AYR-FOIL®
HI-PERFORMANCE REFLECTIVE INSULATION

HI-PERFORMANCE REFLECTIVE INSULATION

THE MOST VERSATILE INSULATION IN THE WORLD

GREAT ENERGY SAVINGS FOR NEW CONSTRUCTION AND RETROFIT PROJECTS

CONTRACTOR INFORMATION AND INSTALLATION GUIDE

AYR-FOIL™ (by **RESISTO**, a division of **SOPREMA CANADA INC.**) is a Canadian manufacturer fully committed to designing, manufacturing, and marketing reflective insulation and radiant barrier products.

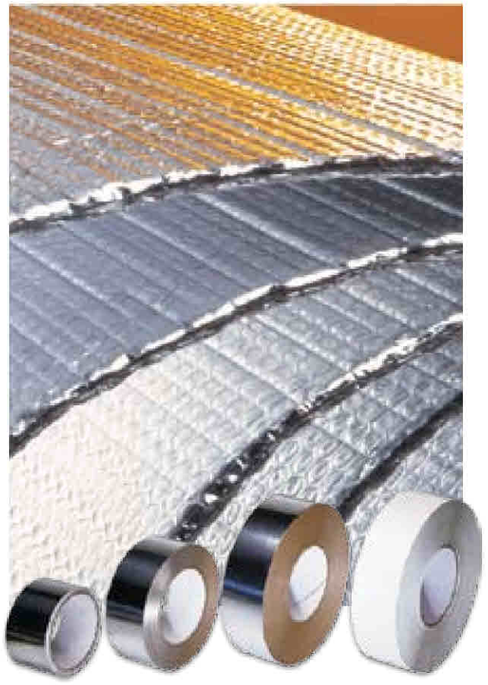
Our state of the art manufacturing plant is the most versatile in the industry. Custom widths up to 99 inches wide are available to meet your special needs.

Our technicians have developed specific installation methods for residential, commercial, industrial, agricultural and HVAC applications. Our products have been tested by independent laboratories to meet most North American building code requirements.

The design of **AYR-FOIL™** Reflective Insulation products provide them with R-values ranging from R-4 to R-16 depending on the installation method used and the direction of the heat flow.

AYR-FOIL™'S MISSION

- To promote the use of reflective insulation and radiant barriers.
- To educate contractors and end users on the remarkable properties of **AYR-FOIL™**'s products and provide accurate information on their R-values and performance.
- To diversify our product line and develop new markets.
- The **RESISTO** organization is committed to fully meeting the requirements of existing and future customers.



We are there to help you!
Feel free to contact us.

Toll free: 1 877 478.8408
Fax: 1 819 478.0199
info@ayr-foil.com
www.resisto.ca
www.resisto.us

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THE MOST VERSATILE INSULATION IN THE WORLD!

PRODUCT DESCRIPTIONS

AYR-FOIL™ A2A–M2M

Reflective surface
Polyethylene bubble
Polyethylene
Polyethylene bubble
Reflective surface

AYR-FOIL™ A2V–M2V

Reflective surface
Polyethylene bubble
Polyethylene
Polyethylene bubble
White polyethylene (UV protected)

AYR-FOIL™ A1V–M1V

Reflective surface
Polyethylene bubble
White polyethylene (UV protected)

AYR-FOIL™ A1A–M1M

Reflective surface
Polyethylene bubble
Reflective surface

AYR-FOIL™ CA2P

Protective coating
Reflective surface
Polyethylene bubble
Polyethylene
Polyethylene bubble
Clear polyethylene

AVAILABLE SIZES

96" x 125'
(2.4 m x 38.1 m)

72" x 125'
(1.8 m x 38.1 m)

48" x 125'
(1.2 m x 38.1 m)

24" x 125'
(61 cm x 38.1 m)

16" x 62.5'
(40.6 cm x 19 m)

48" x 25'
(1.2 m x 7.6 m)

24" x 25'
(61 cm x 7.6 m)

Other sizes are offered, contact us.

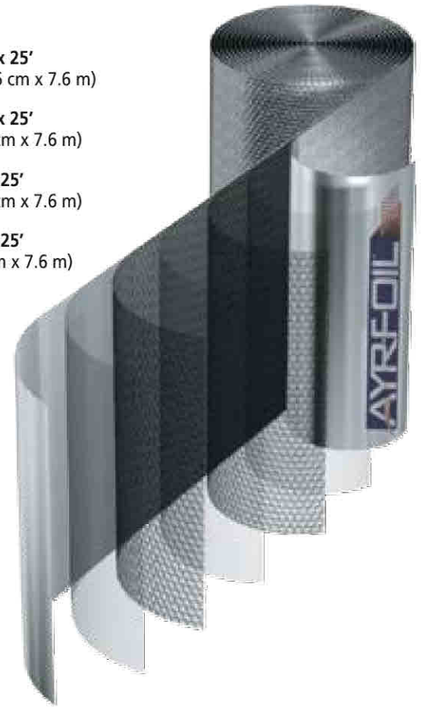
All products are available with a 1" or 2" **staple tab** and/or 1" **quick seam tape**.

16" x 25'
(40.6 cm x 7.6 m)

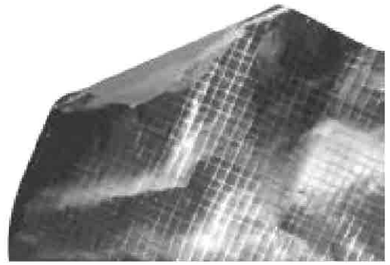
12" x 25'
(30 cm x 7.6 m)

6" x 25'
(15 cm x 7.6 m)

2" x 25'
(5 cm x 7.6 m)



OTHER PRODUCTS



RADIANT BARRIERS

ALUMINUM FOIL–ALUMINUM FOIL
Perforated or not

ALUMINUM FOIL–KRAFT PAPER
Perforated or not

(All radiant barriers are available in 50" (1.27 m) x 250' (76.2 m) rolls.)

* Other products and sizes are available, contact us.

PRE-FABRICATED INSULATION KIT

WATER HEATER KIT
(40 or 60 gallons)

AYR-FOIL™ TAPE TO SEAL SEAMS

ALUMINUM FOIL TAPE
2" x 30'
2" x 150'

WHITE VINYL TAPE OR WHITE POLYESTER TAPE
2" x 300'

REFLECTIVE METALIZED TAPE
2" x 30'
2" x 150'

* Other formats and types of tapes. contact us.

DEFINITIONS
REFLECTIVE INSULATION
RADIANT BARRIERS
R-VALUES

HOW DOES IT WORK ?
WHY USE IT ?

Before you decide which product you need and how it needs to be installed, it is important to understand the difference between a reflective insulation system and a radiant barrier.

