

# ADVANTAGES OF WARM EDGE TECHNOLOGY

## Improved Thermal Efficiency

Thermally efficient windows can help to reduce heat loss by up to 94%. Thermobar can contribute towards improving the overall U-value or Window Energy Rating of Windows to help to swing a rating from a 'B' to an 'A', or even from an 'A' to an 'A+' or 'A\*'. Warm edge integral glazing bars and duplex fittings are also available for the complete warm edge unit. When designing zero carbon homes, every point counts so request further information.

## Aesthetics and Sight Lines

Thermobar warm edge spacers are available in a range of colours to blend naturally with any window frame. The straight sight line and smooth finish can complement any architectural designs.

## Condensation Resistance

Up to 70% reduced condensation with warm edge glazing. By reducing heat loss and keeping the inner glass pane warmer, windows with warm edge spacer are much less likely to develop condensation. Less condensation will lower the chance of potentially harmful mould and bacteria growth that could trigger health problems such as asthma and dermatitis.

## Glass Surface Temperature

Up to 80% of energy lost through a window occurs at its edge. The extremely low conductivity value of warm edge spacers such as Thermobar means less of a variation in the surface temperature of the glazing unit. See thermal images within this document showing the areas of most heat loss where the glazing bars are located.

## Suitable for Triple Glazing

Thermobar rigid spacer system is structurally sound and is currently available in a range of sizes suitable for use in higher performance triple glazing units.

## Sound Absorption

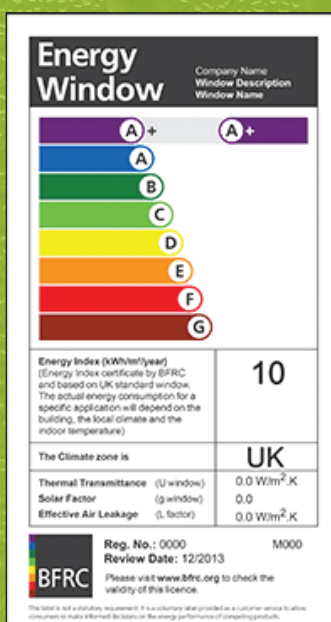
Windows manufactured including warm edge spacer can absorb more noise than traditional windows. Ideal for incorporation in areas where noise could be an issue.

## Gas Retention

Thermobar superior sealed units can easily achieve the European standard EN-1279 Part 3 for minimising gas loss.

## Preferred by Manufacturers

Thermobar is the preferred spacer system of many UK insulated glass sealed unit manufacturers.



Look for this label on your window.

## Request Further Information

1. Thermobar Warm Edge Leaflet
2. Thermobar Colours and Product information incl. Duplex and Muntin Systems
3. Thermobar Technical Data Sheet
4. Thermobar Bundesverband Flachglas Data Sheet Psi Values for Windows
5. Thermobar CE Marking Declaration Letter
6. BFRC details for substitution of Thermobar in current WER Simulations
7. Independent Thermal Performance of insulating glass bond, March 2013

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GROUP  
Dedicated to Insulated Glass



