitherm® One T FG  |         | 0.01       | ★★★★★   | Low       | ★             |
|                  | Planitherm® One       |         |            |         |           |               |

## GUARDIAN

| TYPE               | NAME                    | COATING | EMISSIVITY | U-VALUE | G-VALUE   | ENERGY RATING |
|--------------------|-------------------------|---------|------------|---------|-----------|---------------|
| Float              | ExtraClear®             | N/A     | 0.89       | ★       | High      | ★★★           |
| Float (Laminate)   | LamiGlass® ExtraClear®  |         |            |         | Very High | ★★★★★         |
| Low Ion            | UltraClear®             |         |            |         | High      | ★★★★★         |
| Low Ion (Laminate) | LamiGlass® UltraClear®  |         |            |         | Moderate  | ★★★★★         |
| Low E              | Climaguard® A+          | Soft    | 0.05       | ★★★     | Low       | ★             |
|                    | Climaguard® 1.0+        |         | 0.01       | ★★★★★   | Low       | ★             |
|                    | Climaguard® 1.0 Neutral |         |            |         |           |               |

## AGC

| TYPE             | NAME        | COATING | EMISSIVITY | U-VALUE | G-VALUE   | ENERGY RATING |
|------------------|-------------|---------|------------|---------|-----------|---------------|
| Float            | Clearlite   | N/A     | 0.89       | ★       | High      | ★★★           |
| Float (Laminate) | Lamisafe™   |         |            |         | Very High | ★★★★★         |
| Low Ion          | Clearvision |         |            |         | Moderate  | ★★★           |
| Low E            | Planibel G  | Hard    | 0.14       | ★★      | Moderate  | ★★★           |
|                  | Planibel A  |         | 0.10       | ★★★     |           |               |

- **Float** – Standard glass, normally placed on the external side of a glazing unit
- **Low Ion** – Higher G-value. Low iron content boasting superior clarity over float, allows unfiltered light to pass through
- **Low E** – Stands for low emissivity (how effective heat travels through a medium). Low emissivity glass distributes thermal radiation less effectively, hence better U-values. Normally placed on the internal side of a glazing unit
- **Laminate** – Safety and security glass required for Part K and Part Q
- **Hard Coating** – Cost effective, allows more light transition and easier to manufacture glass units
- **Soft Coating** – Improved U-values and more expensive over hard coating

## Spacer Bars

The table below shows the spacer bars available on the Energy Performance Calculator. Lower conductivity values give lower U-values and higher energy ratings, the better it will perform thermally. Butyl sealant has a lower conductivity than PU/PS (0.24 vs 0.40), and is better for fabricating units with flexible spacers, whereas PU/PS is better for fabricating rigid spacers units.

| SUPPLIER         | NAME                    | MATERIAL                                             | SEALANTS             | CONDUCTIVITY |
|------------------|-------------------------|------------------------------------------------------|----------------------|--------------|
| N/A              | Generic Aluminium       | Aluminium                                            | PU/PS                | 160          |
| Allmetal         | ALLMETAL GTS            | Stainless Steel                                      | Butyl<br>or<br>PU/PS | 0.59         |
| Alu-Pro          | Chromatech              | Stainless Steel                                      |                      | 0.81         |
|                  | Chromatech Ultra F/F1   | Stainless Steel & PVCu                               |                      | 0.28         |
|                  | Chromatech Ultra S      | Stainless Steel & Polypropylene                      |                      | 0.32         |
|                  | Multitech               | Multilayer foil, Metalized, Styrene Acrylonitrile    |                      | 0.13         |
|                  | Multitech G             | Multilayer foil, glass coated, Styrene Acrylonitrile |                      | 0.125        |
|                  | Thermix TX Pro          | Stainless Steel & Polypropylene                      |                      | 0.31         |
| Edgetech         | Genesys                 | Elastomeric Composite Foam                           | Butyl                | 0.15         |
|                  | Super Spacer® Premium   | Silicone Foam, Mylar Foil                            |                      | 0.15         |
|                  | TruPlas®                | Glass Reinforced Thermoplastic                       |                      | 0.14         |
|                  | T-Spacer™ Premium       | Silicone Foam, Modified Mylar Foil                   |                      | 0.15         |
|                  | T-Spacer™ SG            |                                                      |                      | 0.19         |
| Swisspacer       | Swisspacer Advance      | Thermally improved aluminium foil, SAN-GF            | Butyl<br>or<br>PU/PS | 0.29         |
|                  | Swisspacer Ultimate     | Metalized polyester film “High T Foil”, SAN-GF       |                      | 0.14         |
|                  | Swisspacer Ultimate Pro | Metalized polyester film “High T Foil”, ABS-GF       |                      | 0.135        |
| Technoform       | Technoform SP12         | Stainless Steel & Polypropylene                      |                      | 0.31         |
|                  | Technoform SP13         |                                                      |                      | 0.31         |
|                  | Technoform SP14         |                                                      | PU/PS                | 0.31         |
|                  | Technoform SP16         | Multilayer barrier film, SAN-GF                      | Butyl<br>or<br>PU/PS | 0.14         |
|                  | Technoform SP18         | Stainless Steel & PVCu                               |                      | 0.31         |
| Thermoseal Group | Thermobar               | Polypropylene 40% glass filled                       | PU/PS                | 0.14         |
|                  | Thermoflex              | Silicone Foam, preformed flex spacer polyester       | Butyl                | 0.175        |

## Spacer Bars (cont.)

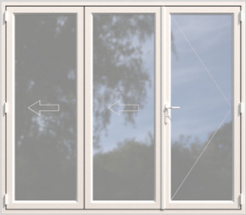
- **Warm Edge** – 'Warm edge' technology rectifies the high conductivity produced by generic metal spacer bars. By using highly-advanced plastics and foam rubbers rather than metal – like Edgetech's pioneering Super Spacer® which has been in continual use for over thirty years – were able to offer vastly better performance.
- **Rigid** – Rigid spacers, like Edgetech TruPlas®, have several advantages – they offer improved thermal performance over metal spacer bars, and companies can switch to them from their metal counterparts easily, using their existing machinery. The makeup of rigid spacers is of high-performing glass-reinforced thermoplastics or a combination of plastic and steel.
- **Flexible** – Flexible spacers like Super Spacer® have far more versatility. Their flexible design means they can be used to easily create unconventionally shaped units. Flexible spacers will return to its original position where strong winds and fluctuating temperatures apply pressure to the internally glazed units, reducing the stress on the glass edge.