DEFINITION OF A REFLECTIVE INSULATION SYSTEM AND A RADIANT BARRIER (SOURCE: RIMA):

Reflective insulation is thermal insulation composed of enclosed air spaces sandwiched between one or more low emittance materials. A radiant barrier system specifies that the reflective material facing an open air space.
The main difference between the two is that a reflective insulation system has a measurable R-value.

By definition, this means that our **AYR-FOIL™** bubble products are reflective insulation systems because they already have an enclosed air space sandwiched between the outer layers. Radiant barriers are typically products such as aluminium-aluminium or aluminium-kraft paper. These products can also be reflective insulation systems if their foil side is facing an enclosed air space.

With its **AYR-FOIL™** products, RESISTO is committed to develop the use of bubble foil insulation. This is why you will find a lot more info on bubble-foil products than laminated foil in this installation guide.

AYR-FOIL™ is a 5/16" or 3/16" thick, multi-layer, reflective insulation available in rolls of various widths and lengths. Two outer layers of reflective material reflect up to 97% of radiant heat. Each reflective surface is bonded to a tough layer of polyethylene for strength. Two inner layers of insulating bubble pack resist conductive heat flow while a centre layer of polyethylene gives **AYR-FOIL™** high reliability and strength.

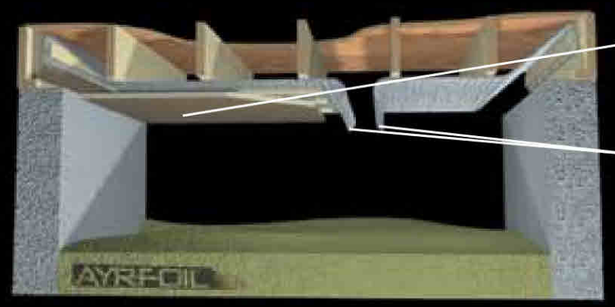
AYR-FOIL™ reflects the sun's rays (infra-red) in the hot summer months. It also retains interior heat and helps to reduce or eliminate potentially damaging ice dams and condensation during the winter months.

Radiant heat, the major source of heat transfer, is energy in the form of infrared rays. It travels at the speed of light, even through a vacuum, and is either transmitted through, absorbed into or reflected by any material it comes in contact with. Air, water, and glass, for example, transmit visible light to varying degrees. A white surface such as snow reflects it; while a black surface absorbs it.
AYR-FOIL™ reflective insulation reflects up to 97% of radiant energy.

WHAT ARE R-VALUES ?

R-values are commonly used to rate the thermal resistance and effectiveness of insulating materials. When properly installed, **AYR-FOIL™** has a good R-value, which effectively resists heat transfer through thermal conduction. Because it acts as a radiant energy barrier **AYR-FOIL™** is superior to other mass insulation products with the same R-values. In addition to ensuring exceptional indoor comfort, **AYR-FOIL™** stands out by its ability to provide superior energy savings.

CRAWL SPACES



R-21
1" RIGID INSULATION AND AYR-FOIL™ A2A

R-12.5
AYR-FOIL™ A2A

- Prevents cold floors
- Increases the R-value
- Prevents insects and rodents from building nests
- Prevents ground moisture from causing dry rot

*To avoid condensation problems, do not install fibrous insulation between the joists during cold weather.

INSTALLATION METHOD

1

Make sure there is no fibrous insulation between the floor joists.

2

Staple AYR-FOIL™ under the floor joists.
Be sure to seal it well around the perimeter joist as close as possible to the top corner.

3

Seal all the seams with AYR-FOIL™ ALUMINUM TAPE.

TO INCREASE THE R-VALUE:

4

Install wood strapping on the AYR-FOIL™ perpendicular to the joists.

5

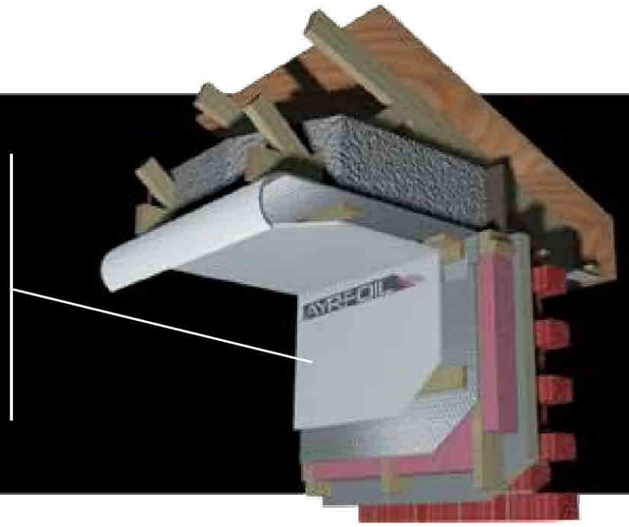
Nail the rigid insulation to the strapping according to the manufacturer's recommendations.
Make sure the air space between the foil and the rigid insulation is properly sealed.

INSULATING VAPOUR BARRIER FOR WALLS AND CEILINGS

ADDS R-4.5 TO THE R-VALUES OF WALLS

ADDS R-3.8 ADDED TO THE R-VALUES OF CEILINGS

- DRYWALL
- WOOD STRAPPING (AIR SPACE)
- AYR-FOIL™ A1V
- 2" X 4" OR 2" X 6" (5 CM X 10 CM OR 5 CM X 15 CM) WITH FIBREGLASS IN THE MIDDLE
- REGULAR OUTSIDE FINISH



INSTALLATION METHOD

WALLS

1

Make sure the fiberglass is installed correctly between the studs.

2

Staple the AYR-FOIL™ A1V to the studs with the white side facing the fiberglass (reflective side facing in) every 16" (40.6 cm) c / c. Do not overlap the materials.

3

Seal the seams with AYR-FOIL™ REFLECTIVE TAPE.

CEILINGS

1

As with walls, the AYR-FOIL™ and strapping can be installed first. AYR-FOIL™ can support the attic insulation. Simply install the fibrous insulation over the AYR-FOIL™ between the rafters.

- The R-value includes the **AYR-FOIL™ A1V** and the enclosed air space adjacent to the walls and ceiling.
- Is a very robust, certified vapour barrier that increases the long-term effectiveness of fibrous insulation.
- Prevents air infiltration.

INTERIOR RETROFITS

MATERIAL ADDED
- WOOD STRAPPING
- AYR-FOIL™ A2A
- WOOD STRAPPING
- DRYWALL

ADDS R-7.5 TO THE R-VALUES OF WALLS AND CEILINGS

- **AYR-FOIL™** can be installed on any kind of surface.
- Contains no hazardous materials.
- Prevents heat loss by conduction, convection and radiation.
- Is an excellent vapour barrier.

