

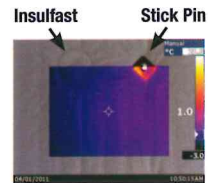
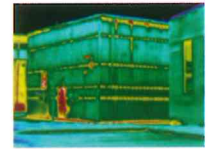


Thermal Performance of Building Envelope Assemblies

In buildings, when insulating material is interrupted by a highly conductive material, thermal bridging takes place. Examples of thermal bridges include steel pins that interrupt the continuity of batt insulation and go through heavily insulated exterior walls. Simply put, thermal bridges occur where differences in material thermal conductivities result in significant lateral heat flow; e.g., heat flowing along the surface of a wall and then flowing through the wall via a steel pins.

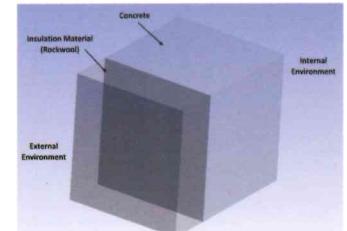
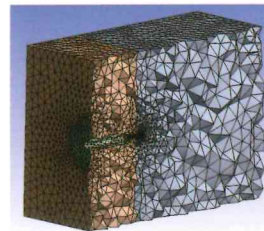
The infrared image to the right shows heat loss (i.e. yellow/red areas) through fasteners. The infrared camera doesn't reveal any heating transfer for the InsulFast™ (at -3°C) rather it highlights a high thermal bridging for the steel pin with a 21°C temperature.

The Calculations performed by the Advanced Thermal/Fluids Optimization, Modelling and Simulation (ATOMS) Laboratory, Department of Mechanical & Industrial Engineering, University of Toronto show that the InsulFast™ is over 99% efficient whereas the stick pins can downgrade the efficiency by more than 10%.

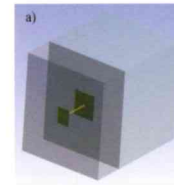
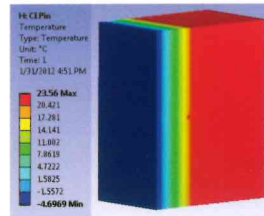


Suggested Specification

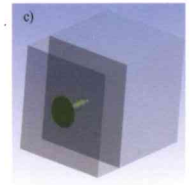
The fastener used to attach Insulation (Rockwool, Expanded Polystyrene, and Extruded Polystyrene) in to Solid Masonry, Hollow Concrete Block, and Steel Studs shall be Ramset InsulFast™ Fastener. The Ramset InsulFast™ Fastener shall be fastened using the Ramset T3IGT Gas Tool. The Ramset InsulFast™ Fastener must be made from High Density Polyethylene (HDPE) plastic and has a holding diameter of 2-3/8" (60 mm) with the Ramset logo marking.



Reference Assembly



Steel Pin Assembly



InsulFast (with cap) Assembly

		Insulation Thickness					
		1 in	2 in	3 in	4 in	5 in	6 in
Reference	U – Factor (W/m ² °C)	1.1786	0.7122	0.5103	0.3976	0.3257	0.2758
	Efficiency (%)	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Stick Pin	U – Factor (W/m ² °C)	1.2422	0.7706	0.5597	0.4397	0.3621	0.3078
	Efficiency (%)	94.88%	92.42%	91.17%	90.43%	89.94%	89.59%
InsulFast™	U – Factor (W/m ² °C)	1.1845	0.7162	0.5132	0.3999	0.3276	0.2773
	Efficiency (%)	99.50%	99.45%	99.44%	99.43%	99.42%	99.42%



Over used stick pin installation. This increases the thermal bridge and reduces thermal efficiency.

These thermal bridges contribute to a multitude of problems, including, but not limited to:

- added energy use during heating and cooling seasons
- interior surface condensation which leads to:
 - high humidity levels that can lead to unusual concentrations of airborne contaminants and microbial growth
 - rusting issues that can damage the structure