- **WER** – Window Energy Ratings indicates how energy-efficient a window is.
- **DER / DSER** – Door Energy Ratings or Doorset Energy Rating indicates how energy-efficient a door is.
- **GGF** – The Glass & Glazing Federation is a trade association that exists for anyone that manufactures, supplies or fits glass and glazing products.
- **UKAS** – The United Kingdom Accreditation Service is a government appointed national accreditation body for the UK. They assess and accredit organisations that provide services including certification, testing, inspection, calibration, validation and verification.
- **BFRC** – The British Fenestration Rating Council are an approved test house that verifies U-value simulation reports with UKAS accreditation, and the energy performance (WER's of windows and doors.
- **ERC** – ER Certification Ltd operates as an Independent Agency conducting audits for an energy rating scheme. They conduct assessments and audits to enable window fabrication & installation companies operate the WER scheme.
- **FENSA** – The Fenestration Self-Assessment Scheme is a government-authorised scheme that monitors building regulation compliance for replacement windows and doors. Every FENSA approved installer, from large national brands to small local companies, is assessed regularly to ensure its standards are continually maintained.
- **Emissivity** – A measure of how well a surface emits thermal radiation. A higher emissivity means more heat is emitted, a lower emissivity means more heat is reflected. Float glass is typically 0.89 or 89%, meaning it absorbs and re-emits 89% of the thermal radiation it encounters. Low E glass has a much lower emissivity (between 0.14 and 0.01) due to a special coating.

## GGF Sample Sizes

The below table shows the GGF (Glass & Glazing Federation) window and door styles that are used for U-values and energy ratings. Approved Document L states for U-values, you can use the GGF style or any size/configuration. The 25% rule sizes are only applicable to U-values, they are not applicable to energy ratings.



| STYLE                                                                               | PRODUCTS          | STANDARD SIZES<br>(U-values & Energy Ratings) | 25% RULE SIZES<br>(U-values only) |
|-------------------------------------------------------------------------------------|-------------------|-----------------------------------------------|-----------------------------------|
|    | All Windows       | Width: 1.23m<br>Height: 1.48m                 | Width: 1.538m<br>Height: 1.48m    |
|  | Residential Doors | Width: 1.23m<br>Height: 2.18m                 | Width: 1.538m<br>Height: 2.725m   |
|  | French Doors      | Width: 2.00m<br>Height: 2.18m                 | Width: 2.50m<br>Height: 2.725m    |
|  | Patio Doors       | Width: 2.00m<br>Height: 2.18m                 | Width: 2.50m<br>Height: 2.725m    |
|  | Bi-Fold Doors     | Width: 2.50m<br>Height: 2.18m                 | Width: 2.50m<br>Height: 2.725m    |

## 70mm Casement Window



This document shows suggested specifications and have been determined with consideration of more realistic scenarios, cost effectiveness and industry standards.

- No large head ventilation
- PVCu Thermal Reinforcement only
- No double coatings on DGU
- No triple coatings on TGU
- 90% Argon (10% Air) only
- 4mm glass only

| LOWEST U-VALUE & HIGHEST ENERGY RATING |                                                                            |                                                                        |
|----------------------------------------|----------------------------------------------------------------------------|------------------------------------------------------------------------|
|                                        | U-Value: 0.81 W/m²K                                                        | WER: A++ (≥20 Energy Index)                                            |
| Calculation Method                     | 25% Rule                                                                   | Standard                                                               |
| Window Suite                           | EnergyPlus                                                                 | EnergyPlus                                                             |
| Outer Frame                            | Small                                                                      | Small                                                                  |
| Large Head                             | No                                                                         | No                                                                     |
| Mullion                                | Standard                                                                   | Standard                                                               |
| Reinforcement                          | PVCu                                                                       | PVCu                                                                   |
| Glazing Flipper                        | Yes                                                                        | No                                                                     |
| Thermal Dam                            | Yes                                                                        | No                                                                     |
| Glazing Thickness                      | 40mm (Triple)                                                              | 36mm (Triple)                                                          |
| External Pane                          | 4mm Float                                                                  | 4mm Low Ion                                                            |
| Cavity                                 | 90% Argon (10% Air)                                                        | 90% Argon (10% Air)                                                    |
| Internal Pane                          | 4mm Optitherm™ S1 Plus<br>4mm Planitherm® One T FG<br>4mm Climaguard® 1.0+ | 4mm K Glass™ S<br>4mm Planitherm® Total+ FG<br>4mm Climaguard® A+      |
| Spacer Bar                             | Multitech (Butyl) or (PU/PS)<br>Multitech G (Butyl) or (PU/PS)             | Edgetech Super Spacer® Premium<br>Edgetech TruPlas® (Butyl) or (PU/PS) |

Indicated values (U-Value and WER) can be improved further but with the use of 90% Krypton (10% Air) gas.