INSTALLATION METHOD

1

Make sure that the surface is level and dry. Seal all cracks prior to installing the product. If there is an existing vapour barrier, perforate it at several places to prevent the build up of moisture between two vapour barriers.

2

Install the first layer of wood strapping every 16" (40.6 cm) c/c.

3

Staple the AYR-FOIL™ A2A to the wood strapping without overlapping it. Seal the seams with AYR-FOIL™ REFLECTIVE TAPE.

4

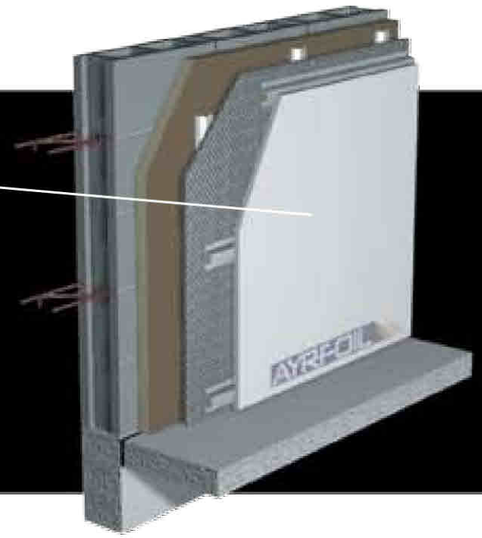
Install the second layer of strapping and the drywall.

CONCRETE BLOCK WALL

FOUNDATION WALLS

ADDS R-14 TO THE R-VALUE OF THE WALL

MATERIAL ADDED
- CONCRETE BLOCKS (OR FOUNDATION WALLS)
- RIGID INSULATION 1" (2,5 CM)
- STRAPPING (AIR SPACE)
- AYR-FOIL™ A2A
- STRAPPING (AIR SPACE)
- DRYWALL



INSTALLATION METHOD

1

Attach the rigid insulation temporarily to the concrete blocks.

2

Screw the first layer of metal strapping to the wall through the rigid insulation.

3

Attach the AYR-FOIL™ A2A to the metal strapping using double-sided tape.

4

Seal the seams with AYR-FOIL™ ALUMINUM TAPE.

5

Install the second layer of strapping and the drywall according to the manufacturer's recommendations.

- **AYR-FOIL™** can be installed on both sides of concrete block walls. Make sure that the **AYR-FOIL™** is installed on the warm side of the wall assembly in colder climates.
- The insulation system is very effective and airtight.
- The insulation system term boasts long-term stability.

* Other installation methods are possible.

INSULATING A METAL BUILDING

THE BEST REFLECTIVE INSULATION FOR METAL BUILDINGS AND POST FRAME AND POLE BUILDINGS

- Quick and easy to install.
- Reduces condensation and energy costs.
- Reduces heat gains indoors.
- Protects livestock.
- Available in custom widths up to 98" (2.5 m) with staple tabs.
- Available with staple tabs or quick seam double-sided self-adhesive tape for quick installation.
- UV resistant.

THE BEST INSULATION FOR METAL BUILDINGS

Whether for a new metal building or a retrofit, many different methods can be used to insulate metal buildings. Of course, the R-values will depend on the installation method used. Even though a number of installation methods are presented in this Guide, we recommend that you contact our specialists. They can help you select the best system for your needs and measure the R-value of your building.

AYR-FOIL™ REFLECTIVE INSULATION PRODUCTS

- Are quick and easy to install.
- Reduce condensation, air infiltration, and energy costs.
- Reduce inside heat gains and provide an excellent R-value.
- Protect livestock.
- Are reliable, long-lasting vapour barriers.
- Prevent condensation and are not affected by mold.
- Can be installed on the interior or exterior of structures, over existing insulation.
- Are available in rolls up to 8' (2.5 m) wide.
- Are easy to clean and provide a good-looking finish.

POST FRAME AND POLE BUILDINGS

AYR-FOIL™ helps to solve or limit two of the major problems associated with post frame buildings. The reflective side of **AYR-FOIL™**'s prevents temperature increases providing a more comfortable environment for workers and livestock. In addition, the air bubbles reduce condensation problems. Furthermore, the white polyethylene side is easy to clean and has a bright shiny finish.

BENEFITS

- Is an excellent vapour barrier.
- Is an effective sun screen that prevents farm buildings from overheating and protects the livestock.
- Has a clean and washable finish.
- Eliminates condensation problems
- Is UV resistant

INSTALLATION METHOD

1

Install wood strapping on the wood or metal structure. In general, 1" x 3" wood strapping is ideal.

2

Other strapping systems may also be used.

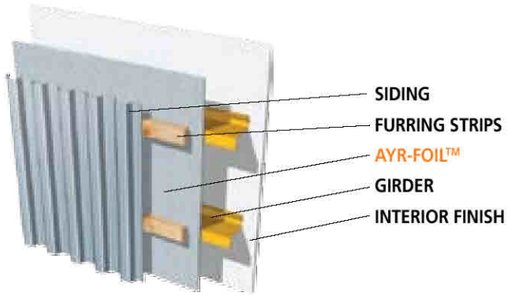
3

Unroll the AYR-FOIL™ A2V, white side facing the outside of the structure and the strapping the inside of the building. Staple it to the strapping every 4" (10 cm). Rust resistant staples must be used.

4

Seal seams with 2"-wide (5 cm) AYR-FOIL™ WHITE VINYL TAPE.

METAL BUILDINGS



METAL WALLS

AYR-FOIL™ A2A or **A1A** can be used to insulate metal buildings and provide R-values of up to R-8 and R-10 respectively.

1

Start at end of purlins.

2

Attach foil securely.

3

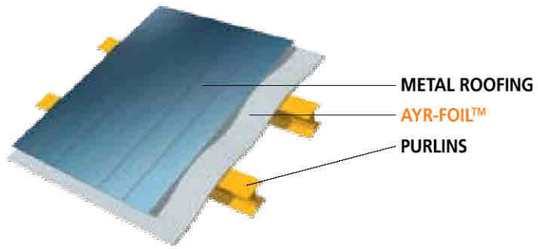
Pull tight when unrolling the foil. Seal seams using AYR-FOIL™ TAPE or AYR-FOIL™ QUICK SEAM TAPE (double-sided).

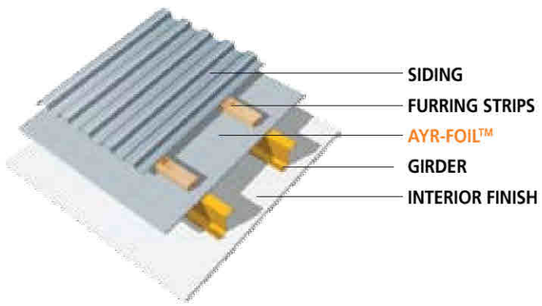
4

Attach the thermal block on top of the foil.