COMPONENT SUPPLIER  
OF THE YEAR  
FOR 2 YEARS IN A ROW



**Thermobar**  
Warm Edge Spacer Tube

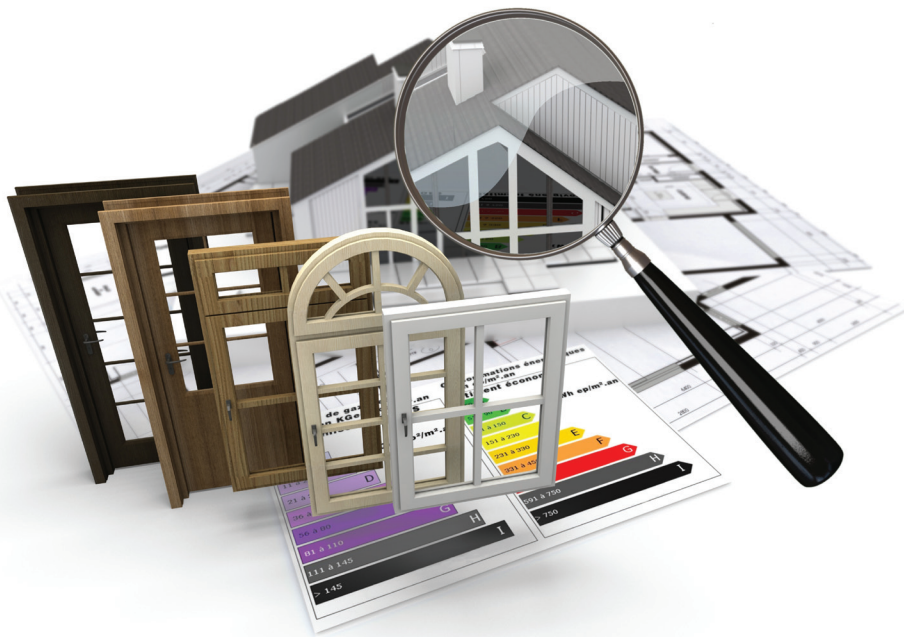


Manufactured  
in the UK

For more information you can find us at:  
[www.thermobarwarmedge.com](http://www.thermobarwarmedge.com)



A superior technology designed to minimise energy loss through your windows



SAVE energy with the lowest conductivity spacers - **0.14W/mK**

SAVE energy with lowest Psi Values

SAVE energy with reduced overall window U-values

SAVE costs on the best futureproof window components

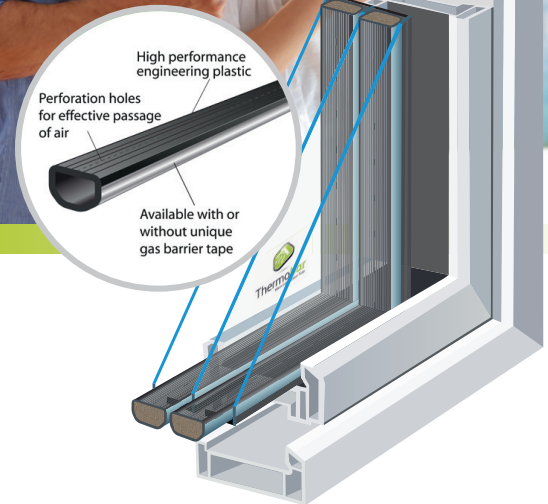
Helps to achieve A+ and A\* Window Energy Ratings

Our spacers are the result of over 35 years of dedication to insulated glass. We understand the conditions within a glazing unit and how each component performs within the lifetime of the unit. This helps us to ensure that the components we manufacture and supply are second-to-none.



Architects, Specifiers and Builders

For more information you can find us at:  
[www.thermobarwarmedge.com](http://www.thermobarwarmedge.com)



## WARM EDGE WINDOW COMPONENTS ENGINEERED FOR SAVINGS



Thermal Conductivity: **0.14 W/mK**

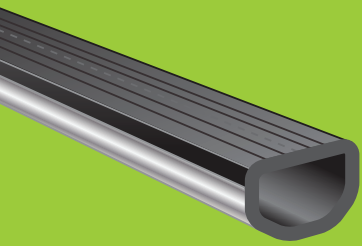
	Plastic window frame	Wood window frame
Double Glazing	0.032	0.031
Triple Glazing	0.030	0.029

Above Psi values based on BF Data Sheet  
[www.bundesverband-flachglas.de](http://www.bundesverband-flachglas.de)  
Lower Psi values achievable with Hot Melt



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Warm Edge Spacer Tube

TO DISCOVER MORE ABOUT THERMOBAR OR THERMOFLEX WARM EDGE SPACERS AND OUR 1,500 GLAZING COMPONENTS visit [www.thermosealgroup.com](http://www.thermosealgroup.com) or call **0845 331 3950 Intl. +44 121 3313950**



## What is Warm Edge Technology?

The term 'Warm Edge' within double or triple glazing refers to the spacer used to separate the panes of glass. If the spacer material is less conductive than traditional aluminium spacer ( $\leq 0.007\text{W/K}$ ), it is termed warm edge. Non-metal spacers generally have a lower thermal conductivity value.