## THERMAL COMPLIANCE - PART L (REPLACEMENT)

|                    | U-Value: $\leq 1.4 \text{ W/m}^2\text{K}$                                                                          | WER: B (-10 to <0 Energy Index)                                                                                    |
|--------------------|--------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Calculation Method | Standard                                                                                                           | Standard                                                                                                           |
| Window Suite       | Standard                                                                                                           | Standard                                                                                                           |
| Outer Frame        | Small                                                                                                              | Small                                                                                                              |
| Large Head         | No                                                                                                                 | No                                                                                                                 |
| Mullion            | Standard                                                                                                           | Standard                                                                                                           |
| Reinforcement      | PVCu                                                                                                               | PVCu                                                                                                               |
| Glazing Flipper    | No                                                                                                                 | No                                                                                                                 |
| Thermal Dam        | No                                                                                                                 | No                                                                                                                 |
| Glazing Thickness  | 28mm (Double)                                                                                                      | 28mm (Double)                                                                                                      |
| External Pane      | 4mm Float                                                                                                          | 4mm Float                                                                                                          |
| Cavity             | 90% Argon (10% Air)                                                                                                | 90% Argon (10% Air)                                                                                                |
| Internal Pane      | 4mm K Glass™ S<br>4mm Planitherm® Total+ FG<br>4mm Climaguard® A+                                                  | 4mm K Glass™<br>4mm Planibel G                                                                                     |
| Spacer Bar         | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Edgetech Super Spacer® Premium<br>Edgetech TruPlas® (Butyl) or (PU/PS) | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Edgetech Super Spacer® Premium<br>Edgetech TruPlas® (Butyl) or (PU/PS) |

## THERMAL COMPLIANCE - PART L (NEW BUILD)

|                    | U-Value: $\leq 1.6 \text{ W/m}^2\text{K}$                                                                          |
|--------------------|--------------------------------------------------------------------------------------------------------------------|
| Calculation Method | Standard                                                                                                           |
| Window Suite       | Standard                                                                                                           |
| Outer Frame        | Small                                                                                                              |
| Large Head         | No                                                                                                                 |
| Mullion            | Standard                                                                                                           |
| Reinforcement      | PVCu                                                                                                               |
| Glazing Flipper    | No                                                                                                                 |
| Thermal Dam        | No                                                                                                                 |
| Glazing Thickness  | 28mm (Double)                                                                                                      |
| External Pane      | 4mm Float                                                                                                          |
| Cavity             | 90% Argon (10% Air)                                                                                                |
| Internal Pane      | 4mm K Glass™<br>4mm Planibel G                                                                                     |
| Spacer Bar         | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Edgetech Super Spacer® Premium<br>Edgetech TruPlas® (Butyl) or (PU/PS) |

## 70mm Tilt & Turn Window



This document shows suggested specifications and have been determined with consideration of more realistic scenarios, cost effectiveness and industry standards.

- No large head ventilation
- PVCu Thermal Reinforcement only
- No double coatings on DGU
- No triple coatings on TGU
- 90% Argon (10% Air) only
- 4mm glass only

### LOWEST U-VALUE & HIGHEST ENERGY RATING

|                    | U-Value: 0.85 W/m²K                                                        | WER: A++ (≥20 Energy Index)                                            |
|--------------------|----------------------------------------------------------------------------|------------------------------------------------------------------------|
| Calculation Method | 25% Rule                                                                   | Standard                                                               |
| Window Suite       | EnergyPlus                                                                 | EnergyPlus                                                             |
| Outer Frame        | Small                                                                      | Small                                                                  |
| Large Head         | No                                                                         | No                                                                     |
| Mullion            | Standard                                                                   | Standard                                                               |
| Reinforcement      | PVCu                                                                       | PVCu                                                                   |
| Glazing Flipper    | Yes                                                                        | Yes                                                                    |
| Thermal Dam        | Yes                                                                        | Yes                                                                    |
| Glazing Thickness  | 40mm (Triple)                                                              | 40mm (Triple)                                                          |
| External Pane      | 4mm Float                                                                  | 4mm Low Ion                                                            |
| Cavity             | 90% Argon (10% Air)                                                        | 90% Argon (10% Air)                                                    |
| Internal Pane      | 4mm Optitherm™ S1 Plus<br>4mm Planitherm® One T FG<br>4mm Climaguard® 1.0+ | 4mm K Glass™ S                                                         |
| Spacer Bar         | Multitech (Butyl) or (PU/PS)<br>Multitech G (Butyl) or (PU/PS)             | Edgetech Super Spacer® Premium<br>Edgetech TruPlas® (Butyl) or (PU/PS) |

Indicated values (U-Value and WER) can be improved further but with the use of 90% Krypton (10% Air) gas.

## THERMAL COMPLIANCE - PART L (REPLACEMENT)

|                    | U-Value: $\leq 1.4 \text{ W/m}^2\text{K}$                                                                          | WER: B (-10 to <0 Energy Index)                                                                                    |
|--------------------|--------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Calculation Method | Standard                                                                                                           | Standard                                                                                                           |
| Window Suite       | Standard                                                                                                           | Standard                                                                                                           |
| Outer Frame        | Large                                                                                                              | Large                                                                                                              |
| Mullion            | Standard                                                                                                           | Standard                                                                                                           |
| Reinforcement      | PVCu                                                                                                               | PVCu                                                                                                               |
| Glazing Flipper    | No                                                                                                                 | No                                                                                                                 |
| Thermal Dam        | No                                                                                                                 | No                                                                                                                 |
| Glazing Thickness  | 28mm (Double)                                                                                                      | 28mm (Double)                                                                                                      |
| External Pane      | 4mm Float                                                                                                          | 4mm Float                                                                                                          |
| Cavity             | 90% Argon (10% Air)                                                                                                | 90% Argon (10% Air)                                                                                                |
| Internal Pane      | 4mm K Glass™ S<br>4mm Planitherm® Total+ FG<br>4mm Climaguard® A+                                                  | 4mm K Glass™ S<br>4mm Planitherm® Total+ FG<br>4mm Climaguard® A+                                                  |
| Spacer Bar         | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Edgetech Super Spacer® Premium<br>Edgetech TruPlas® (Butyl) or (PU/PS) | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Edgetech Super Spacer® Premium<br>Edgetech TruPlas® (Butyl) or (PU/PS) |