5

Install metal roofing using the customary method.





METAL ROOF

AYR-FOIL™ is perfect for insulating roofs and provides an R-10 value, using either the purlin, or drape method.

PURLIN METHOD

1

Start at end of purlins.

2

Attach foil securely. Pull tight when unrolling the foil.

3

Seal seams using AYR-FOIL™ TAPE or AYR-FOIL™ QUICK SEAM TAPE (double-sided).

4

Attach the thermal block on top of the metal foil.

5

Install the metal roofing using the customary method.

DRAPE METHOD

1

Apply the double-sided tape to the first C or Z channel, starting at furthest end of the building.

2

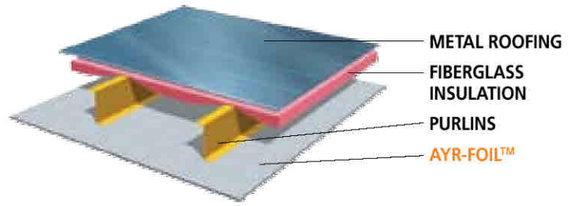
Roll out the AYR-FOIL™ A2A or A2V on the surface allowing it to sag between the channels to create an air space.

3

Seal seams using AYR-FOIL™ TAPE or AYR-FOIL™ QUICK SEAM TAPE (double-sided).

4

Install the metal roofing using the customary method.



RETROFITTING METAL BUILDINGS

It is easy to obtain an R-19 value with **AYR-FOIL™ A2V** or **A2A** Reflective Insulation products when they are installed over existing fibreglass*.

1

Start at end of purlins.

2

Attach foil securely.

3

Seal seams using AYR-FOIL™ TAPE or AYR-FOIL™ QUICK SEAM TAPE (double-sided).

4

Attach the thermal block on top of the metal foil.

5

Install the metal roofing using the customary method.

* Other retrofit assemblies are possible. Consult our specialist.

INSULATING METAL ROOFS

AYR-FOIL™ A2V and **A1V** Reflective Insulation products are ideal for quickly and easily insulating existing metal roofs. Because they are only 3 / 16" or 5 / 16" thick, they are perfect for tight spaces. Once installed, **AYR-FOIL™ A2V** and **A1V** products reflect the heat to keep the inside of the building cooler and prevent water infiltrations.

INSTALLATION METHOD

1

Pre-cut lengths of AYR-FOIL™ that span eave-to-eave, up and over the ridgeline.

2

Begin at one eave by laying the AYR-FOIL™ flat on the roof. Unroll toward the ridge and continue down to the other side.

3

Lay the next course of AYR-FOIL™ parallel to the first. If using tap products, make sure the square edge faces the tab edge of the previous course of AYR-FOIL™.

4

Seal the joints and make sure the entire roofline is covered with AYR-FOIL™.

5

Attach furring material of choice over the AYR-FOIL™ covered roof.

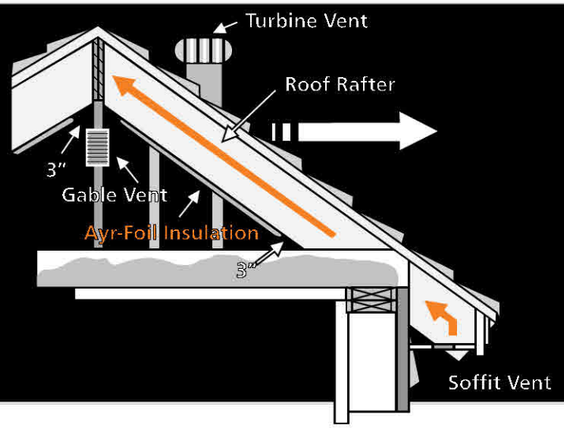
6

Install the metal roof on the furring.

WARNING :

To ensure proper ventilation, vents (ridge, gable, soffit, etc) should not be covered with AYR-FOIL™ insulation.

RADIANT BARRIER FOR ATTICS



In the summer, most of the heat entering homes and buildings comes through the roof. Using a reflective foil like **AYR-FOIL™** aluminium-aluminium or aluminium-kraft paper saves on air conditioning costs and maintains a comfortable temperature inside. **AYR-FOIL™** attic barrier can reduce heat gains through the attic by as much as 78%. Both products available are perforated to eliminate condensation problems. **AYR-FOIL™** radiant barriers can also improve fibrous insulation performance in the winter.

INSULATING ATTICS

1

Staple the AYR-FOIL™ radiant barrier in place. For adequate ventilation leave a 3" (7.6 cm) gap along the ridgepole and the base of the rafters. A turbine and gable vent or soffit vent will circulate air between the rafters.

2

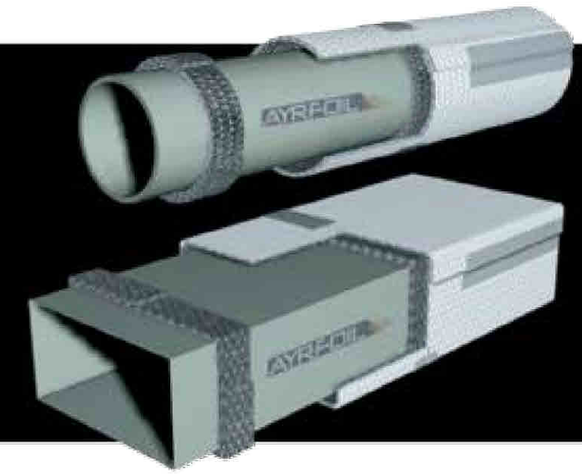
The joints can be overlapped without sealing the seams.

INSULATING WATER PIPES AND AIR DUCTS

ROUND OR REGULAR DUCTS

AYR-FOIL™ A2A
R-4.3 WITHOUT SPACER STRIPS
R-6 WITH SPACER STRIPS

TALK TO OUR TECHNICIANS ABOUT THE R-8 INSTALLATION METHOD.



INSTALLATION METHOD

1

Install 2"-wide (5 cm) strips of AYR-FOIL™ every 16" (40.6 cm) around pipes (two thicknesses) to create an air space.

2

Roll the AYR-FOIL™ A2A over the spacer strips and overlap the preceding piece by approximately 1" (2.5 cm). Avoid placing the envelope seams over the spacer seams. The foil side must face the pipe or duct.

