WHAT IS PLY-FOIL?

Ply-Foil is a multilayer, reflective insulation which comes in rolls consisting of a variety of widths and lengths for use in both specialty and standard construction projects. Two outer layers of metalized film reflect 96% of the radiant heat. Each layer of film is bonded to a tough layer of polyethylene for strength. The inner layers of bubblepack resist conductive heat flow while a center layer of polyethylene gives Ply-Foil additional strength. (See Illustration)

Ply-Foil provides nominal 1/4” thick Single Bubble, nominal 5/16” thick Double Bubble, Standard Edge and Staple Tab product lines for both Metal and Post Frame Construction. Perfect for New Construction or Retrofit of existing structures.

HOW DOES IT WORK?

Radiant energy, the major source of heat flow, is energy in the form of infrared waves. It travels at the speed of light, even through a vacuum; and is either transmitted through, absorbed into, or reflected by any material it contacts. Air, water, and glass, for example, transmit visible light in varying degrees. A white surface, such as snow, reflects it; and a black surface absorbs it.

Infrared waves work in the same way as visible light; heat is generated when this energy is absorbed. Common insulation products, like most building materials, tend to absorb a large percentage of the radiant energy they encounter as heat. However, tests have shown that the Ply-Foil metalized film products, when installed adjacent to an air space, reflects 96% of radiant energy. As a result, only 4% (of this radiant energy) is being retransmitted (emitted). Properly installed, Ply-Foil takes full advantage of this benefit by offering products that one or two 96% reflective surfaces.
PLY-FOIL PROVIDES YOU WITH UP-TO-DATE INFORMATION

Over the years, Ply-Foil has collected and continues to collect test data on applications using its insulation products. On the following pages, we discuss applications for post frame and metal buildings including benefits and installation procedures.

Ply-Foil Reflective Insulation has been tested by independent government approved laboratories. These tests provide the contractor with accurate and useful information on system thermal performance.

Reflective insulation is effective when installed with at least 3/4” of airspace between the insulation and surrounding surfaces. The thermal (R-value) of the insulation system will vary depending on the size of the airspace and the direction of heat flow. Due to heat losses caused by differences in convection, conduction, and radiation, several different R-values are achieved with the same product.

Ply-Foil products have also been extensively tested for system thermal properties, flame spread, vapor transmission, mold and mildew resistance, emittance, smoke density, and physical properties. Test data is available. Contact factory.

PLY-FOIL BLACKS RADIANT HEAT TRANSFER

According to an analysis performed at Penn State University, approximately 75% of total heat transfer in structures occurs through radiation. The foil in Ply-Foil reflects 96% of radiant energy striking it. (See Illustration)
POST FRAME CONSTRUCTION THERMAL VALUES

ROOF

Thermal resistance values for roof applications in typical post frame construction have been calculated on an assembly consisting of a corrugated metal exterior, a 2” x 4” purlin, Ply-Foil Insulation, and a 2” x 6” to represent the top cord of a truss. The model was designed to include typical construction methods. 1) With wafer board covering the interior and airspace in between. 2) A metal liner with air space, and 3) The Ply-Foil product exposed to the interior. The thermal values below are for double reflective, double and single bubble insulation.

SYSTEM THERMAL RESISTANCE VALUE (R-VALUE):

HEAT FLOW

<table>
<thead>
<tr>
<th></th>
<th>Double Bubble</th>
<th>Single Bubble</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation with Wafer Board</td>
<td>5.8</td>
<td>11.7</td>
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<tr>
<td>Insulation with Metal Interior</td>
<td>5.1</td>
<td>11.0</td>
</tr>
<tr>
<td>Insulation Exposed to Interior</td>
<td>4.4</td>
<td>9.0</td>
</tr>
</tbody>
</table>

All thermal values are corrected for stud loss. *Includes thermal resistance of 1.32 Up and 4.55 Down for interior air film.

WALLS

The thermal resistance values for installation in walls of post frame buildings have been calculated on an assembly consisting of corrugated metal exterior, 2” x 4” girts, Ply-Foil Insulation, a 2” x 6” to represent the support beams and a 1/2” wafer board as an interior wall covering. The thermal values below are for double reflective, double and single bubble insulation.

HEAT FLOW HORIZONTAL*

<table>
<thead>
<tr>
<th></th>
<th>Double Bubble</th>
<th>Single Bubble</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation with Wafer Board</td>
<td>7.0</td>
<td>6.6</td>
</tr>
<tr>
<td>Insulation with Metal Interior</td>
<td>6.3</td>
<td>5.9</td>
</tr>
<tr>
<td>Insulation Exposed to Interior</td>
<td>5.3</td>
<td>4.9</td>
</tr>
</tbody>
</table>

All thermal values are corrected for stud loss. *Includes thermal resistance of 1.70 for interior air film.
Thermal resistance of Ply-Foil Insulation, as it would be installed in new metal building construction, was tested with external thermal blocks, Ply-Foil Insulation, and 8” Z purlin commonly used in metal buildings. The thermal values below are for double and single bubble insulation.

