The best approach to long-term energy efficiency is to increase insulation levels and reduce air infiltration through the building envelope. Using THERMAX™ Insulation as a continuous insulation layer, in conjunction with one or more different joint and interface treatment strategies, delivers a fully tested and viable air barrier solution.

By using a systems approach to manage air barriers in metal buildings, different yet compatible materials can be easily and cost effectively detailed to meet prescriptive air barrier requirements, especially those found in newer model energy codes and in green building design guidelines. For example, one prescriptive air barrier solution is THERMAX™ Insulation which qualifies as an air barrier per ASTM E2178-03 by properly detailing joints and interfaces - including adhesive tapes, polyvinyl chloride (PCV) strips, THERMAX™ joint treatments, sealants, adhesives and spray foams, together they deliver a cost-effective system approach to air barriers in metal buildings.

Both ASHRAE 90.1: 2010 “Energy Standard for Buildings Except Low-Rise Residential Buildings” and “International Energy Conservation Code” (IECC) 2012 call for air barriers to reduce air leakage by sealing the building envelope – basically all penetrations and openings – with prescriptive strategies to minimize air leakage. This can include caulking, gasketing systems, weather-stripping, sealed or taped joints and seams, impermeable wrapping materials, etc. All materials must work together and account for expansion and contraction of the construction materials. (See Table 1.)

### Table 1: Air Leakage Test Results

<table>
<thead>
<tr>
<th>Dow Building Solutions Product</th>
<th>Standard</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>THERMAX™ Insulation*</td>
<td>ASTM E2178-03 Standard Test Method for Air Permeance of Building Materials**</td>
<td>&lt;0.0002 cfm/ft²</td>
</tr>
<tr>
<td></td>
<td>ASTM E 283-04 Standard Test Method for Determining Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors Under Specific Pressure Differences Across the Specimen (Modified per ICC ES AC12-09 Section 4.5.11.6)</td>
<td>&lt; 0.004 cfm/ft²</td>
</tr>
<tr>
<td></td>
<td>ASTM E 331-00, Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Differences</td>
<td>No leakage</td>
</tr>
<tr>
<td></td>
<td>ASTM E2357-05 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies</td>
<td>No leakage</td>
</tr>
<tr>
<td>FROTH-PAK™ Foam Insulation***</td>
<td>ASTM E2178-03 (1” thickness)</td>
<td>&lt;0.0001 cfm/ft²</td>
</tr>
<tr>
<td></td>
<td>ASTM E 283-04 (1/2” thickness)</td>
<td>&lt;0.004 cfm/ft²</td>
</tr>
<tr>
<td>GREAT STUFF PRO™ Gaps &amp; Cracks Insulating Foam Sealant***</td>
<td>UL R13655</td>
<td>Classified as a sealant</td>
</tr>
</tbody>
</table>

* All tests had taped joints EXCEPT ASTM E2178-03 (board only)
** Board only
*** Read the instructions and Material Safety Data Sheets carefully before use

**Trademark of The Dow Chemical Company ("Dow") or an affiliated company of Dow

Rigid high R-value insulation – such as THERMAX™ Insulation – can be installed as part of a system to meet the prescriptive air leakage requirements specified in ASHRAE 90.1:2010 and IECC 2012. As outlined below, THERMAX™ Insulation can be installed with a range of different joint or interface sealing options including tapes, strips, insulation edge treatments, sealants, adhesives, and spray foams – either singly or in combination as needed.

NOTE: Always follow local building code requirements for air barrier and/or air sealing needs.
Understanding the Model Energy Code Requirements for Insulation and Air Barriers

Both ASHRAE 90.1 and IECC have similar goals: to reduce energy use by reducing fuel consumption and greenhouse gas emissions. Updates to both model codes over the years have adopted new building science technologies although states and even regions have adopted different model code versions. The model codes will continue to evolve; ASHRAE's strategic plan 2010-2015 calls for a 50 percent reduction in annual energy use from the ASHRAE 90.1-2007 standard in all building types. The recent ASHRAE 90.1-2010 version calls for 30 percent more energy efficient buildings over the 2004 version.

Both codes now recognize the importance of continuous insulation (ci), an uninterrupted blanket of insulation that spans over structural members without thermal bridges other than from fasteners and service openings. For those states following ASHRAE 90.1-2007 and IECC 2009, continuous insulation is no longer simply a value-added option – it is a requirement.

Air barrier requirements have changed as well. Properly designed, air barriers help control the unintended movement of air into and out of a building and are critical to prevent damage to the building. ASHRAE 90.1-2010 and IECC 2012 mandate a continuous air barrier for all building types.