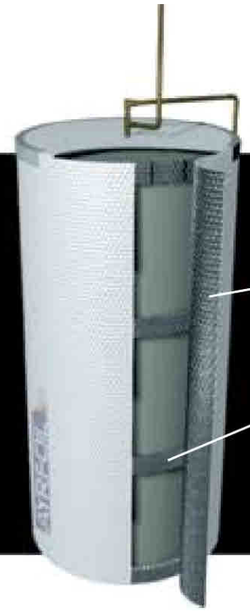
3

Seal all seams with AYR-FOIL™ REFLECTIVE FOIL TAPE.

- **AYR-FOIL™ pipe wrap can be used for smaller pipes and ducts. Available in 2", 4", 6" and 12" (5 cm, 10 cm, 15 cm and 30 cm) wide formats.**
- **AYR-FOIL™ spacer strips are available in a 2" x 25' format and come in bags of 24.**

- Prevents condensation.
- Reduces noise, and vibration.
- Is equivalent to more than 1 ½" (3.8 cm) of fibreglass insulation.
- Is not affected by moisture or water.
- Contains no hazardous materials and is non-allergenic.
- Can be washed.
- Does not need to be painted.
- Is ideal for air conditioning and ventilation ducts.
- With spacer strips, adds R-6 to the R-value.

WATER HEATERS



AYR-FOIL™ A2V

AYR-FOIL™ 2" (5 CM) SPACING STRIP

- Is perfect for 40-and 60-gallon gas* and electric water heaters. It can also be used with larger tanks.
- Has a clean, washable finish.

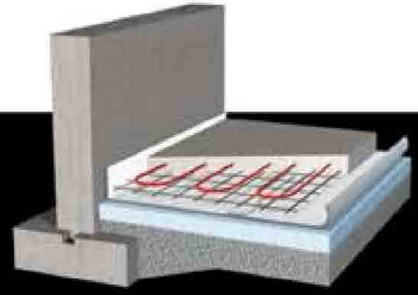
* VERY IMPORTANT: To prevent fire hazards, do not cover the combustion chamber of the pilot light.

AYR-FOIL™ CAN PREVENT UP TO 18% ON ENERGY LOSSES FROM WATER HEATERS.

PIPE AND DUCT WRAP

INSULATION SYSTEMS UNDER CONCRETE SLABS

WITH OR WITHOUT RADIANT HEAT



WITH

- CONCRETE SLAB
- AYR-FOIL™ CA2P (REFLECTIVE SIDEUP)
- RIGID INSULATION
- SAND OR GRAVEL
- GROUND

WITHOUT

- CONCRETE SLAB
- AYR-FOIL™ A2V (WHITE SIDE UP) OR CA2P (REFLECTIVE SIDE UP)
- SAND OR GRAVEL
- GROUND

WITH RADIANT HEAT

1

Unroll AYR-FOIL™ CA2P over the rigid insulation*, with the reflective side facing up.

2

Overlap the seams by 2" (5 cm). Cut AYR-FOIL™ CA2P so that it overlaps the base of the wall by 6" (15 cm).

3

Seal the seams with 2"- wide (5 cm) AYR-FOIL™ ALUMINIUM TAPE.

4

Pour the concrete over the AYR-FOIL™ CA2P.

* Consult heating systems manufacturers to know more about rigid insulation requirements.

WITHOUT RADIANT HEAT

1

Unroll AYR-FOIL™ over the sand or gravel, with the reflective side facing the ground (white side up (A2V)) or reflective side up (CA2P).

2

Overlap the seams by 2" (5 cm). Cut AYR-FOIL™ so that it overlaps the base of the wall by 6" (15 cm).

3

Seal the seams with 2"- wide (5 cm) AYR-FOIL™ WHITE VINYL TAPE or ALUMINIUM TAPE 2"- wide (5 cm).

4

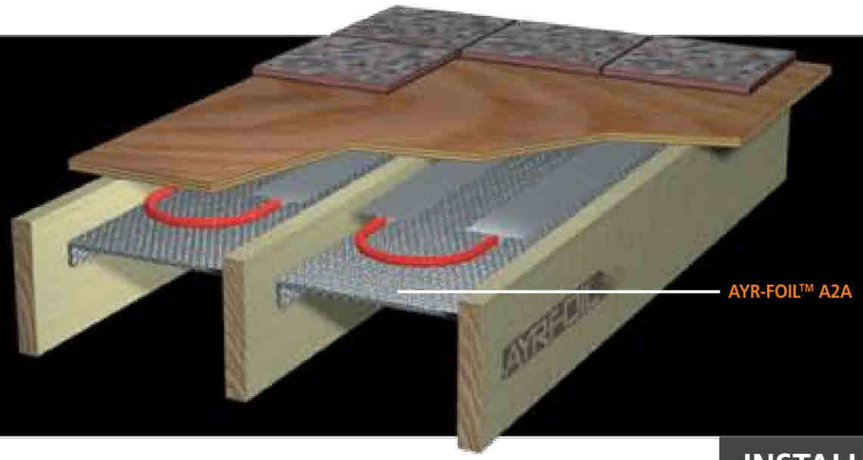
Pour the concrete over the AYR-FOIL™.

It is the exclusive responsibility of the user to ensure that the products are installed according to applicable Building Codes and municipal authorities' requirements (ex.: R Value requirement).

WITH OR WITHOUT AYR-FOIL™ A2V OR CA2P

- Eliminates basement dampness.
- Increases comfort in the basement.
- Keeps the temperature of the slab very close to room temperature.
- Is easy and quick to install.
- Possesses 60 psi crush resistance.
- Helps reflect energy from the slab back into the room.
- Breaks the thermal bridges between the slab and the ground.

RADIANT HEATING UNDER A WOOD FLOOR



UP TO **R-14.5**

INSTALLATION METHOD

- Is installed between the joists.
- Conserves heat.
- Maximizes the efficiency of the heating system.
- Allows for a quick response time by the heating system.

1

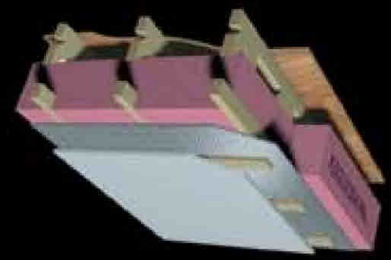
Cut the AYR-FOIL™ A2A to the right width, generally 16” or 24” (41 or 61 cm).

2

Staple the AYR-FOIL™ to the sides of the joists (see illustration).

* AYR-FOIL™ is also available in 16” and 24” (41 and 61 cm) widths with staple tabs for easy, quick installation.

OTHER APPLICATIONS



ADDS **R-4** THE R-VALUE

GARDEN SHEDS, FISHING AND HUNTING CABINS

- Can be use as an interior finish.
- Conserves heat.
- Keeps the inside cool in summer and warm in winter.
- Makes it possible to cool down and heat up the rooms more quickly.