## What is Thermobar?

Thermobar warm edge spacer is a rigid tube which is made from high performance engineering plastic with a gas diffusion barrier to minimise gas loss from the edge of the unit. The composition of Thermobar ensures that the glazing unit is structurally sound while helping to reduce heat loss at the edge of the glazing.



Thermal photograph showing standard cold edge windows - red signifies area of heat loss.

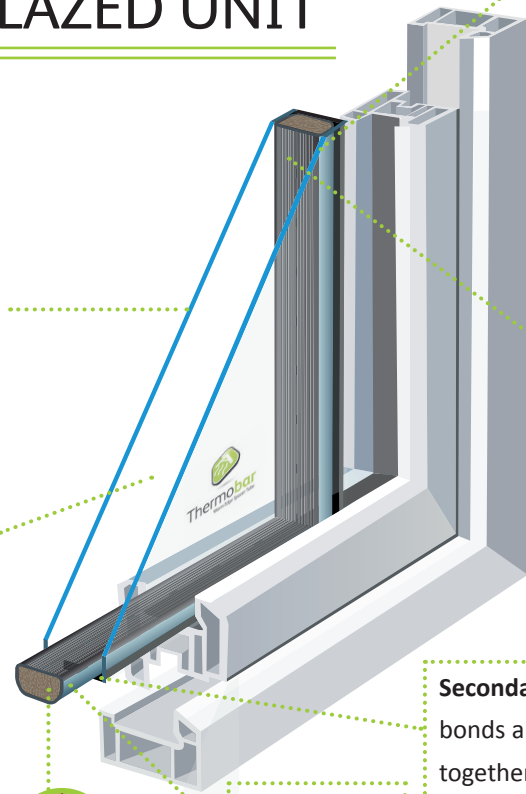


Warm Edge Windows showing virtually no heat loss.

# A SUPERIOR DOUBLE GLAZED UNIT

**Low-emissivity (Low-E) coated glass** forms the inner pane of a double glazing unit. The energy-saving coating lets the sun's rays through but reflects internal heating back into the property.

**Air space filled with at least 90% inert gas** such as Argon, Krypton or Xenon. These gases provide better insulation properties than air which contributes towards improving the window's energy efficiency. This unit must meet EN1279 part 3 manufacturing standards.



**Float glass**, or where increased solar gain is required **Low Iron glass**, is used for the outer pane of a double glazed unit.



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**Primary butyl gas-tight seal** (optional).

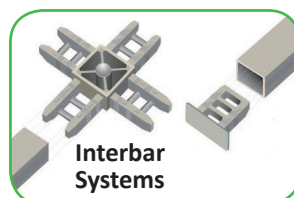
**Secondary sealant** bonds all components together.

**A 3A molecular sieve or 'desiccant'** is an essential component of a superior double-glazed unit. Its primary role is to adsorb moisture that is unavoidably trapped within the unit during manufacture to stop internal condensation. However, it must also serve to selectively adsorb the moisture which passes into the unit throughout its lifetime without affecting the balance of inert gas within the unit.

## DUAL SEAL SYSTEMS

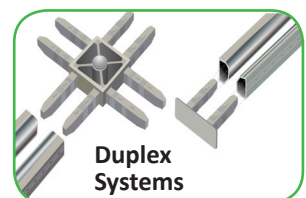
Dual seal systems make up for over 90% of the European insulated glass market. The primary seal serves as an assembly support during the construction of the sealed unit. Once completed, low moisture vapour transmission rate and low gas permeability help stop the movement of water vapour and inert gases in and out of the sealed unit.

