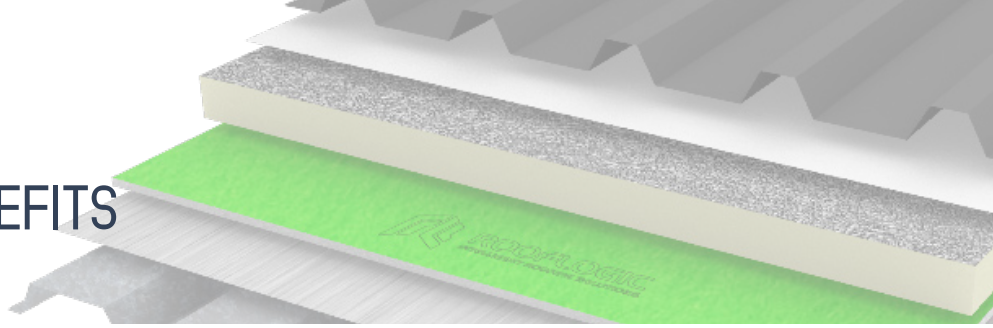


RL ULTRATHERM MSR ENVIRONMENTAL BENEFITS

ROOFLOGIC INFORMATION SHEET



INTRODUCTION

The RoofLogic UltraTherm MSR system consists of a metal liner (RL Liner Deck), a layer of rigid PIR insulation (RL PIR Board) and a profiled metal topdeck (eg. Topdeck T, Topdeck C).

One of the key benefits of the MSR system is its enhanced thermal performance. The superior thermal characteristics of the system are achieved with the use of a separable layer of RL PIR (polyisocyanurate) Board to provide a continuous insulating core within the system. This PIR insulating core, along with the separable nature of the system which enables individual component recycling, extended system life and reduced life cycle cost, makes the RoofLogic MSR system the sustainable roofing solution.

WHAT IS PIR INSULATION?

PIR is a rigid foam insulation used increasingly in commercial roof construction.

The benefits of using PIR include:

- Low environment impact
- Virtually no global warming potential
- Zero ozone depletion potential
- Cost effective, optimised energy performance
- Long service life
- Recyclable through reuse
- Meets new continuous insulation (ci) standards
- Quality Mark™ certified LTTR-values
- High R-value per mm of thickness
- Excellent fire test performance
- Moisture resistance
- Dimensional Stability
- Compressive Strength

LIFE CYCLE ASSESSMENT ON PIR PRODUCTS

Because PIR roof insulation is incorporated within a larger roofing system assembly, the most significant determinant of PIR insulation service life is the service life of the roofing system itself. Because roofing system service life is influenced by many variables (including system design, durability of components, quality of installation, ongoing maintenance procedures, periodic system refurbishment, severe weather events, and physical abuse), historical studies of roof system performance identify a very wide range of effective roof service life.

Because the LCA impact results reported in this declaration are based on a 60-year service life, the data may be interpolated for service lives less than 60 years simply by dividing the data by the lower estimated service life. However, with the RoofLogic MSR system it is conceivable that the service life could be extended beyond this time. The benefit of the MSR system is the ability of the separable top skin to be replaced whilst leaving the rest of the assembly, including the rigid PIR insulation, in place.

Based on the historical performance of metal skin roofing solutions in New Zealand it can be estimated that the metal skin of the RoofLogic MSR system would provide a service life of between 30-40 years. The advantage of the MSR system is that, when the metal skin needs replacement to maintain weather-tightness, the outer skin can be replaced without the removal of the total assembly. The RL Liner Deck can remain in place, as can the layer of PIR insulation, which can be retained to fulfil its service life of 60+ years. The metal skin that is removed is also able to be 100% recycled.

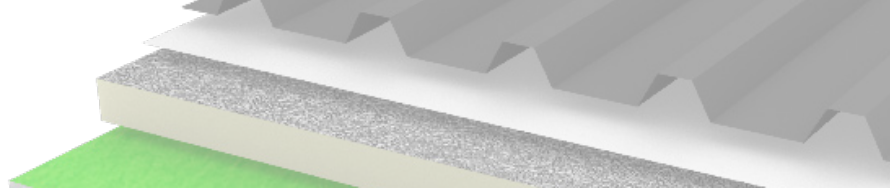
R-VALUE OF PIR INSULATION

PIR has the highest mm R-value of any insulation available. Because of its superior R-value, buildings that use PIR have lower heating and cooling costs than buildings insulated with other materials of the same thickness.