## THERMAL COMPLIANCE - PART L (NEW BUILD)

|                    | U-Value: $\leq 1.6 \text{ W/m}^2\text{K}$                                                                          |
|--------------------|--------------------------------------------------------------------------------------------------------------------|
| Calculation Method | Standard                                                                                                           |
| Window Suite       | Standard                                                                                                           |
| Outer Frame        | Large                                                                                                              |
| Mullion            | Standard                                                                                                           |
| Reinforcement      | PVCu                                                                                                               |
| Glazing Flipper    | No                                                                                                                 |
| Thermal Dam        | No                                                                                                                 |
| Glazing Thickness  | 28mm (Double)                                                                                                      |
| External Pane      | 4mm Float                                                                                                          |
| Cavity             | 90% Argon (10% Air)                                                                                                |
| Internal Pane      | 4mm K Glass S<br>4mm Planitherm Total+ FG<br>4mm Climaguard A+                                                     |
| Spacer Bar         | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Edgetech Super Spacer® Premium<br>Edgetech TruPlas® (Butyl) or (PU/PS) |

## 70mm Flush Sash Casement Window



This document shows suggested specifications and have been determined with consideration of more realistic scenarios, cost effectiveness and industry standards.

- No large head ventilation
- PVCu Thermal Reinforcement only
- No double coatings on DGU
- No triple coatings on TGU
- 90% Argon (10% Air) only
- 4mm glass only

| LOWEST U-VALUE & HIGHEST ENERGY RATING |                                                                            |                                                                                                                    |
|----------------------------------------|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
|                                        | U-Value: 1.1 W/m <sup>2</sup> K                                            | WER: A+ (>10 to 20 Energy Index)                                                                                   |
| Calculation Method                     | 25% Rule                                                                   | Standard                                                                                                           |
| Window Suite                           | EnergyPlus                                                                 | EnergyPlus                                                                                                         |
| Outer Frame                            | Small                                                                      | Small                                                                                                              |
| Large Head                             | No                                                                         | No                                                                                                                 |
| Mullion                                | Standard                                                                   | Standard                                                                                                           |
| Reinforcement                          | PVCu                                                                       | PVCu                                                                                                               |
| Glazing Flipper                        | Yes                                                                        | Yes                                                                                                                |
| Thermal Dam                            | Yes                                                                        | Yes                                                                                                                |
| Glazing Thickness                      | 28mm (Triple)                                                              | 28mm (Double)                                                                                                      |
| External Pane                          | 4mm Float                                                                  | 4mm Low Ion                                                                                                        |
| Cavity                                 | 90% Argon (10% Air)                                                        | 90% Argon (10% Air)                                                                                                |
| Internal Pane                          | 4mm Optitherm™ S1 Plus<br>4mm Planitherm® One T FG<br>4mm Climaguard® 1.0+ | 4mm K Glass™ S<br>4mm Planitherm® Total+ FG<br>4mm Climaguard® A+                                                  |
| Spacer Bar                             | Multitech (Butyl) or (PU/PS)<br>Multitech G (Butyl) or (PU/PS)             | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Edgetech Super Spacer® Premium<br>Edgetech TruPlas® (Butyl) or (PU/PS) |

Indicated values (U-Value and WER) can be improved further but with the use of 90% Krypton (10% Air) gas.

## THERMAL COMPLIANCE - PART L (REPLACEMENT)

|                    | U-Value: $\leq 1.4 \text{ W/m}^2\text{K}$                                                                          | WER: B (-10 to <0 Energy Index)                                                                                    |
|--------------------|--------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Calculation Method | Standard                                                                                                           | Standard                                                                                                           |
| Window Suite       | Standard                                                                                                           | Standard                                                                                                           |
| Outer Frame        | Small                                                                                                              | Small                                                                                                              |
| Large Head         | No                                                                                                                 | No                                                                                                                 |
| Mullion            | Standard                                                                                                           | Standard                                                                                                           |
| Reinforcement      | PVCu                                                                                                               | PVCu                                                                                                               |
| Glazing Flipper    | No                                                                                                                 | No                                                                                                                 |
| Thermal Dam        | No                                                                                                                 | No                                                                                                                 |
| Glazing Thickness  | 28mm (Double)                                                                                                      | 28mm (Double)                                                                                                      |
| External Pane      | 4mm Float                                                                                                          | 4mm Float                                                                                                          |
| Cavity             | 90% Argon (10% Air)                                                                                                | 90% Argon (10% Air)                                                                                                |
| Internal Pane      | 4mm K Glass™ S<br>4mm Planitherm® Total+ FG<br>4mm Climaguard® A+                                                  | 4mm K Glass™<br>4mm Planibel G                                                                                     |
| Spacer Bar         | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Edgetech Super Spacer® Premium<br>Edgetech TruPlas® (Butyl) or (PU/PS) | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Edgetech Super Spacer® Premium<br>Edgetech TruPlas® (Butyl) or (PU/PS) |

## THERMAL COMPLIANCE - PART L (NEW BUILD)

|                    | U-Value: $\leq 1.6 \text{ W/m}^2\text{K}$                                                                          |
|--------------------|--------------------------------------------------------------------------------------------------------------------|
| Calculation Method | Standard                                                                                                           |
| Window Suite       | Standard                                                                                                           |
| Outer Frame        | Small                                                                                                              |
| Large Head         | No                                                                                                                 |
| Mullion            | Standard                                                                                                           |
| Reinforcement      | PVCu                                                                                                               |
| Glazing Flipper    | No                                                                                                                 |
| Thermal Dam        | No                                                                                                                 |
| Glazing Thickness  | 28mm (Double)                                                                                                      |
| External Pane      | 4mm Float                                                                                                          |
| Cavity             | 90% Argon (10% Air)                                                                                                |
| Internal Pane      | 4mm K Glass™<br>4mm Planibel G                                                                                     |
| Spacer Bar         | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Edgetech Super Spacer® Premium<br>Edgetech TruPlas® (Butyl) or (PU/PS) |

## 80mm Resurgence Flush Sash Window



This document shows suggested specifications and have been determined with consideration of more realistic scenarios, cost effectiveness and industry standards.

