

The debate surrounding U-values of industrial valley and boundary wall gutters continues to confuse specifiers and building envelope designers alike. The topic currently being discussed is “should the U-value of the gutter be the same, better or worse than that of the roof?”

Knowledgeable building owners, who have experienced the problems associated with the overflow of melting snow and frozen outlets, have very clear views on this issue – all snow and ice in the gutter MUST melt first to allow a clear drainage path for water as thawing occurs on the roof slopes.

However some gutter manufacturers suggest that the U-value through the sole of the gutter be equal to that of the roof. Since they are perceived as the experts on this issue, subsequent ‘snow-thaw’ overflows are often not recognised as a problem with gutter design and manufacture until they occur.

NFRC guidelines on this subject state “it is recommended that gutters give less insulation than the roof so that snow and ice melt preferentially in the gutter. This can usually be achieved without lowering the overall insulation value of the roof envelope”.

CA Group Limited is in complete agreement with this statement. When ice or snow cover the roof and gutter, it is crucial that radiated heat from within the building and solar heat from the sun on the outside melts the ice or snow in the gutter first, ensuring that water within the gutter flows before the mass of the roof begins to thaw without any restrictions.

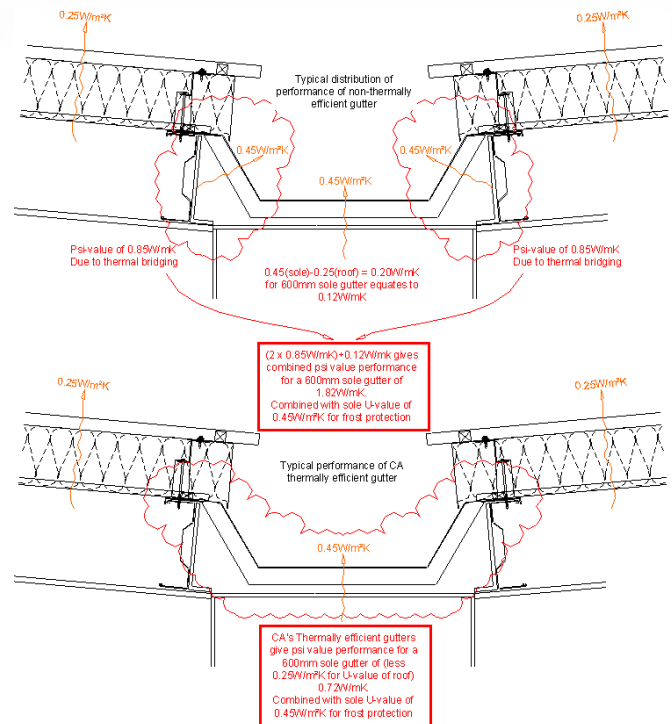
If the water in the gutter cannot escape due to frozen outlets, this can lead to the eventual ingress of water into the building due to the gutter overflowing.

Uninsulated outlets - which are the first gutter element to heat up and thaw, therefore, are an important feature for the safe drainage of roof water in thawing conditions.

The considerations listed above do not mean that the gutter must be treated as separate U-value and Psi-value. Treating the whole gutter as a Psi-value means that the critical issue of draining thaw water can be properly handled without excessive heat loss from the inside of the building by using the ‘Thermally Efficient’ Therma-gutter TE detail.

Therma-gutter TE minimises conducted heat loss by removing ‘slots’ of metal from the purlin bearing arms, creating a barrier across which heat conduction can not pass. This enables minimal heat loss where frost protection is not required and concentrates controlled radiated heat loss at the sole of the gutter where ice and snow may cause rainwater management problems.

These changes make no significant impact on the overall thermal performance of the building envelope. However, by using simple yet effective details, the building envelope designer has gone one step further in keeping water where it belongs - outside of the building.



To comply with Building Regulation Approved Document L2A in terms of thermal performance for gutters, psi-value calculations can be undertaken to establish the point thermal bridge in terms of heat loss. These values should then be included in the whole building calculation (iSBEM or similar approved software) to prove the building will comply with AD L2.

A critical element of the insulated gutter is the risk of condensation to the purlin bearing flange. The *f*-factor must be calculated at the same time as the psi-value which must be related to the building type. For instance a Class 1 type construction (e.g. an unheated warehouse) requires a minimum *f*-factor of 0.30, whereas a Class 5 building this figure is 0.90. Effectively, the building classification will determine whether or not the steel penetrations require insulating, or thermally breaking to reduce the risk of condensation. Therefore, all construction details, irrespective of the thermal performance, must have a minimum *f*-factor as described in BS5250:2002.

Typical valley gutter values in terms of *f*-factors & psi-values have been modelled with the following results; *(the following figures have been based on 2mm thick TC/500-25 coated galvanised steel gutters, 150mm deep)*

Sole	Insulation	Gutter Type	<i>f</i> -factor	psi-value
300	45mm PIR	Non TE	0.63	2.08W/mK
		TE	0.72	0.57W/mk
600	45mm PIR	Non TE	0.63	2.14W/mK
		TE	0.72	0.59W/mK
300	50mm RW	Non TE	0.67	2.03W/mK
		TE	0.73	0.63W/mK
600	50mm RW	Non TE	0.67	2.14W/mK
		TE	0.73	0.78W/mK