Long Term Thermal Resistance (LTTR) is a scientifically supported method to calculate the 15-year, time-weighted average R-value of roof insulation.

All PIR manufacturers of the Polyisocyanurate Insulation Manufacturers Association (PIMA) have adopted the LTTR method as the exclusive means to measure thermal performance of roof insulation. PIMA PIR manufacturers have certified LTTR-value products verified by the Quality Markcm Program.

COMPARISON OF ROOF INSULATION



Impact	Measure	Closed Cell SPF (Roofing)	XPS	HD Mineral Wool Board	RL PIR Roof Insulation
Global Warming Potential (GWP)	kg CO2 eq,	34.3	60.8	7.9	2.8
Ozone Depletion Potential (ODP)	kg CFC 11 eq.	16.7x10-8	3,630x10-8	11.8x10-8	9.4x10-8
Smog Formation Potential	kg O3 eq.	0.27	0.21	W0.25	0.18
Acidification Potential	Moles H+ eq.	1073x10-3	1,780x10-3	2,750x10-3	9.1x10-3
Eutrophication Potential	kg N eq.	1.33x10-4	9.85x10-4	9.40x10-4	14.0x10-4
Primary Energy Demand	MJ	136	81	99	53

- Published EPD Values with $R_{si}=1m^2 K/W$ for $1m^2$ of insulation over 60 year building service life.
- XPS EPD from a single manufacturer; all others from industry EPD.

WHAT ARE THE ENVIRONMENTAL BENEFITS OF PIR INSULATION?

PIR insulation is an ideal choice for green building design, offering:

Reduced Fossil Fuel Consumption

Well-insulated buildings reduce the need for energy, thereby reducing air pollution and greenhouse gas (GHG) emissions.

For example, BOMA (Building Owners and Managers Assn) in the United States represents approximately 900 million square metres of roofing. Reducing energy consumption by just 10 percent in these roofs is equal to planting 344,922,103 trees - a huge reduction in atmospheric CO2. The planting of these trees would also:

- Generate \$10.7 trillion of oxygen
- Control \$10.8 trillion worth of soil erosion
- Recycle \$12.9 trillion worth of water
- Provide \$21.4 trillion worth of air pollution control

It would also be the equivalent of removing 42.7 million cars off the road for one year.

These statistics underscore the significant positive environmental impact that well insulated roof systems can have.

Highest Thermal Efficiency

PIR is the most thermally efficient insulation available in the marketplace, as determined using Long Term Thermal Resistance (LTTR) values, a 15 year time-weighted R-value. In addition, PIR manufacturers participate in a third party certification program – QualityMark – to validate these predicted thermal values. QualityMark is a voluntary program administered by FM Global.

Zero Ozone Depletion Potential

RL PIR Board is produced using rigid foam board with third-generation, zero ozone-depleting blowing agents. All PIR products are now HCFC-free and CFC-free.

Zero Global Warming Potential

RL PIR Board is produced using rigid foam board with zero global warming potential blowing agents. This quality is critical as the impact of climate change is acknowledged as a worldwide environmental concern.

PIR Continuous Insulation

By blocking thermal bridging, a PIR continuous insulation system increased the overall thermal performance of a roof assembly and a building. A PIR continuous insulation system keeps energy and heat loss to a minimum, increasing the building's energy efficiency and leading to lower energy use.



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ENVIRONMENTAL BENEFITS OF THE PRODUCT DURING USE

High Thermal Efficiency

Because it is one of the most thermally efficient building insulations available in today's marketplace, PIR requires less total thickness to deliver specified R-value in roof and wall assemblies, reducing overall construction costs, and increasing usable building space.

High Net Return on Embodied Energy

A recent study comparing initial embodied energy to long-term energy savings achieved over 60 years in a typical commercial building suggests that the net energy savings potential of PIR roof insulation ranges between 9 and 44 times the initial embodied energy required to produce, transport and install the PIR insulation.

Zero Ozone Depletion Potential

RL PIR is produced with rigid foam board with third-generation, zero ozone-depleting blowing agents. The blowing agent (pentane) used in PIR also is among the lowest in Global Warming Potential.

Opportunity for Reuse

At the end of the roof service life PIR roof insulation boards can be salvaged and reused, either at the original site or on another construction site.

PIR and Environmentally Sustainable Building Design

Because it offers high thermal efficiency, zero ozone depletion potential PIR is an ideal choice for environmentally sustainable buildings.

USEFUL LIFE SPAN OF PIR AND THE ROOFLOGIC MSR SYSTEM

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