FREQUENTLY ASKED QUESTIONS

rFOIL™ Insulation Products

Using rFOIL ™ Reflective Insulation in Metal Buildings

1. **What is the R-Value of your rFoil ™?**

   R-Value indicates resistance to heat loss, and measures a mass insulation's ability to slow down heat flow through it. R-Values tell how well a product absorbs and holds heat energy, not how well it redirects it. rFOIL™ works by reflecting heat energy back in the direction of its source, and rFOIL™s true performance is not measured by the R-Value. Just as the absorbency of a raincoat is unrelated to its ability to repel water, the R-Value of rFOIL™ does not fully measure its ability to insulate and redirect heat energy.

   The ASTM C236-1224 tests that determine a products R-Value yield the following results for rFOIL™ Reflective Insulation:

Heat Flow Down =	R-10.6
Heat Flow Horizontal =	R-6.8
Heat Flow Up =	R-5.3

   NOTE: All materials have three separate R-Values, as above, depending on the direction of the primary heat source. Most insulation manufacturers do not provide all three values when labelling their products.

2. **How well does rFOIL™ work compared to fibreglass?**
   rFOIL™ will stop 97% of Radiant Energy (heat that is radiating through the air in its direction). Radiant heat is often overlooked and misunderstood, often because R-Values do not take it into account. Radiant heat transfer is responsible for up to 75% of total building heat gain or loss. Traditional Insulation products such as fibreglass, cellulose and EPS foam board are effective in reducing CONVECTION and CONDUCTIVE heat transfer, but do little to prevent RADIANT heat transfer. Radiant heat energy can either be absorbed or reflected. rFOIL™

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contains aluminum, which has an excellent reflective surface that effectively redirects this energy component.

3. What is RADIANT heat?

Simply put, this is heat energy that is radiating through an air space. If a surface is hotter than the adjacent airspace, it will cast off its energy, in the form of heat rays, into that airspace. These rays are invisible, yet they are powerful. Consider that temperatures in a dark attic can reach above 150 degrees, when the outside air is only 95 degrees. This is because the sun is saturating the roof with intense energy, which radiates into the attic below. This attic stays dark, but the energy released inside is intense.

Now consider what happens in a metal building. The roof absorbs the sun's energy continuously throughout the day. Since energy cannot be created or destroyed, it can only be transferred or redirected. The metal casts this energy into the metal building in the form of invisible rays or energy. This energy manifests itself as heat when it strikes objects inside the building, including people. This, in turn, heats the surrounding air. The result is hot, stifling conditions inside the building.

The energy that is radiating into the building is mostly unaffected by mass insulation products. These materials absorb this energy, build heat themselves, and then cast this energy into the building. As the sun continues to provide energy, the interior of the building continues to receive it.

This energy can, however be controlled. Aluminum has the ability to redirect these invisible rays. This is why aluminum is used to insulate airplanes, the space shuttle, and even the spacesuits worn by astronauts. Without reflective materials, an astronaut would perish in space. NASA even credits reflective insulation for allowing man and equipment to withstand the harsh environment of space orbit, where temperatures reach over 400 degrees in the sun, and less than minus 200 degrees in the dark.

When installed in metal buildings rFOIL™ effectively redirects the energy that radiates from the underside of the metal. A substantial portion of this energy is reflected upward, and not allowed inside the building.

4. How does the cost compare to 3” fiberglass?

Typically, rFOIL™ Double Bubble is priced very closely with 3” fibreglass, depending on the supplier of the two products.

5. How can rFOIL™ insulate if it's so thin?

It's a common misconception that insulation must be THICK to perform. This is because R-Values are closely related to a product's thickness. If you have two similar products with different thicknesses, the thinner of the two will always have a lower R-Value than the other.

It is also a common mistake to ONLY consider a material's R-Value when choosing insulation. It's highly possible for a thinner reflective material to provide better thermal performance than a thicker non-reflective product, even though the thicker product will have a higher R-Value.

Except for gold and silver, pure aluminum is the most reflective material on earth. The thin aluminum layer reflects radiant heat energy, and this ability is unrelated to the product's overall thickness.