- No large head ventilation
- PVCu Thermal Reinforcement only
- No double coatings on DGU
- No triple coatings on TGU
- 90% Argon (10% Air) only
- 4mm glass only

| LOWEST U-VALUE & HIGHEST ENERGY RATING |                                                                            |                                                                        |
|----------------------------------------|----------------------------------------------------------------------------|------------------------------------------------------------------------|
|                                        | U-Value: 0.84 W/m <sup>2</sup> K                                           | WER: A+ (>10 to 20 Energy Index)                                       |
| Calculation Method                     | 25% Rule                                                                   | Standard                                                               |
| Glazing Flipper                        | Yes                                                                        | No                                                                     |
| Thermal Dam                            | Yes                                                                        | No                                                                     |
| Glazing Thickness                      | 40mm (Triple)                                                              | 40mm (Triple)                                                          |
| External Pane                          | 4mm Float                                                                  | 4mm Low Ion                                                            |
| Cavity                                 | 90% Argon (10% Air)                                                        | 90% Argon (10% Air)                                                    |
| Internal Pane                          | 4mm Optitherm™ S1 Plus<br>4mm Planitherm® One T FG<br>4mm Climaguard® 1.0+ | 4mm K Glass™ S                                                         |
| Spacer Bar                             | Multitech (Butyl) or (PU/PS)<br>Multitech G (Butyl) or (PU/PS)             | Edgetech Super Spacer® Premium<br>Edgetech TruPlas® (Butyl) or (PU/PS) |

Indicated values (U-Value and WER) can be improved further but with the use of 90% Krypton (10% Air) gas.

## THERMAL COMPLIANCE - PART L (REPLACEMENT)

|                    | U-Value: $\leq 1.4 \text{ W/m}^2\text{K}$                                                                          | WER: B (-10 to <0 Energy Index)                                                                                    |
|--------------------|--------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Calculation Method | Standard                                                                                                           | Standard                                                                                                           |
| Glazing Flipper    | No                                                                                                                 | No                                                                                                                 |
| Thermal Dam        | No                                                                                                                 | No                                                                                                                 |
| Glazing Thickness  | 28mm (Double)                                                                                                      | 28mm (Double)                                                                                                      |
| External Pane      | 4mm Float                                                                                                          | 4mm Float                                                                                                          |
| Cavity             | 90% Argon (10% Air)                                                                                                | 90% Argon (10% Air)                                                                                                |
| Internal Pane      | 4mm K Glass™ S<br>4mm Planitherm® Total+ FG<br>4mm Climaguard® A+                                                  | 4mm K Glass™ S<br>4mm Planitherm® Total+ FG<br>4mm Climaguard® A+                                                  |
| Spacer Bar         | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Edgetech Super Spacer® Premium<br>Edgetech TruPlas® (Butyl) or (PU/PS) | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Edgetech Super Spacer® Premium<br>Edgetech TruPlas® (Butyl) or (PU/PS) |

## THERMAL COMPLIANCE - PART L (NEW BUILD)

|                    | U-Value: $\leq 1.6 \text{ W/m}^2\text{K}$                                                                          |
|--------------------|--------------------------------------------------------------------------------------------------------------------|
| Calculation Method | Standard                                                                                                           |
| Glazing Flipper    | No                                                                                                                 |
| Thermal Dam        | No                                                                                                                 |
| Glazing Thickness  | 28mm (Double)                                                                                                      |
| External Pane      | 4mm Float                                                                                                          |
| Cavity             | 90% Argon (10% Air)                                                                                                |
| Internal Pane      | 4mm K Glass™<br>4mm Planibel G                                                                                     |
| Spacer Bar         | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Edgetech Super Spacer® Premium<br>Edgetech TruPlas® (Butyl) or (PU/PS) |

## 70mm Reversible Window



This document shows suggested specifications and have been determined with consideration of more realistic scenarios, cost effectiveness and industry standards.

- No large head ventilation
- PVCu Thermal Reinforcement only
- No double coatings on DGU
- No triple coatings on TGU
- 90% Argon (10% Air) only
- 4mm glass only

| LOWEST U-VALUE & HIGHEST ENERGY RATING |                                                                            |                                                                        |
|----------------------------------------|----------------------------------------------------------------------------|------------------------------------------------------------------------|
|                                        | U-Value: 0.85 W/m <sup>2</sup> K                                           | WER: A+ (>10 to 20 Energy Index)                                       |
| Calculation Method                     | 25% Rule                                                                   | Standard                                                               |
| Window Suite                           | EnergyPlus                                                                 | EnergyPlus                                                             |
| Glazing Flipper                        | Yes                                                                        | No                                                                     |
| Thermal Dam                            | Yes                                                                        | No                                                                     |
| Glazing Thickness                      | 40mm (Triple)                                                              | 36mm (Triple)                                                          |
| External Pane                          | 4mm Float                                                                  | 4mm Float                                                              |
| Cavity                                 | 90% Argon (10% Air)                                                        | 90% Argon (10% Air)                                                    |
| Internal Pane                          | 4mm Optitherm™ S1 Plus<br>4mm Planitherm® One T FG<br>4mm Climaguard® 1.0+ | 4mm K Glass™ S<br>4mm Planitherm® Total+ FG<br>4mm Climaguard® A+      |
| Spacer Bar                             | Multitech (Butyl) or (PU/PS)<br>Multitech G (Butyl) or (PU/PS)             | Edgetech Super Spacer® Premium<br>Edgetech TruPlas® (Butyl) or (PU/PS) |

Indicated values (U-Value and WER) can be improved further but with the use of 90% Krypton (10% Air) gas.