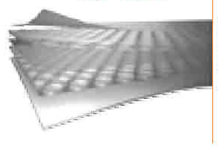
INSULATING GARAGE DOORS

- **AYR-FOIL™** reduces heat losses.
- Is very light (no need to adjust the door opener).
- Has a clean and washable finish.
- Has an R-6 value.

CATHEDRAL CEILINGS

- Be sure to leave at least a 2” (5 cm) air space between the top of the insulation and the roof.
- Install fibrous insulation between the rafters.
- Attach the **AYR-FOIL™ A1V** to rafters.
- Install wood strapping.
- Install drywall.

PRODUCT PROPERTIES

PRODUCT	DESCRIPTION	THICKNESS	DIMENSIONS*	EMISSIVITY
A2A 	2 layers of bubbles, reflective surface on both sides	8 mm (5/16 in)	16″ 24″ 48″ 72″ or 96″ W X 62.5′ or 125′ L	0.06
A2V 	2 layers of bubbles, reflective surface on one side and white polyethylene on other side, UV resistant	8 mm (5/16 in)		0.06
A1A 	1 layer of bubbles, reflective surface on both sides	4 mm (3/16 in)		0.06
A1V 	1 layer of bubbles, reflective surface on one side and white polyethylene on other side, UV resistant	4 mm (3/16 in)		0.06
CA2P 	2 layers of bubbles, reflective surface with protective coating on one side and translucent polyethylene coating on other side	8 mm (5/16 in)		0.2

See complete data sheets at **www.resisto.ca** / **www.resisto.us**

RADIANT BARRIER DATA SHEET

	ALUMINIUM- ALUMINIUM	ALUMINIUM-KRAFT PAPER
Basis weight	10 lbs / 1000 sq. ft	21 lbs / 1000 sq. ft
Bursting strength	65 psi (Mullen burst)	40 psi
Puncture strength		25 beach units
Tensile strength	23 lbs/ n width (MD) 24 lbs/in width (XD)	40 lbs/in width (MD) 25 lbs/in width (XD)
Caliper thickness	0.005 inches	0.008 inches
Operating temperature	-40° F to 240° F (-40°C to 116°C) (no delamination)	-40° F to 240° F (-40°C to 116°C) (no delamination)
Water immersion (24 hrs at 73° F (23°C)	No delamination	No delamination
Emissivity	0.03–0.05	0.03– 0.05
Flame spread (ASTM E84)	Aluminium exposed 5 Polyester exposed 5	Aluminium exposed 5 Kraft paper exposed 25
Smoke developed	Aluminium exposed 0 Polyester exposed 10	Aluminium exposed 0 Kraft paper exposed 10

See complete data sheets at **www.resisto.ca** / **www.resisto.us**

INSTALLATION AND SAFETY TIPS

THE FOLLOWING TIPS APPLY TO ALL AYR-FOIL™ PRODUCTS AND SHOULD BE TAKEN INTO CONSIDERATION DURING THE INSTALLATION.

- The R-values given in this guide are based on current knowledge and testing methods. Since **AYR-FOIL™** prevents heat transfers in three ways (see pages 5 and 6), energy savings and overall performance can be better than other insulation products with higher R-values. Always verify local codes before beginning the construction of new buildings.
- All cracks and holes on the surfaces should be repaired before installing **AYR-FOIL™**. If there is an existing vapour barrier, it must be removed or perforated to avoid condensation problems.
- With **AYR-FOIL™** A1V or A2V, the reflective side must face the air space. See the illustrations for exceptions.
- Installing **AYR-FOIL™** products has no effect on construction methods. Some details in the illustrations should be considered as general indications only. When in doubt, contact our technical department.
- **AYR-FOIL™** should not be overlapped unless it is being installed under a concrete slab. The seams must be sealed properly.
- To reduce air infiltration and moisture transfers to a minimum, **AYR-FOIL™** should not be perforated. All perforations must be sealed with **AYR-FOIL™** TAPE or an appropriate caulking.
- Air spaces next to **AYR-FOIL™** products should be at least 5/8" wide (16 mm). For vertical air spaces larger than 2 1/2" (62 mm), an anti-convection barrier should be installed every 4 feet.
- **AYR-FOIL™** can be stapled, nailed, screwed, glued, or taped. When in doubt, ask one of our technicians to help you select the appropriate installation method.
- Always use protective eye glasses when using staple or nail guns.
- Always be careful when working with large pieces of **AYR-FOIL™** on windy days.
- Wear sunglasses when working outside with **AYR-FOIL™** products.

BENEFITS FOR CONTRACTORS, ARCHITECTS, AND END-USERS

AYR-FOIL™ is one of the most cost-effective energy saving products on the market. Its remarkable properties make it the ideal solution for new construction or retrofit projects in the residential, commercial, and agricultural sectors. It is also recommended for HVAC applications, metal buildings, and post frame buildings. With the increasing demand for energy efficient and environmentally safe products, we believe that **AYR-FOIL™** provides more benefits than any other type of insulation.

BENEFITS FOR CONTRACTORS

AYR-FOIL™

- Is easy to install because of its solidity and flexibility.
- Does not require any special tools or protection.
- Saves up to 50% on installation time compared to other types of insulation.
- Requires much less space for storage. (2500 sq. ft can easily fit in a pick-up truck).
- Is an excellent insulation solution for retrofit work where space is an issue.
- Is available in convenient sizes for easy installation; custom sizes are also available on request.

BENEFITS FOR ARCHITECTS

AYR-FOIL™

- Provides the most cost-effective R-value for its thickness.
- Provides a solution for reducing and eliminating condensation problems.
- Reduces costs associated with heat losses and gains thanks to its reflective properties.
- Is a technologically advanced insulation that limits heat transfers.
- Is an environmentally friendly product.

BENEFITS FOR THE END-USERS

AYR-FOIL™

- Ensures that homes and buildings are healthier, more comfortable, and more energy efficient.

SOME REMARKABLE PROPERTIES OF AYR-FOIL™ REFLECTIVE INSULATION

- The white film is UV protected.
- Is environmentally friendly.
- Is non-toxic and non-allergenic, and harmless to humans and the environment.
- Is easy to work with. A utility knife and reflective tape are all you need. The easy installation saves you time.
- Reflects up to 97% of radiant energy. Energy transfers are down to minimum.
- Is robust and is not affected by mold and bacteria.
- Prevents insects and rodents from building nests.
- Is 100% waterproof.
- Has high moisture and puncture resistance.
- Is light and thin.
- Installation requires little space during retrofitting works.
- R-values are unaffected by humidity and water.
- Creates a thermal break.
- Is easy to repair. If a rip occurs, simply patch with foil tape. If the damage is extensive, cut the damaged area out and staple a new piece in place.
- Is ideal for retrofits and can be installed over existing insulation or on drywall.
- As a radiant barrier, reduces the solar heat gains through the roof.
- Is not affected by bad weather or frost and can be stored outdoors.
- Is shipped in plastic bags for easy storage.
- Is anti-static and does not damage computers.
- Is non-capillaty.
- Does not tear when being installed.
- Does not shrink over time.
- Properties not affected by UV rays.
- When not covered, its ability to reflect the light makes the rooms brighter.
- Robust : the reflective surface is mold-resistant.