Does rFOIL™ keep a substance cool too?

rFOIL™ does not necessarily cool a substance. Rather, it keeps it from getting hot. Consider a small experiment, using three boxes:

1. One insulated with fibreglass,

2. One insulated with foam, and

3. The last insulated with foil.

A bag of ice was placed in each box and its rate of melting was recorded. In the boxes insulated with fiberglass and foam, the bags of ice took 24 hours to melt. The bag of ice placed in the box lined with foil took 4 days to melt! This test clearly exposes the fallacy of the r-value test: A high r-value does not necessarily mean a better insulator.

6. How is rFoil™ installed?

Depending on the application rFOIL™ can be installed in numerous ways. In pre-engineered steel buildings, rFOIL™ is installed either above or below the purlins supporting the metal roof and sidewalls. In new construction, it's most often installed on the outside of the purlins. rFOIL™ usually runs perpendicular to the purlins, and in the same direction as the exterior metal. In retrofit applications, it is easiest to install rFOIL™ directly to the inside of the purlins, and running parallel. rFOIL™ requires an airspace, ideally at least ¾", to effectively redirect heat transfer. This is easily accomplished when installing over purlins spaced 5' apart, since the products own weight creates a natural drape of 2 ½" along this span.

UNDER CONCRETE: When installing Ultra Poly under concrete, it is important that the clear poly side face upward. An adverse chemical reaction occurs between the lime contained in concrete and aluminum, which will oxidize your concrete, creating blisters on the surface.

7. Can the bubbles go flat after rFOIL™ is installed in a building?

If the bubbles in rFOIL™ contain air when the product's installed, it will maintain this air indefinitely. rFOIL™ is produced with high-quality, linear-low density polyethylene, which is an excellent air barrier. And since the air pressure inside the bubbles is exactly the same as the air pressure outside, there are no forces in place that will cause the air to escape.

8. What if the bubbles lose their air?

It is highly unlikely that any of the bubbles will ever lose their air, given the equal air pressure both inside and out, and due to the quality of polyethylene used. However, it is possible for bubbles to be punctured by a sharp object. However, each bubble is independent of the other, so if one is punctured, the others will still maintain air.

9. Will rFOIL™ prevent condensation? If so, how?

Yes, rFOIL™ is an outstanding solution to condensation problems. The thermal break provided by the air space prevents warm, moist air inside a building from interacting with cold air on the same surface. When installed correctly, with secure seams, condensation will not occur on the surface of rFOIL™.

10. Can I lay the metal down directly on the foil?

Yes. Theoretically, if it were possible to achieve 100% surface contact with rFOIL™ and the metal exterior, the performance of rFOIL™ could be compromised.

However, two factors prevent this from ever occurring in metal building installations. First, the natural weight of rFOIL™ makes it easy to achieve the necessary drape to ensure optimum performance. When pulled tightly during installation, rFOIL™ will naturally drape 2 ½" when spanning purlins spaced 5' on center. Second, the ribbed profile of exterior metal adds to the airspace already in place.

Also, rFOIL™ provides a thermal break where the exterior metal attaches to the purlins. The only conductive transfer that occurs is via the screws that attach the exterior metal to the purlins.

11. Do I need to tape the seams?

Taping the seams is highly recommended, especially as interior condensation is an issue. Heated metal buildings in colder climates are especially susceptible to condensation problems, as well as agricultural buildings housing livestock. If there are no concerns about interior condensation, taping the seams is an option. As a rule, taping the seams is recommended.

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12. What is the best way to tape the seams?

Generally, it is always easier to tape seams from above, just before attaching the exterior metal to the purlins. The most common method for taping seams with 5' purlin spacing is to install double-tabbed rFOIL™ before attaching the metal. Both tabs are brought upward together, and often stapled every 1-2 feet. Foil tape is then applied atop the tabs. This method also helps the adjacent rows stay together as pressure is applied to the tape.

rFOIL™ Quick-Seam is another popular option, especially in post/frame buildings. Quick-Seam is a single-tabbed product, with double-coated tape on the interior side of the tab. When installed, the tab overlaps the next row of rFOIL™, the contact strip is removed from the material, and the tab is pressed into place on the adjacent material. Once attached, no other steps are necessary, and a secure vapour barrier is in place.