### THERMAL COMPLIANCE - PART L (REPLACEMENT)

|                    | U-Value: $\leq 1.4 \text{ W/m}^2\text{K}$                                                                          | WER: B (-10 to <0 Energy Index)                                                                                    |
|--------------------|--------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Calculation Method | Standard                                                                                                           | Standard                                                                                                           |
| Glazing Flipper    | No                                                                                                                 | No                                                                                                                 |
| Thermal Dam        | No                                                                                                                 | No                                                                                                                 |
| Glazing Thickness  | 28mm (Double)                                                                                                      | 28mm (Double)                                                                                                      |
| External Pane      | 4mm Float                                                                                                          | 4mm Float                                                                                                          |
| Cavity             | 90% Argon (10% Air)                                                                                                | 90% Argon (10% Air)                                                                                                |
| Internal Pane      | 4mm K Glass™ S<br>4mm Planitherm® Total+ FG<br>4mm Climaguard® A+                                                  | 4mm K Glass™ S<br>4mm Planitherm® Total+ FG<br>4mm Climaguard® A+                                                  |
| Spacer Bar         | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Edgetech Super Spacer® Premium<br>Edgetech TruPlas® (Butyl) or (PU/PS) | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Edgetech Super Spacer® Premium<br>Edgetech TruPlas® (Butyl) or (PU/PS) |

### THERMAL COMPLIANCE - PART L (NEW BUILD)

|                    | U-Value: $\leq 1.6 \text{ W/m}^2\text{K}$                                                                          |
|--------------------|--------------------------------------------------------------------------------------------------------------------|
| Calculation Method | Standard                                                                                                           |
| Glazing Flipper    | No                                                                                                                 |
| Thermal Dam        | No                                                                                                                 |
| Glazing Thickness  | 28mm (Double)                                                                                                      |
| External Pane      | 4mm Float                                                                                                          |
| Cavity             | 90% Argon (10% Air)                                                                                                |
| Internal Pane      | 4mm K Glass™<br>4mm Planibel G                                                                                     |
| Spacer Bar         | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Edgetech Super Spacer® Premium<br>Edgetech TruPlas® (Butyl) or (PU/PS) |

## Zero|90 Casement Window



This document shows suggested specifications and have been determined with consideration of more realistic scenarios, cost effectiveness and industry standards.

- No large head ventilation
- PVCu Thermal Reinforcement only
- No double coatings on DGu
- No triple coatings on TGu
- 90% Argon (10% Air) only
- 4mm glass only

| LOWEST U-VALUE & HIGHEST ENERGY RATING |                                                                            |                                                                                                                    |
|----------------------------------------|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
|                                        | U-Value: 0.65 W/m²K                                                        | WER: A++ (≥20 Energy Index)                                                                                        |
| Calculation Method                     | 25% Rule                                                                   | Standard                                                                                                           |
| Outer Frame                            | Small                                                                      | Small                                                                                                              |
| Large Head                             | No                                                                         | No                                                                                                                 |
| Glazing Flipper                        | Yes                                                                        | No                                                                                                                 |
| Thermal Flipper                        | Yes                                                                        | No                                                                                                                 |
| Glazing Thickness                      | 56mm (Triple)                                                              | 48mm (Triple)                                                                                                      |
| External Pane                          | 4mm Float                                                                  | 4mm Float                                                                                                          |
| Cavity                                 | 90% Argon (10% Air)                                                        | 90% Argon (10% Air)                                                                                                |
| Internal Pane                          | 4mm Optitherm™ S1 Plus<br>4mm Planitherm® One T FG<br>4mm Climaguard® 1.0+ | 4mm K Glass™<br>4mm Planibel G                                                                                     |
| Spacer Bar                             | Multitech (Butyl) or (PU/PS)<br>Multitech G (Butyl) or (PU/PS)             | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Edgetech Super Spacer® Premium<br>Edgetech TruPlas® (Butyl) or (PU/PS) |

Indicated values (U-Value and WER) can be improved further but with the use of 90% Krypton (10% Air) gas.

## THERMAL COMPLIANCE - PART L (REPLACEMENT)

|                    | U-Value: $\leq 1.4 \text{ W/m}^2\text{K}$                                                                          | WER: B (-10 to <0 Energy Index)                                                   |
|--------------------|--------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Calculation Method | Standard                                                                                                           | Standard                                                                          |
| Outer Frame        | Small                                                                                                              | Small                                                                             |
| Large Head         | No                                                                                                                 | No                                                                                |
| Glazing Flipper    | No                                                                                                                 | No                                                                                |
| Thermal Flipper    | No                                                                                                                 | No                                                                                |
| Glazing Thickness  | 28mm (Double)                                                                                                      | 28mm (Double)                                                                     |
| External Pane      | 4mm Float                                                                                                          | 4mm Float                                                                         |
| Cavity             | 90% Argon (10% Air)                                                                                                | 90% Argon (10% Air)                                                               |
| Internal Pane      | 4mm K Glass™ A<br>4mm Planibel A                                                                                   | 4mm K Glass™<br>4mm Planibel G                                                    |
| Spacer Bar         | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Edgetech Super Spacer® Premium<br>Edgetech TruPlas® (Butyl) or (PU/PS) | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Swisspacer Advance (Butyl) or (PU/PS) |

## THERMAL COMPLIANCE - PART L (NEW BUILD)

|                    | U-Value: $\leq 1.6 \text{ W/m}^2\text{K}$                                         |
|--------------------|-----------------------------------------------------------------------------------|
| Calculation Method | Standard                                                                          |
| Outer Frame        | Small                                                                             |
| Large Head         | No                                                                                |
| Glazing Flipper    | No                                                                                |
| Thermal Flipper    | No                                                                                |
| Glazing Thickness  | 28mm (Double)                                                                     |
| External Pane      | 4mm Float                                                                         |
| Cavity             | 90% Argon (10% Air)                                                               |
| Internal Pane      | 4mm K Glass™<br>4mm Planibel G                                                    |
| Spacer Bar         | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Swisspacer Advance (Butyl) or (PU/PS) |

## Zero|90 Tilt & Turn Window



This document shows suggested specifications and have been determined with consideration of more realistic scenarios, cost effectiveness and industry standards.