## TRADITIONAL MULTI-PANE WINDOWS



**Interbar Systems**

Bespoke Thermobar warm edge Interbar and Duplex components are available to simulate traditional multipane window units.

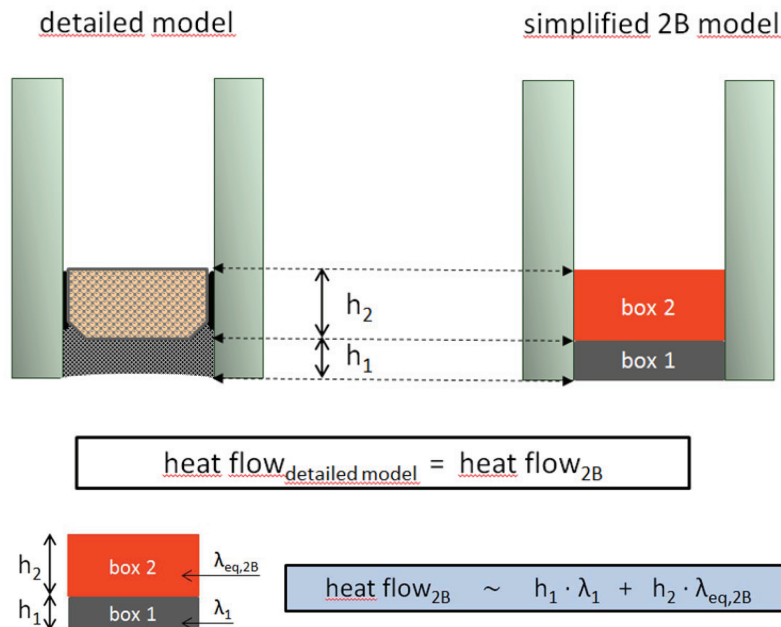


**Duplex Systems**

# COMPARISON OF THERMAL PERFORMANCE

## 2-Box Model of Thermal Comparison of a glass edge bond

To make thermal simulations easier, the two-box-model substitutes the detailed geometry of the insulating glass edge bond with two rectangular boxes of the width of the cavity. Box 1 is representing the secondary sealant and box 2 the spacer including PIB and desiccant. The height of box 2 (h<sub>2</sub>) is identical with the actual height of the spacer [1]. The equivalent thermal conductivity value of box 2, λ<sub>eq,2B</sub> can either be determined by simulation of the detailed model or by means of measurement [2].



To carry out comparison via this method, a spacer bar report must be obtained which includes a thermal value for spacer bar including PIB and desiccant. Thermoseal Group can provide a Bundesverband Flachglas Psi Value Data Sheet with this proven value for Thermobar warm edge spacer.

Also required is a value for the secondary sealant. Standard values for hot melt and 2-part sealants are listed in a thermal comparison table within the latest EN ISO 10077 report.

For technical information, product reports and thermal values please e-mail: [specification@thermosealgroup.com](mailto:specification@thermosealgroup.com)