TESTING AND CERTIFICATION + FAQ

Tests were performed on **AYR-FOIL™** reflective insulation products and radiant barriers by certified independent laboratories. American, Canadian and European laboratories used different techniques to validate the performance of the products based on the building codes in effect in their country. Visit our web site at **www.resisto.ca / www.resisto.us** for a complete list of data sheets.

For more information, feel free to contact us.

Thermal performance for heat flow up, down and horizontal	ASTM C236
Thermal performance for heat flow up, down and horizontal	ASTM C518
Hot Surface Performance	ASTM C411
Flame spread and smoke development (reflective surface)	ASTM E84 class 1 / A
Flame spread and smoke development (On the white poly side)	ASTM E84 class 1 / A
Water vapour transmission	ASTM E96
Tensile strength	CGSB 51.33 M89
Pliability	CGSB 51.33 M89
Emissivity	ASTM E408-71/ ASTM C1371
Standard specification for Reflective insulation	ASTM C1224
Fungi resistance	ASTM C1338-08
Temperature/humidity resistance	ASTM C1258

FAQ

WHERE CAN I USE AYR-FOIL™ INSULATION?

Your imagination is almost the only limit to the many uses of **AYR-FOIL™**. It can be installed wherever you would use any other insulation. It can also be used for other applications. For example, it can be used as a camping mattress, stadium seat, cooler insulation, windshield sunscreen and much more.

IS THE AIR SPACE NECESSARY?

Since it already contains enclosed air spaces, **AYR-FOIL™** already has a good R-value. However, you will obtain better results and superior performance with an enclosed air space facing the reflective surface on one or both sides. Ideally, the air space should be 3/4" wide but can range from 1/2" to 2".

DOES AYR-FOIL™ WORK IN WARM AND COLD CLIMATES?

YES. Whether you live in a warm or a cold climate, the three methods of heat transfer (conduction, convection and radiation) apply. **AYR-FOIL™** will radiate out warm air in the summer and keep it in during the winter.

IS AYR-FOIL™ A VAPOUR BARRIER?

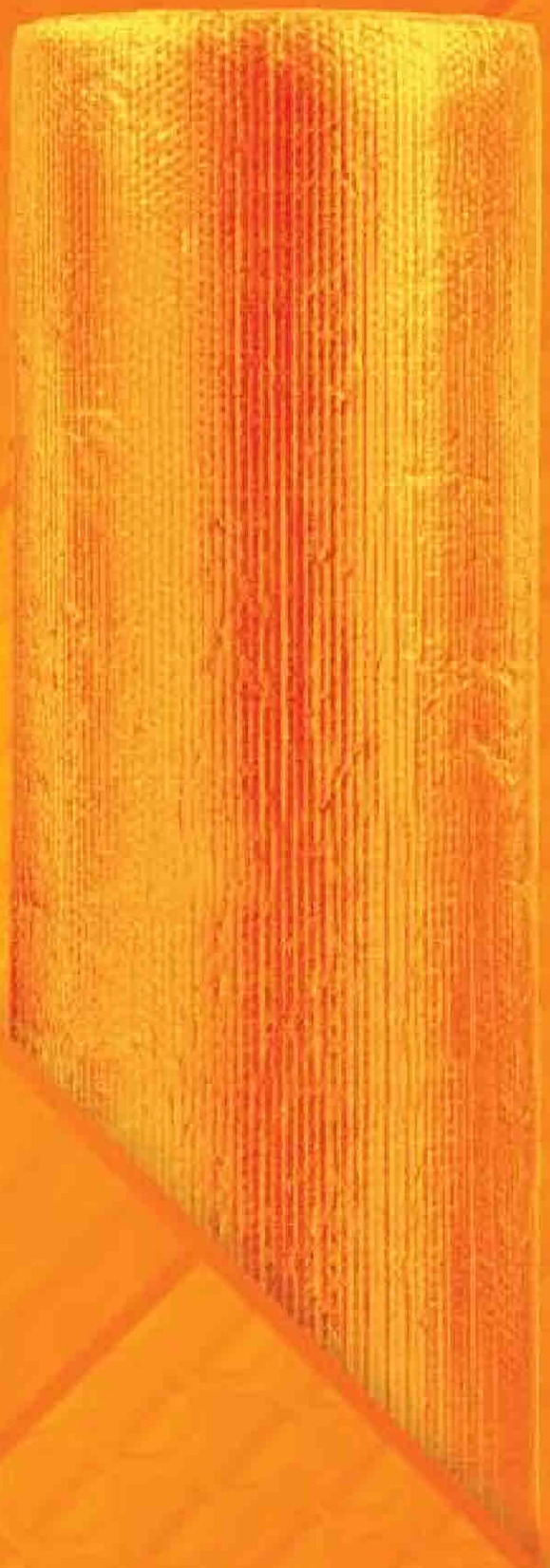
YES. All our bubble products are ASTM E96-certified type 1 vapour barriers. Like any other vapour barrier, **AYR-FOIL™** has to be in the right place in your assembly. Perforated aluminium-aluminium and aluminium-kraft paper radiant barriers are available when a vapour barrier is not desired.

IS AYR-FOIL™ A FIRE RETARDANT?

NO. **AYR-FOIL™** is not a fire retardant (like drywall for instance) but it has a class 1-A flame spread and smoke development rating on both the reflective surface and the white poly side based on the ASTM E84 test. This meets most building codes requirements for insulation products.

WHY SHOULD I USE AYR-FOIL™ TAPE?

In most applications, we recommend sealing seams with an appropriate tape. **AYR-FOIL™** TAPE meets fire ratings and vapour barrier requirements. The glue is designed to adhere permanently to the foil and white polyethylene.



AYR-FOIL®
HI-PERFORMANCE REFLECTIVE INSULATION

ANOTHER EFFECTIVE SOLUTION BY

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Customer Service
TOLL FREE : 1 877 478.8408
www.resisto.ca
www.resisto.us

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FAQ
#100

Metal Buildings and Condensation

Frequently Asked Questions

1) What are the conditions that will make condensation occur on the underside of an uninsulated metal roof deck or framing members?