- No large head ventilation
- PVCu Thermal Reinforcement only
- No double coatings on DGu
- No triple coatings on TGu
- 90% Argon (10% Air) only
- 4mm glass only

| LOWEST U-VALUE & HIGHEST ENERGY RATING |                                                                            |                                                                                                                    |
|----------------------------------------|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
|                                        | U-Value: 0.68 W/m²K                                                        | WER: A++ (≥20 Energy Index)                                                                                        |
| Calculation Method                     | 25% Rule                                                                   | Standard                                                                                                           |
| Outer Frame                            | Small                                                                      | Small                                                                                                              |
| Large Head                             | No                                                                         | No                                                                                                                 |
| Glazing Flipper                        | Yes                                                                        | No                                                                                                                 |
| Thermal Flipper                        | Yes                                                                        | No                                                                                                                 |
| Glazing Thickness                      | 56mm (Triple)                                                              | 48mm (Triple)                                                                                                      |
| External Pane                          | 4mm Float                                                                  | 4mm Float                                                                                                          |
| Cavity                                 | 90% Argon (10% Air)                                                        | 90% Argon (10% Air)                                                                                                |
| Internal Pane                          | 4mm Optitherm™ S1 Plus<br>4mm Planitherm® One T FG<br>4mm Climaguard® 1.0+ | 4mm K Glass™<br>4mm Planibel G                                                                                     |
| Spacer Bar                             | Multitech (Butyl) or (PU/PS)<br>Multitech G (Butyl) or (PU/PS)             | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Edgetech Super Spacer® Premium<br>Edgetech TruPlas® (Butyl) or (PU/PS) |

Indicated values (U-Value and WER) can be improved further but with the use of 90% Krypton (10% Air) gas.

## THERMAL COMPLIANCE - PART L (REPLACEMENT)

|                    | U-Value: $\leq 1.4 \text{ W/m}^2\text{K}$                                                                          | WER: B (-10 to <0 Energy Index)                                                   |
|--------------------|--------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Calculation Method | Standard                                                                                                           | Standard                                                                          |
| Outer Frame        | Small                                                                                                              | Small                                                                             |
| Large Head         | No                                                                                                                 | No                                                                                |
| Glazing Flipper    | No                                                                                                                 | No                                                                                |
| Thermal Flipper    | No                                                                                                                 | No                                                                                |
| Glazing Thickness  | 28mm (Double)                                                                                                      | 28mm (Double)                                                                     |
| External Pane      | 4mm Float                                                                                                          | 4mm Float                                                                         |
| Cavity             | 90% Argon (10% Air)                                                                                                | 90% Argon (10% Air)                                                               |
| Internal Pane      | 4mm K Glass™ A<br>4mm Planibel A                                                                                   | 4mm K Glass™<br>4mm Planibel G                                                    |
| Spacer Bar         | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Edgetech Super Spacer® Premium<br>Edgetech TruPlas® (Butyl) or (PU/PS) | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Swisspacer Advance (Butyl) or (PU/PS) |

## THERMAL COMPLIANCE - PART L (NEW BUILD)

|                    | U-Value: $\leq 1.6 \text{ W/m}^2\text{K}$                                         |
|--------------------|-----------------------------------------------------------------------------------|
| Calculation Method | Standard                                                                          |
| Outer Frame        | Small                                                                             |
| Large Head         | No                                                                                |
| Glazing Flipper    | No                                                                                |
| Thermal Flipper    | No                                                                                |
| Glazing Thickness  | 28mm (Double)                                                                     |
| External Pane      | 4mm Float                                                                         |
| Cavity             | 90% Argon (10% Air)                                                               |
| Internal Pane      | 4mm K Glass™<br>4mm Planibel G                                                    |
| Spacer Bar         | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Swisspacer Advance (Butyl) or (PU/PS) |

## Zero|90R Rebated Casement Window



This document shows suggested specifications and have been determined with consideration of more realistic scenarios, cost effectiveness and industry standards.

- No large head ventilation
- PVCu Thermal Reinforcement only
- No double coatings on DGU
- No triple coatings on TGU
- 90% Argon (10% Air) only
- 4mm glass only

| LOWEST U-VALUE & HIGHEST ENERGY RATING |                                                                            |                                                                                                                    |
|----------------------------------------|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
|                                        | U-Value: 0.67 W/m <sup>2</sup> K                                           | WER: A++ (≥20 Energy Index)                                                                                        |
| Calculation Method                     | 25% Rule                                                                   | Standard                                                                                                           |
| Glazing Flipper                        | Yes                                                                        | No                                                                                                                 |
| Thermal Dam                            | Yes                                                                        | No                                                                                                                 |
| Thermal Flipper                        | Yes                                                                        | No                                                                                                                 |
| Glazing Thickness                      | 56mm (Triple)                                                              | 48mm (Triple)                                                                                                      |
| External Pane                          | 4mm Float                                                                  | 4mm Float                                                                                                          |
| Cavity                                 | 90% Argon (10% Air)                                                        | 90% Argon (10% Air)                                                                                                |
| Internal Pane                          | 4mm Optitherm™ S1 Plus<br>4mm Planitherm® One T FG<br>4mm Climaguard® 1.0+ | 4mm K Glass™ A<br>4mm Planibel A                                                                                   |
| Spacer Bar                             | Multitech (Butyl) or (PU/PS)<br>Multitech G (Butyl) or (PU/PS)             | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Edgetech Super Spacer® Premium<br>Edgetech TruPlas® (Butyl) or (PU/PS) |

Indicated values (U-Value and WER) can be improved further but with the use of 90% Krypton (10% Air) gas.