When spanning purlins spaced 5' apart, installing rFOIL™ Quick-Seam is slightly more difficult, but the convenience of not applying tape separately is a plus. In this case, it is important to maintain a consistent drape with each row, to ensure adequate surface contact for the tape. Also, when pressing down on the taped seam, it's also helpful to have someone pushing from below to provide resistance for the tape to make full contact.

13. How much tape will I need?

First, determine how many **linear** feet of rFOIL™ is being installed. This is approximately how much tape you will need. However, remember to allow at least 20% for tape overlap, scrap, etc...Rolls of rFOIL™ Tape are available in 2” or 3” widths, and lengths of 150'.

14. What kind of tape works best with rFOIL™?

We offer three types of rFOIL™ Insulation Tapes:

- Aluminum FOIL tape to seal the seams of FOIL faced side.
- White Poly tape to seal poly-facing seams.
- Double-sided tape to attach the first course of rFOIL™ to the roof edge.

15. Can water get inside the bubbles of rFOIL™?

No. Each bubble is independent of the others, and polyethylene is a natural moisture and vapor barrier.

16. How easily will the product tear?

rFOIL™ is produced with linear-low density polyethylene, with very high tensile strength and puncture resistance. When handled properly, it is very difficult to tear the material.

17. When using rFOIL™, how can I achieve an R-10?
A system R-10 is obtained by installing rFOIL™ alone in a metal building.

18. When using rFOIL™, how can I achieve an R-19?
A system R-19 is obtained by installing rFOIL™ in conjunction with 3" unfaced fiberglass.

19. When using rFOIL™, how can I achieve an R-30?
A system R-30 can be obtained by installing rFOIL™ in conjunction with 6" unfaced fiberglass. In this application, the 6" fiberglass is installed between the purlins, and the rFOIL™ is attached directly to the bottom of the purlins.
The result is an attractive, consistent ceiling surface, with tremendous thermal properties.

20. Will the material degrade or break down?
rFOIL™ is made from polyethylene and aluminum. Both of these materials are very environmentally stable, which means they do not biodegrade quickly.

21. Can I spray wash the material?
Yes, you can keep the surface clean by spray washing the insulation. However, power washing is not recommended.

22. How do animal fluids (urine) affect the white side? The Foil side?
Both the white poly side, and the foil side of rFOIL™ are unaffected by animal fluids. Both materials are non-porous, and chemically stable. There is no interaction of degradation that occurs when contact is made with animal urine and fluids.

23. How is the rFOIL™ installed with standing seams?
As with traditional metal roofing, rFOIL™ is installed directly onto the purlins. Installation procedures do not change when used with standing seams.

24. rFOIL™ does a great job keeping heat out in the summer, but doesn't seem as effective keeping the building warm in winter, especially in unheated buildings. Why is this?
Generally, summer heat gain in metal buildings is primarily the result of radiant energy entering the building. Since rFOIL™ reflects this energy, it is extremely effective at reducing summer heat gain. When it is cold outside the dynamics change. Unlike during summer, there is not an intense source of radiant energy for inside the building for rFOIL™ to reflect. Also, the concrete slab is wicking much of the heat energy from the building during the winter. Radiant energy

accounts for about one-half of the heat loss during cold seasons.
One other factor affects the thermal properties of a metal building in cold weather. Typically, the sun's energy actually provides a heat source during the winter. The sun makes the metal surface warmer than the ambient air, and that heat energy is transferred into the building. Installing rFOIL™ prevents this. Although winter heat gain is thermally inefficient, it sometimes makes FOIL seem less effective, when it is actually doing exactly what it's supposed to do...stop heat transfer.
The bottom line is that nobody can expect an insulation product to stop heat fain in the summer and allow it in the winter.

25. How long is the warranty?
rFOIL™ carries a 20-year limited warranty against any material defects.

26. What does the warranty cover?
Material defects include de-lamination, surface imperfection, foil corrosion, and air retention. Any defect in material or workmanship is covered by the rFOIL™ warranty.

27. What if the material is found defective after it's installed?
It is always recommended that the underside surface be carefully inspected prior to attaching exterior metal to the building, in case defects are ever found. The warranty provides for the repair or replacement of defective products only.

28. What is the fire rating of the product?

- All rFOIL™ material with foil on both sides is a Class 1/Class A material
- rFOIL™ material with white poly on one side is Class 2 /Class B material
- rFOIL™ “FR” (Fire Rated) has a white poly side, but is a Class 1/Class A material.