**SYSTEM THERMAL RESISTANCE VALUE (R-VALUE):**

<table>
<thead>
<tr>
<th>Thermal Resistance</th>
<th>Double Bubble</th>
<th>Single Bubble</th>
</tr>
</thead>
<tbody>
<tr>
<td>UP</td>
<td>DOWN</td>
<td>UP</td>
</tr>
<tr>
<td>Insulation with Wafer Board</td>
<td>6.93</td>
<td>15.11</td>
</tr>
<tr>
<td>Insulation with Metal Interior</td>
<td>6.22</td>
<td>14.40</td>
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<tr>
<td>Insulation Exposed to Interior</td>
<td>4.91*</td>
<td>12.81*</td>
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</tbody>
</table>

*Includes thermal resistance of 1.32 Up and 4.55 Down for interior air film
+Computation extrapolated to show value with foil exposed inside

**WALLS**

Thermal resistance testing of Ply-Foil Insulation as part of a system in the walls of new metal buildings consisted of an assembly representing a metal exterior sheeting, 1/2” extruded polystyrene thermal blocks, Ply-Foil Insulation, and an 8” Z girt with 1/2” wafer board to represent an interior finished wall. The thermal values below are for double bubble and single bubble insulation.

**THERMAL VALUES:**

<table>
<thead>
<tr>
<th>Thermal Resistance</th>
<th>Double Bubble</th>
<th>Single Bubble</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation with Wafer Board</td>
<td>5.45</td>
<td>5.39</td>
</tr>
<tr>
<td>Insulation with Metal Interior</td>
<td>4.77</td>
<td>4.72</td>
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<tr>
<td>Insulation Exposed to Interior+</td>
<td>4.50*</td>
<td>4.45*</td>
</tr>
</tbody>
</table>

*Includes thermal resistance of 1.70 for interior air film
+Computation extrapolated to show value with foil exposed inside
ROOF INSTALLATION
PLY-FOIL OVER PURLINS:

- Start at one end of the building laying the rolls of Ply-Foil Reflective Insulation on the purlins. To keep the rolls from falling through the purlins, put PVC pipe through core.

- Unroll the Ply-Foil along the purlins, stapling and taping the inside seams with foil tape as you go.

- Apply the metal over foil. Make sure foil sags between purlins creating a 3/4” airspace - Do not pull taut.

ROOF INSTALLED BETWEEN TRUSS AND PURLIN:

- Start at the end truss, attach the end of the foil insulation securely to it.

- Use a PVC pipe through the core to unroll the foil as you go. Pull the foil tight and staple it to the truss. Before you put the purlins on, make a jig to be sure you don’t pull the trusses out of line.

- Screw or nail the purlins down to the truss through the foil. This will maintain adequate air space.

- Tape the inside seams on the underside between the trusses.

- Apply aluminum foil tape, using a tape paddle, to the inside seam as you go, then press it against the two-way tape to hold it in place until sheeting is in place.
POST FRAME CONSTRUCTION (CONTINUED)

FOR TAB INSTALLATION:

• Staple Tab can be used by folding the tabs up and applying a bead of silicone caulk to the seam. Press the two tabs together to create an airtight seal.

• Staple Caulked Ply-Foil Tabs every 4” using 5/16” staple and fold tab flat.

WALL INSTALLATION:

• Unroll the foil to install in the same direction the girts are running.

• Staple Ply-Foil Insulation horizontally to the girts. Staple the foil and tape the inside seams as you go. Allow enough extra foil between girts to create a 3/4” air space.

• When installing the exterior metal siding, a 3/4” air space must be created between metal and foil. Air cannot penetrate Ply-Foil Insulation.

If an interior covering is required, install either metal or woods sheets to the inside of the girts. This will provide a 1-1/2” nominal air space between the insulation and the wall material.

Inside view of Ply-Foil installed across purlins in new Post Frame Construction.

Ply-Foil installed over purlins in new Post Frame Construction.

Tape Inside Ply-Foil Joint for Side Wall.
INSTALLATION GUIDE FOR METAL BUILDING CONSTRUCTION

This illustration shows Ply-Foil Reflective Insulation installed in new metal buildings with a finished ceiling.

ROOF INSTALLATION:

• Use a PVC pipe through the core to connect all of the rolls as you unroll the Ply-Foil to keep them together.