## THERMOBAR WINDOW THERMAL PERFORMANCE FIGURES

THERMOBAR - Thermal performance in various window types						
Spacer System	DOUBLE GLAZING			TRIPLE GLAZING		
	Aluminium	Stainless Steel	Thermobar	Aluminium	Stainless Steel	Thermobar
WOODEN WINDOWS:	Frame value: U <sub>f</sub> =1.4 W/m <sup>2</sup> K; Glass value: U <sub>g</sub> =1.1 W/m <sup>2</sup> K			Frame value: U <sub>f</sub> =1.3 W/m <sup>2</sup> K; Glass value: U <sub>g</sub> =0.7 W/m <sup>2</sup> K		
Psi value [W/mK]	0.082	0.053	0.031	0.089	0.054	0.029
Window, U <sub>w</sub> 1-pane [W/m <sup>2</sup> K]	1.40	1.32	1.27	1.10	1.02	0.95
Window, U <sub>w</sub> 2-pane [W/m <sup>2</sup> K]	1.52	1.41	1.33	1.26	1.13	1.04
Minimal surface temperature* [°C]	4.1	7.3	9.7	6	9.6	12.1
PVC WINDOWS:	Frame value: U <sub>f</sub> =1.2 W/m <sup>2</sup> K; Glass value: U <sub>g</sub> =1.1 W/m <sup>2</sup> K			Frame value: U <sub>f</sub> =1.2 W/m <sup>2</sup> K; Glass value: U <sub>g</sub> =0.7 W/m <sup>2</sup> K		
Psi value [W/mK]	0.076	0.051	0.032	0.078	0.050	0.030
Window, U <sub>w</sub> 1-pane [W/m <sup>2</sup> K]	1.32	1.26	1.21	1.05	0.98	0.93
Window, U <sub>w</sub> 2-pane [W/m <sup>2</sup> K]	1.42	1.33	1.26	1.19	1.08	1.01
Minimal surface temperature* [°C]	5.3	8.3	10.4	6.7	9.9	12.0
WOOD ALUMINIUM WINDOWS:	Frame value: U <sub>f</sub> =1.4 W/m <sup>2</sup> K; Glass value: U <sub>g</sub> =1.1 W/m <sup>2</sup> K			Frame value: U <sub>f</sub> =1.4 W/m <sup>2</sup> K; Glass value: U <sub>g</sub> =0.7 W/m <sup>2</sup> K		
Psi value [W/mK]	0.094	0.059	0.032	0.100	0.060	0.030
Window, U <sub>w</sub> 1-pane [W/m <sup>2</sup> K]	1.43	1.34	1.28	1.17	1.08	1.00
Window, U <sub>w</sub> 2-pane [W/m <sup>2</sup> K]	1.57	1.44	1.34	1.35	1.21	1.10
Minimal surface temperature* [°C]	2.2	6.1	8.8	4.4	8.6	11.3
ALUMINIUM WINDOWS:	Frame value: U <sub>f</sub> =1.6 W/m <sup>2</sup> K; Glass value: U <sub>g</sub> =1.1 W/m <sup>2</sup> K			Frame value: U <sub>f</sub> =1.6 W/m <sup>2</sup> K; Glass value: U <sub>g</sub> =0.7 W/m <sup>2</sup> K		
Psi value [W/mK]	0.110	0.068	0.036	0.120	0.064	0.031
Window, U <sub>w</sub> 1-pane [W/m <sup>2</sup> K]	1.54	1.44	1.36	1.30	1.17	1.09
Window, U <sub>w</sub> 2-pane [W/m <sup>2</sup> K]	1.72	1.56	1.45	1.53	1.32	1.21
Minimal surface temperature* [°C]	4.7	8.4	10.8	6.8	10.6	12.9

The equivalent heat conductivity was calculated as per the ift WA-17/1 guidelines. The representative Psi values were calculated under the conditions laid down in the ift WA-08/2 guidelines.

Psi value: linear heat throughput at edge of glass  
[W/mK] as per EN ISO 10077-2:2012-06

\* corresponds to conditions in DIN 4108-3

External temperature T<sub>a</sub>: -10°C  
Internal temperature T<sub>i</sub>: +20°C

Geometry	Wood	PVC	Wood-Aluminium	Aluminium
Total Area: (1.23 x 1.48m) A <sub>w</sub> in m <sup>2</sup>	1.82	1.82	1.82	1.82
Frame width b <sub>f</sub> in mm:	110	117	120	130
Frame area A <sub>f</sub> : in m <sup>2</sup> (1-pane/2-pane.)	0.548/0.686	0.579/0.725	0.593/0.742	0.637/0.796
Length of glass edge l <sub>g</sub> : in m (1-pane/2-pane)	4.540/6.840	4.484/6.742	4.460/6.700	4.380/6.560



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