The codes offer three different compliance approaches to meet the requirement: prescriptive option, trade-off option and energy cost budget simulation. The easiest strategy to follow is the prescriptive case that outlines two methods. One option is that all individual air barrier materials have a maximum air permeance level no greater than 0.004 cfm/ft², with caulked or sealed joints, penetration, etc. Another option requires that the assembly of materials limits air leakage to no greater than 0.04 cfm/ft².

Table 1 lists the air leakage results for THERMAX™ Insulation and other Dow air sealing solutions, making compliance to the prescriptive option easy.

Continuous Insulation

<table>
<thead>
<tr>
<th>Name</th>
<th>Highlights</th>
</tr>
</thead>
<tbody>
<tr>
<td>THERMAX™ Sheathing, THERMAX™ Metal Building Board THERMAX™ ci THERMAX™ White Finish THERMAX™ Light Duty THERMAX™ Heavy Duty THERMAX™ Heavy Duty Plus*</td>
<td>• Meets air leakage requirements using a building envelope system approach where all the materials work together – from the board to the joint treatment to the transition areas. (See Table 1.) • Provides compliance with the continuous insulation (ci) portion of the new codes. • Range of joint sealing options to meet the air barrier/air sealing requirements (see below). • Easy application in different building types – from metal framed building to insulating the ceiling of a parking garage under that metal building. • Works in interior and exterior applications. • Delivers aesthetically pleasing board finishes and joint treatments.</td>
</tr>
</tbody>
</table>

* For use in walls only

©™Trademark of The Dow Chemical Company (“Dow”) or an affiliated company of Dow
**Tapes**

<table>
<thead>
<tr>
<th>Name and Compatibility</th>
<th>Highlights</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>THERMAX™ White Foil Tape</strong>&lt;br&gt;(for use with THERMAX™ White Finish, THERMAX™ Light Duty, THERMAX™ Heavy Duty and THERMAX™ Heavy Duty Plus*)</td>
<td>• Pressure sensitive, 2.0 mil (50 micron) high strength aluminum foil.&lt;br&gt;• Available in 3” (76.2 mm) widths and 150’ (45.7 m) long.&lt;br&gt;• Easy to install in any temperature.</td>
</tr>
<tr>
<td><strong>THERMAX™ Aluminum Foil Tape</strong>&lt;br&gt;(For use with THERMAX™ Sheathing, THERMAX™ Metal Building Board)</td>
<td>• Pressure sensitive, 2.0 mil (50 micron) high strength aluminum foil.&lt;br&gt;• Available in 3” (76.2 mm) widths and 150’ (45.7 m) long.&lt;br&gt;• Easy to install in any temperature.</td>
</tr>
<tr>
<td><strong>WEATHERMATE™ Straight Flashing</strong>&lt;br&gt;(For use with THERMAX™ Sheathing, THERMAX™ Metal Building Board, THERMAX™ ci, THERMAX™ White Finish, THERMAX™ Light Duty, THERMAX™ Heavy Duty and THERMAX™ Heavy Duty Plus*)</td>
<td>• High-density polyethylene film facer with butyl rubber adhesive backing.&lt;br&gt;• Ideal for standing seam roofs (SSR) and steel stud walls.&lt;br&gt;• Available in 4” (100 mm) and 6” (150 mm) widths and 100’ (30.5 m) long.</td>
</tr>
</tbody>
</table>

**THERMAX™ Joint Treatment**

<table>
<thead>
<tr>
<th>Name and Compatibility</th>
<th>Highlights</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>THERMAX™ ShipLap Board Joint</strong>&lt;br&gt;(Available on THERMAX™ Sheathing, THERMAX™ Metal Building Board, THERMAX™ White Finish, THERMAX™ Light Duty, THERMAX™ Heavy Duty, THERMAX™ Heavy Duty Plus*)</td>
<td>• One of the most thermally efficient joint treatments available.&lt;br&gt;• Accommodates foam thicknesses - 1.5” (38.1mm) and greater.&lt;br&gt;• Designed to be used with caulking or sealants (see below).</td>
</tr>
</tbody>
</table>

---

*™Trademark of The Dow Chemical Company (“Dow”) or an affiliated company of Dow

* For walls only
## Polyvinyl Chloride (PVC) Strips

<table>
<thead>
<tr>
<th>Name and Compatibility</th>
<th>Highlights</th>
</tr>
</thead>
</table>
| **White PVC Clip Strip**<br>(for THERMAX™ White Finish, THERMAX™ Light Duty, THERMAX™ Heavy Duty, THERMAX™ Heavy Duty Plus*) | • Designed for use with construction grade sealants to ensure air tight seal.  
• Ideal in exposed interior spaces.  
• Works with various insulation thicknesses from 1” (25.4 mm) to 3” (76.2 mm).  
• Available in 10’ lengths.|

