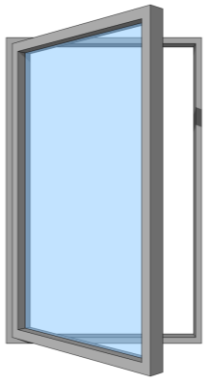
THERMAL TRANSMITTANCE (U_T) CALCULATION

(Calculation according to EN ISO 10077-1:2006, 10077-2:2006)

The following equation is used to calculate the total thermal transmittance (U_T) for a window (U_W) or door (U_D).

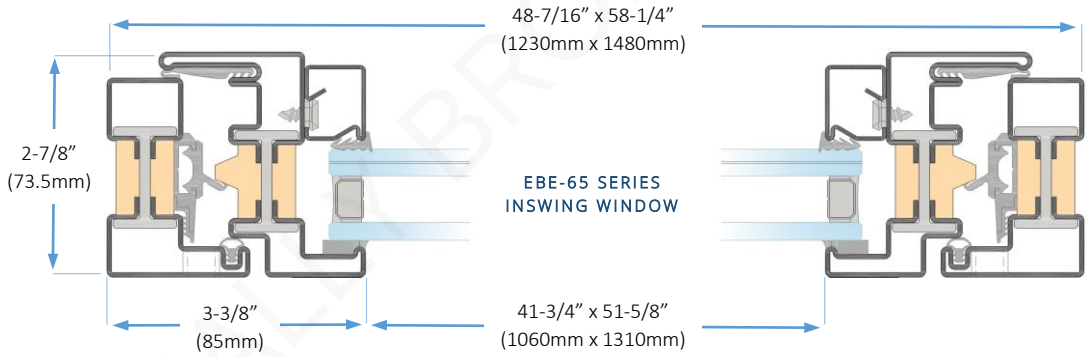
$$U_T = \frac{\left[\Sigma(A_g U_g) + \Sigma(A_f U_f) + \Sigma(L_g \varphi_g)\right]}{(\Sigma A_g + \Sigma A_f)}$$



EQUATION VARIBLES:			SI Units	English Units
A_T	→	Total Unit Area	m^2	ft^2
A_g	→	Total Visible Glass Area	m^2	ft^2
A_f	→	Total Frame Area	m^2	ft^2
L_g	→	Total Perimeter of Visible Glass	m	ft
U_g	→	Thermal Transmittance of Glass	W/m^2*K^o	$BTU/hr*ft^2*F^o$
U_f	→	Thermal Transmittance of Frame	W/m^2*K^o	$BTU/hr*ft^2*F^o$
Ψ_g	→	Linear Thermal Transmittance of Glass	$W/m*K^o$	$BTU/hr*ft*F^o$

(Combined thermal effect of glazing, spacer bar and frame)

CALCULATION EXAMPLE: *(Standard glazed building element according to EN ISO 14351-1:2006+A1:2010)*



VARIBLE CALCULATIONS:			SI Units	English Units
A_T	=	1.23m x 1.48m	$1.82m^2$	$19.59ft^2$
A_g	=	(1.23m – (0.085m x 2)) x (1.48m – (0.085m x 2))	$1.39m^2$	$14.96ft^2$
A_f	=	$A_T - A_G$ ∴ $1.82m^2$ - $1.39m^2$	$0.43m^2$	$4.63ft^2$
L_g	=	2 x [(1.23m – (0.085m x 2)) + (1.48m – (0.085m x 2))]	4.74m	15.55ft
U_g	=	*Predetermined Value*	$1.1\ W/m^2*K^o$	$0.194\ BTU/hr*ft^2*F^o$
U_f	=	*Predetermined Value* *(Test Method Ref. EN ISO 12567-1)*	$2.7\ W/m^2*K^o$	$0.475\ BTU/hr*ft^2*F^o$
Ψ_g	=	*Predetermined Value*	$0.057\ W/m*K^o$	$0.033\ BTU/hr*ft*F^o$

$$U_T = \frac{\left[\Sigma\left(1.39m^2 * 1.1\frac{W}{m^2K^\circ}\right) + \Sigma\left(0.43m^2 * 2.7\frac{W}{m^2K^\circ}\right) + \Sigma\left(4.74m * 0.057\frac{W}{mK^\circ}\right)\right]}{(1.39m^2 + 0.43m^2)} = \mathbf{1.626}\ \frac{\boldsymbol{W}}{\boldsymbol{m^2K^\circ}}$$

$$U_T = \frac{\left[\Sigma\left(14.96ft^2 * 0.194\frac{BTU}{hrft^2F^\circ}\right) + \Sigma\left(4.63ft^2 * 0.475\frac{BTU}{hrft^2F^\circ}\right) + \Sigma\left(15.55ft * 0.033\frac{BTU}{hrftF^\circ}\right)\right]}{(14.96ft^2 + 4.63ft^2)} = \mathbf{0.286}\ \frac{\boldsymbol{BTU}}{\boldsymbol{hrft^2F^\circ}}$$