• Place the rolls of foil at one end of the building and apply two-way tape on the first C or Z channel, making sure the starting end of the foil is secured to the building.

• Apply two-way tape to C or Z channels four foot on center.

• Unroll the foil in the same direction as the C or Z channel. Allow the foil to sag at least 3/4” creating an air space.

• Apply aluminum foil tape, using a tape paddle, to seal the seams until sheeting is in place.

• Place the metal sheeting (use thermal blocks) and attach with screws.

FOR TAB INSTALLATION:

• Install Ply-Foil Staple Tab Insulation secured to the C or Z channel by using two-way tape.

• Fold the tabs up and apply a bead of silicone caulk between the tabs, then press together to create an airtight seal and staple 4” on center.

• Allow a 3/4” sag to create an air space between Ply-Foil and exterior metal sheeting.

• Install thermal blacks over Ply-Foil along each C or Z channel.

• Install roofing by screwing through metal siding, thermal black, and insulation. If installing a standing seam roof, use clips with thermal blacks.

Tape Bottom Side of Ply-Foil.
METAL BUILDING
CONSTRUCTION (CONTINUED)

WALL INSTALLATION:

• Place the rolls of foil at the end of the building. Apply two-way tape on the first C or Z channel securing Ply-Foil at the beginning.

• Apply two-way tape along the wall channels 4-feet on center.

• As you unroll the foil, press it against the two-way tape with a tape paddle. Apply Ply-Foil aluminum tape to the top seam in the same manner.

• Install Ply-Foil Staple Tab Insulation vertically. Apply a bead of silicone caulk between the tabs of the insulation. Press together to create an airtight seal and staple 4” on center.

• Be sure to leave a 3/4” air space. Use thermal black and attach corrugated metal exterior sheeting.

To cover the entire wall at once: Stand two or more rolls of foil on top of each other. Slide PVC pipe through the core to hold the rolls together. As you unroll Ply-Foil, tape seams on C or Z channel to prevent dust and moisture from penetrating the seam.

You can also lay Ply-Foil out on the ground and tape the seams together. Then lift up against the building and use two-way tape to apply the insulation against the wall framing.

BASEMENT WALL INSTALLATION

Ply-Foil Insulation is an excellent basement wall insulation. By using 1” x 2” furring strips, you can insulate the walls without taking up needed floor space. It performs as a vapor retardant, a fungus resistor, and inhibits condensation (R-value is unaffected by a damp basement environment.) The tested R-value 6.1 is obtained by installing Ply-Foil, as instructed below, between two furring strips creating an air space on both sides of the product.

INSTRUCTIONS:

1. Check the walls you are going to insulate for any needed repairs.

2. Install 1” x 2” furring strips to basement wall 16” on-center using 1-1/2” masonry nails.

3. On poured concrete walls, install the furring strips using a construction grade silicone caulk as adhesive. You will have to tape the furring strips in place for 24 hours to allow the caulk to cure.

4. Install Ply-Foil product to the furring strips, stapling every 3” to 4” with 5/16” staples.

5. Next, nail another 1” x 2” furring strip over the first set of furring strips using 1-1/4” common nails.

6. Tape all inside Ply-Foil seams with Ply-Foil tape.

7. Finally, cover with sheet rock or paneling.
TESTING AND CERTIFICATION

All tests on Ply-Foil Insulation are performed at either Nationally Approved Laboratories or at leading universities. Tests are performed to current American Society of Testing and Materials (ASTM) Standards when a standard exists. For a copy of any of the actual test reports, call 1-800-558-5895.

Table:

<table>
<thead>
<tr>
<th>Property</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flame Spread*</td>
<td>Less than 25</td>
</tr>
<tr>
<td>Smoke Density</td>
<td>Less than 50</td>
</tr>
<tr>
<td>Vapor Transmission</td>
<td>.02</td>
</tr>
<tr>
<td>Mold and Mildew</td>
<td>No Growth</td>
</tr>
<tr>
<td>Emittance</td>
<td>.04</td>
</tr>
<tr>
<td>Tensile Strength</td>
<td>3.7 N/mm</td>
</tr>
<tr>
<td>Pliability</td>
<td>No cracking</td>
</tr>
<tr>
<td>Hot Surface Performance</td>
<td>Passed</td>
</tr>
</tbody>
</table>

* Ply-Foil is a Class A/Class 1 fire rated product. Meets all fire and smoke safety requirements of federal, state, and local building codes.

THERMAL TEST

The Thermal Performance of Ply-Foil Insulation was calculated in Post Frame and Metal Building assemblies by R&D Services, Cookeville, TN.