## THERMAL COMPLIANCE - PART L (REPLACEMENT)

|                    | U-Value: $\leq 1.4 \text{ W/m}^2\text{K}$                                                                          | WER: B (-10 to <0 Energy Index)                                                   |
|--------------------|--------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Calculation Method | Standard                                                                                                           | Standard                                                                          |
| Glazing Flipper    | No                                                                                                                 | No                                                                                |
| Thermal Dam        | No                                                                                                                 | No                                                                                |
| Thermal Flipper    | No                                                                                                                 | No                                                                                |
| Glazing Thickness  | 28mm (Double)                                                                                                      | 28mm (Double)                                                                     |
| External Pane      | 4mm Float                                                                                                          | 4mm Float                                                                         |
| Cavity             | 90% Argon (10% Air)                                                                                                | 90% Argon (10% Air)                                                               |
| Internal Pane      | 4mm K Glass™ A<br>4mm Planibel A                                                                                   | 4mm K Glass™<br>4mm Planibel G                                                    |
| Spacer Bar         | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Edgetech Super Spacer® Premium<br>Edgetech TruPlas® (Butyl) or (PU/PS) | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Swisspacer Advance (Butyl) or (PU/PS) |

## THERMAL COMPLIANCE - PART L (NEW BUILD)

|                    | U-Value: $\leq 1.6 \text{ W/m}^2\text{K}$                                         |
|--------------------|-----------------------------------------------------------------------------------|
| Calculation Method | Standard                                                                          |
| Glazing Flipper    | No                                                                                |
| Thermal Dam        | No                                                                                |
| Thermal Flipper    | No                                                                                |
| Glazing Thickness  | 28mm (Double)                                                                     |
| External Pane      | 4mm Float                                                                         |
| Cavity             | 90% Argon (10% Air)                                                               |
| Internal Pane      | 4mm K Glass™<br>4mm Planibel G                                                    |
| Spacer Bar         | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Swisspacer Advance (Butyl) or (PU/PS) |

## Zero|90R Rebated Tilt & Turn Window



This document shows suggested specifications and have been determined with consideration of more realistic scenarios, cost effectiveness and industry standards.

- No large head ventilation
- PVCu Thermal Reinforcement only
- No double coatings on DGU
- No triple coatings on TGU
- 90% Argon (10% Air) only
- 4mm glass only

| LOWEST U-VALUE & HIGHEST ENERGY RATING |                                                                            |                                                                                                                    |
|----------------------------------------|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
|                                        | U-Value: 0.70 W/m²K                                                        | WER: A++ (≥20 Energy Index)                                                                                        |
| Calculation Method                     | 25% Rule                                                                   | Standard                                                                                                           |
| Glazing Flipper                        | Yes                                                                        | Yes                                                                                                                |
| Thermal Dam                            | Yes                                                                        | Yes                                                                                                                |
| Thermal Flipper                        | Yes                                                                        | Yes                                                                                                                |
| Glazing Thickness                      | 56mm (Triple)                                                              | 48mm (Triple)                                                                                                      |
| External Pane                          | 4mm Float                                                                  | 4mm Float                                                                                                          |
| Cavity                                 | 90% Argon (10% Air)                                                        | 90% Argon (10% Air)                                                                                                |
| Internal Pane                          | 4mm Optitherm™ S1 Plus<br>4mm Planitherm® One T FG<br>4mm Climaguard® 1.0+ | 4mm K Glass™ A<br>4mm Planibel A                                                                                   |
| Spacer Bar                             | Multitech (Butyl) or (PU/PS)<br>Multitech G (Butyl) or (PU/PS)             | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Edgetech Super Spacer® Premium<br>Edgetech TruPlas® (Butyl) or (PU/PS) |

Indicated values (U-Value and WER) can be improved further but with the use of 90% Krypton (10% Air) gas.

### THERMAL COMPLIANCE - PART L (REPLACEMENT)

|                    | U-Value: $\leq 1.4 \text{ W/m}^2\text{K}$                                                                          | WER: B (-10 to <0 Energy Index)                                                   |
|--------------------|--------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Calculation Method | Standard                                                                                                           | Standard                                                                          |
| Glazing Flipper    | No                                                                                                                 | No                                                                                |
| Thermal Dam        | No                                                                                                                 | No                                                                                |
| Thermal Flipper    | No                                                                                                                 | No                                                                                |
| Glazing Thickness  | 28mm (Double)                                                                                                      | 28mm (Double)                                                                     |
| External Pane      | 4mm Float                                                                                                          | 4mm Float                                                                         |
| Cavity             | 90% Argon (10% Air)                                                                                                | 90% Argon (10% Air)                                                               |
| Internal Pane      | 4mm K Glass™ A<br>4mm Planibel A                                                                                   | 4mm K Glass™<br>4mm Planibel G                                                    |
| Spacer Bar         | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Edgetech Super Spacer® Premium<br>Edgetech TruPlas® (Butyl) or (PU/PS) | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Swisspacer Advance (Butyl) or (PU/PS) |

### THERMAL COMPLIANCE - PART L (NEW BUILD)

|                    | U-Value: $\leq 1.6 \text{ W/m}^2\text{K}$                                         |
|--------------------|-----------------------------------------------------------------------------------|
| Calculation Method | Standard                                                                          |
| Glazing Flipper    | No                                                                                |
| Thermal Dam        | No                                                                                |
| Thermal Flipper    | No                                                                                |
| Glazing Thickness  | 28mm (Double)                                                                     |
| External Pane      | 4mm Float                                                                         |
| Cavity             | 90% Argon (10% Air)                                                               |
| Internal Pane      | 4mm K Glass™<br>4mm Planibel G                                                    |
| Spacer Bar         | Edgetech T-Spacer™ SG (Butyl) or (PU/PS)<br>Swisspacer Advance (Butyl) or (PU/PS) |



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