Condensation will occur on any surface when the surface air temperature is at or below the "dew point temperature" for an air-water (vapor) mixture. The dew point temperature depends on the dry bulb temperature (measured with an ordinary thermometer) and the relative humidity in the air space next to the surface. The dew point temperature is less than or equal to the dry bulb temperature. The two temperatures are equal when the relative humidity is 100%. Some examples of dew point temperature conditions:

Temperature (inside surface)	Relative Humidity	Dew Point Temperature
70°F	50%	50.5°F
70°F	75%	64.6°F
70°F	90%	66.9°F

As you can see, condensation can occur when the outside temperature is cold. Insulation below a roof deck will have an inside surface temperature that is above the roof surface temperature. The actual temperature of the inside surface depends on the amount of thermal resistance between the roof and the inside surface. The higher the resistance, the closer the interior surface temperature will be to the inside air temperature. Maintaining a reasonable inside relative humidity (less than 60%) is an important factor in preventing condensation.

2) How will the addition of a reflective insulation with an airspace between the roof deck and the aluminum surface change the conditions that cause condensation?

A reflective insulation below the roof deck results in an interior surface temperature that is greater than the outside temperature (in cold weather). As the inside air surface temperature increases, the conditions for condensation become less likely to occur.

3) Is a vapor retarder required?

A vapor retarder is highly recommended on the underside of metal roof decks. A vapor retarder is a layer of material having a permeance of less than 1 perm and is typically applied to a warm interior surface to prevent condensation. If interior air containing water vapor is allowed to come in contact with a cold roof deck, then condensation will likely occur. The insulation system that does not include a high quality vapor retarder will be of little or no value in controlling condensation in cold weather.

Reflective Insulation Manufacturers Association (RIMA)
4519 E. Lone Cactus Drive
Phoenix, Arizona 85050
Toll-Free: 800/279-4123
Fax: 480/513-4748
E-Mail: rima@rima.net or www.rima.net

RADIANT BARRIERS: PROVEN TO WORK

Energy efficiency in home construction is important to home owners and prospective home buyers. Monthly utility bills are balanced against the number of years it takes for an energy saving method to pay for itself. This combined with the fact that the number one challenge in the Sunbelt is to control heat gain, make radiant barriers an integral part of building to improve the overall comfort level in a home and reducing utility bills.

As much as 93% of the total heat gain from the roof decking to the top of the insulation is via radiation, and a radiant barrier will stop as much as 97% of radiant heat transfer. Bulk insulation can only slow heat transfer, and more is not better. Studies have shown that a radiant barrier combined with mass insulation is an effective way to reduce the cost of air conditioning and heating.

In most construction, the roof or ceiling area is the largest contributor to heat gain due to the large surface area exposed to the sun and the extreme temperatures of roof surfaces. Roof temperatures reach upwards of 165 degrees F and attic temperatures can reach 130 degrees F on a typical August day in the Sunbelt. At peak times, more than 40% of the energy which enters the conditioned space through the ceiling is the direct result of radiant energy from the attic deck being transferred to the top of the insulation. While radiant barrier systems have been around for over twenty-five years they have now emerged as one of the most efficient methods of minimizing heat gain.

It is important to understand the simplicity of how radiant barriers work and their applications in residential construction. Heat always travels hot to cold and its method of travel is via radiation, convection and conduction. In an attic space, radiation accounts for as much as 93% of the heat flow. The roof temperature's increase as the sun strikes the roof surface. Roofing materials (shingles & decking) are often poor reflectors, emitting or re-radiating 90% of incoming solar energy. Dark shingles absorb as much as 95% of the incoming solar energy heat gain. The hot roof materials begin transferring this heat to the cooler insulation below, heating the insulation's surface in the same manner. The insulation becomes saturated and begins transferring to all surfaces within the interior of the home. The radiant surface temperatures of the walls and ceilings have a direct influence on the comfort level of the occupants and increased energy costs. Even today, most energy conservation programs, while recognizing radiant barriers, continue to overemphasize insulation in controlling heat flow from the attic to a home's interior.

A polished film of aluminum is the primary component of a radiant barrier system. Compared to a dark surface, aluminum only emits 3% to 5% of as much radiant energy from its surface. Thus, radiant barriers can block 95% to 97% of radiant heat flow.

There are several types of radiant barrier systems: stapled to the underside of roof rafters, draped over the roof trusses and laminated or stapled directly to the underside of the roof decking. A radiant barrier that is stapled to the bottom of the rafters or trusses is the highest performing application. This application, and has the advantage of reducing the radiant heat gain that comes through the truss and rafter surfaces (which can be as much as 10-20% of the total roof area). Deck applied radiant barrier systems consist of aluminum directly applied either by gluing or stapling to the 4' x 8' sheets of roof decking. The decking is applied in the normal fashion but with the radiant barrier facing the attic space. For draped radiant barrier systems, either a single or double sided aluminum radiant barrier material is draped over the roof trusses before the roof sheathing is applied. Some spray- applied coatings are paints are not technically radiant barriers. For a product to be a radiant barrier it must meet the requirements of ASTM C1313, the standard specification for radiant barriers. The aluminum surface must have an emittance of 0.10 or less and a reflectivity of 90% or greater. Low-e paints and coatings have an emittance of 0.22 to 0.50 which is far greater than that of a radiant barrier. The lower the emittance values the better in terms of thermal radiation.

On hot summer days, the roof of a residence absorbs solar radiation at a higher than is dissipated through conduction (to the attic interior) and convection (t0 the outside air), thus creating a rise in roof temperature. During a typical summer afternoon in the Sunbelt, a properly installed attic radiant barrier system will:

- Reduce attic temperatures as much as 30 degrees.
- Reduce heat transfer from attic to living space up to 50%
- Reduce heat loads on attic ducts and equipment up to 50%.
- Extend the life of the air-conditioning unit.
- Increase the comfort level of the home.

It is common to think that radiant barriers will be less efficient if attic ventilation is increased. The fact is that after small ventilation rate is achieved (0.25 CFM/per square foot of attic floor), increasing attic ventilation does not lower the efficiency of radiant barriers. Radiative heat transfer from the roof to the ceiling insulation essentially bypasses attic air; the attic air absorbs only a small percentage of radiant energy. Ventilation is certainly an important component in the construction of a house, but is by no means the cure all for the hot summers of Sunbelt.

In today's market, with rising energy costs and increased consumer awareness in all areas of industry, it is more important than ever to produce a product that is not only smart economics for the builder but also for the consumer. The builders that have adapted radiant barriers into their programs are clearly becoming the benchmark in the industry for energy efficient and environmentally conscious construction and thus are creating a competitive advantage.