SAFETY TIPS

- Do no work in areas of building, such as roof apex, in extreme temperatures.
- Make sure work area is well ventilated and well lit.
- Always use eye protection when using staple guns or screw guns.
- Always exercise extreme caution around electricity.
- Take extra care on windy days when installing Ply-Foil Insulation.
- When working with Ply-Foil product outdoors, wear sunglasses.

SPECIFICATION COMPLIANCE

Ply-Foil meets the following building code specifications:

Federal Minimum Standard Code
C.C.M.C. ES Evaluation Report No. 12360-R
Dade County Evaluation Report No. 94-0718.03
Los Angeles County Evaluation Report No. RR8099

Ply-Foil Reflective Insulation also meets the requirements as a Radiant Barrier in the California, Florida, and Minnesota Energy Codes.

Note: Ply-Foil Insulation will combust. The Class A/Class 1 flame spread rating in no way indicates an approval to use Ply-Foil alone or in conjunction with other materials to obtain a rated burn time for a wall or partition.
PLY-FOIL LIMITED WARRANTY

1) Ply-Foil Corp. warrants that Ply-Foil™ brand reflective insulation will not separate, deflate, or decompose under normal atmospheric conditions for a period of 15 years from the date of purchase. Ply-Foil Corp. further warrants that Ply-Foil reflective insulation was independently tested for flame spread, smoke density, fungus resistance and as part of a system for thermal values in accordance with ASTM testing procedures.

2) This warranty shall apply only when the insulation is installed in accordance with the current Ply-Foil installation instructions furnished with this product. In addition, certain environments are not acceptable for use of this product. This warranty shall not apply in the event the product is installed in an atmosphere that will attack pure aluminum or polyethylene. Further, as warranted, thermal values are based upon testing conducted in a controlled environment, it is the customer’s ultimate responsibility to determine that the thermal values of properly installed Ply-Foil insulation are adequate for one customer’s intended use.

3) In the event the product separates, deflates, or decomposes within 15 years from the date of purchase, Ply-Foil Corp. will, at its option, repair or replace the product found to be defective. Ply-Foil Corp. may elect to refund the original purchase price in the event it is unable to provide replacement and repair is not commercially practicable or cannot be timely made, or if the customer is willing to accept a refund. The customer is responsible for all other costs which may include, but are not limited to, labor charges for removal or reinstallation of the product, shipping, delivery or handling charges, or any necessary incidental costs of any materials or permits required for removal and installation.

4) Ply-Foil Corp. reserves the right to discontinue or modify any insulation product in the future. In the event Ply-Foil elects to replace any defective product under this warranty and the product is no longer available, Ply-Foil Corp. shall have the right to substitute insulation of at least equal quality.

5) In order to make a claim under this warranty, the customer should initially contact the dealer or supplier who sold the product, or any other dealer or supplier handling Ply-Foil insulation. If this is not practicable, the customer should contact Ply-Foil Corp., at P. O. Box 386, Industrial Park, Elkhart Lake, Wisconsin, 53020, (800) 558-5895 or (800) 257-5926.

6) IMPLIED WARRANTIES, INCLUDING ANY WARRANTY OF MERCHANTABILITY IMPOSED ON THE SALE OF THIS PRODUCT UNDER STATE LAW, ARE LIMITED TO THE 15 YEAR DURATION OF THIS WARRANTY. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY Lasts, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

7) NO OTHER EXPRESS WARRANTY HAS BEEN MADE OR WILL BE MADE ON BEHALF OF PLY-FOIL CORP. WITH RESPECT TO THE PRODUCT. PLY-FOIL CORP. SHALL UNDER NO CIRCUMSTANCES, BE LIABLE TO PURCHASER OR ANY OTHER PERSON FOR ANY SPECIAL OR CONSEQUENTIAL DAMAGES WHETHER ARISING OUT OF BREACH OF WARRANTY, BREACH OF CONTRACT OR OTHERWISE. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

8) THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.
PLY-FOIL IS NOT ONLY THE REFLECTIVE INSULATION FOR THE 21ST CENTURY...

There are a lot of logical reasons to use Ply-Foil, including:

• The product comes in large, light weight, easy to handle rolls that will not blow away or break up in the wind.

• Installers will like working with the product because there are no fibers to cause skin itch or make breathing difficult.

• Ply-Foil, properly installed and taped, provides an excellent vapor barrier, assists in limiting condensation and has shown through testing to offer the top classification of burn and flame spread ratings.

• It will not absorb water if left outside at the job site or if it is left partially uncovered during installation.

• It will typically not mildew or allow fungus growth and it is resistant to mice, birds, and insects.

• Ply-Foil will give an attractive finished building interior.

Other products are available for different applications. Call our toll-free number today!

PLY-FOIL
INCorpoRATED
A Plyco Affiliated Company

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FAX: 800-257-5926 FAX: 1-920-876-3527

700-13-1