29. Is this product a fire hazard?
No. The material is more prone to melting during a fire, rather than adding to the burning of the structure. rFOIL™ is produced with aluminum and polyethylene (plastic). Neither material is a fire hazard.

30. Will dust affect the foil's performance?
Layers of dust do have an effect on the material's ability to reflect radiant energy. The degree of

reduction in reflectivity has been debated scientifically. Conclusion ranges from 7% to 18% reductions in reflectivity over 10 to 25 years.

31. Will the foil make my metal hotter than without?

The heat energy that the metal receives comes directly from the sun. No new energy is being created. Only existing energy, which has already been absorbed by the metal is reflected back toward the source.

32. Will rFOIL™ corrode or change color?

rFOIL™ is produced with 99.9% pure aluminum. This is the purest aluminum available on the market. Pure aluminum is highly resistant to discoloration or corrosion. Less than pure aluminum contains filler materials. Often, it is these fillers that are discolouring, not the aluminum content itself. For this reason, rFOIL™ is always produced with the highest quality aluminum available. rFOIL™ is also coated with a clear resin to further protect the integrity of the surface.

33. What if it rains on the material before it is installed?

De-ionized water (rainwater) has no affect on rFOIL™. Any discoloration by rainwater is considered a manufacturing defect, and is covered by the rFOIL™ warranty.

34. Can the material be installed parallel to the ridge, in the same direction as the purlins?

In new pre-engineered steel buildings, rFOIL™ is always installed perpendicular to the ridge and purlins. One exception is retrofits, where the material is often attached along the purlins, and secured to the underside.

In post/frame buildings the same applies. For this application, it is possible to install rFOIL™ parallel to the ridge, atop the purlins. The 2' spacing of purlins in post/frame metal buildings makes it possible to install this way, but only if **ALL** the roof insulation is being rolled out at the same time. In this case, the rolls are unwound together, ahead of the metal as the roofing is secured to the purlins.

35. How is the material secured to the purlins?

rFOIL™ is taped to the roof edge with double-sided tape, to ease installation. From that point, the material is simply draped over the purlins and secured under the exterior metal.

36. Is ¼" rolled foam/foil a better insulator than rFOIL™? (Low-E, MicroFoil)

These are similar to rFOIL™, only in that they are reflective insulation products. The difference

is the strength and effectiveness of the thermal break. Any foam product is prone to de-lamination due to its porous surface. This material is also subject to blistering, an unsightly by-product of de-lamination. Foam products also lack tensile and puncture strength, and often must include reinforcing scrim to be handled without tearing.

37. Is ¼" fibreglass with a FOIL facing a better insulator than rFOIL™?

Like with foam products, fiberglass lacks tensile and puncture strength, and therefore must be laminated to a scrim to be handled without tearing. Fiberglass is also prone to hold heat and moisture, unlike the bubble in rFOIL™ ¼" fiberglass also compresses more than bubble, especially on the purlins. The air vacuum in rFOIL™ bubble is a much more effective thermal and condensation break than thin fiberglass, which is why ¼" fiberglass is seldom used in cold climates.

38. Why is reinforcing scrim added to foam/FOIL and ¼" fiberglass/FOIL insulation products?

The material used in these products, (1/4" foam, ¼" fiberglass) have very little tensile and puncture resistance. For this reason, reinforcing scrim is necessary to prevent tearing when handled, shipped and installed.

39. Will the material tear at the screw holes?

No. The many layers of polyethylene add to the strength of the product and will resist tearing.

40. Will the material compress and secure itself around screw holes?

Yes, the material will stay uniform and "seal" around the screw holes ensuring a tight fit. A simple test is to puncture a sample of rFOIL™ with a nail, then cup the material and fill with water. Water will not leak around the nail or screw.

41. What is the major benefit of adding insulation to a metal building?

Insulation provides increased comfort, energy savings, condensation control, light reflectivity and noise reduction.

42. I am building a warehouse that will not be heated or air-conditioned. Do I need to put any insulation in the building?

To avoid heat gain in the summer as well as condensation problems inside the building, it is necessary to insulate a metal building. The fact that the warehouse is not air-conditioned is even more reason to install a radiant barrier.