| **White PVC J-Channel**<br>(for THERMAX™ White Finish, THERMAX™ Light Duty, THERMAX™ Heavy Duty, THERMAX™ Heavy Duty Plus*) | • Use when the other PVC closure options will not cover the joints between the boards (e.g., joint between the top and bottom of THERMAX™ Insulation boards or at roof peak when combining two sections of the boards).  
• Use with construction grade sealants to ensure air tight seal.  
• Works with various insulation thicknesses from 1” (25.4 mm), 2’ (50.8 mm) and 2.5” (63.5 mm).  
• Available in 10’ lengths.|

| **White PVC Interlocking System**<br>(for THERMAX™ White Finish, THERMAX™ Light Duty, THERMAX™ Heavy Duty, THERMAX™ Heavy Duty Plus*) | • Two part PVC closure system (Base + Top T) with sections that easily snap into place.  
• Two different base thickness (1” (25.4mm) and 2” (50.8mm) pieces fasten to concrete or masonry walls or ceilings.  
• Ideal for parking garage ceiling applications  
• Use with construction grade sealants to ensure air tight seal.  
• 1” (25.4 mm) base works with insulation thicknesses from 1” (25.4 mm) to 1.75” (44.5 mm)  
• 2” (50.8 mm) base works with insulation thicknesses from 2” (50.8 mm) to 3” (76.2mm).  
• Available in 10’ lengths.|
# Construction Grade Sealants and Adhesives

<table>
<thead>
<tr>
<th>Name</th>
<th>Highlights</th>
</tr>
</thead>
</table>
| Commercially available construction grade sealants and adhesives (for use with all THERMAX™ products) | - Check compatibility with THERMAX™ Insulations.  
- Follow manufacturing instructions to produce a continuous air and moisture resistant seal.  
- Examples: Vulkem 116, SikaFlex 201, Dow Corning 790 or equivalent. |

---

## Air Sealing Foams

### FROTH PAK™ Foam Insulation Kit (Class A) *

(for use with all THERMAX™ products)

- Ideal at roof at wall junctions.  
- Two-component, quick-cure polyurethane foam that fills cavities, penetrations, cracks and expansion joints.  
- Chemically cured foam, which significantly reduces curing time.  
- Helps create an airtight seal.  
- Can be left exposed in non-fire-resistant rated roof/wall junctures (max. 6" high and 2" deep, unlimited width) as per NFPA 286 Testing.

### GREAT STUFF PRO™ Insulating Foam Sealant *

(for use with all THERMAX™ products)

- Expands to take the shape of cracks and voids, forming a permanent and airtight barrier.  
- Designed to fill gaps up to 3” (75 mm).  
- Easy to use minimal-expanding single component polyurethane foam sealant with applicator.  
- Use for filling, sealing and insulating to form permanent, airtight and water-resistant bond.
KEY LEARNINGS

Meeting newer energy codes and green building design guidelines for both energy efficiency and air barriers in metal buildings is now easy and cost effective with THERMAX™ Insulation. Using a systems approach to meet prescriptive air barrier requirements allows designers to detail high R-value THERMAX™ Insulation with a range of different joint or interface sealing options - either singly or in combination as needed.

For Technical Information: 1-866-583-BLUE (2583) (English) . 1-800-363-6210 (French)
For Sales Information: 1-800-232-2346 (English) . 1-800-565-1255 (French)
THE DOW CHEMICAL COMPANY . Dow Building Solutions . 200 Larkin . Midland, MI 48674
www.DowMetalBuilding.com

Illustrations are not intended to replace the need for design by appropriate professionals such as architects or engineers.

NOTICE: No freedom from any patent owned by Dow or others is to be inferred. Because use conditions and applicable laws may differ from one location to another and may change with time, Customer is responsible for determining whether products and the information in this document are appropriate for Customer’s use and for ensuring that Customer’s workplace and disposal practices are in compliance with applicable laws and other government enactments. The product shown in this literature may not be available for sale and/or available in all geographies where Dow is represented. The claims made may not have been approved for use in all countries or regions. Dow assumes no obligation or liability for the information in this document. References to “Dow” or the “Company” mean the Dow legal entity selling the products to Customer unless otherwise expressly noted. NO EXPRESS WARRANTIES ARE GIVEN EXCEPT FOR ANY APPLICABLE WRITTEN WARRANTIES SPECIFICALLY PROVIDED BY DOW. ALL IMPLIED WARRANTIES INCLUDING THOSE OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY EXCLUDED.

Dow Polyisocyanurate Insulation
CAUTION: This product is combustible and shall only be used as specified by the local building code with respect to flame spread classification and to the use of a suitable thermal barrier. For more information, consult MSDS, call Dow at 1-866-583-BLUE (2583) or contact your local building inspector. In an emergency, call 1-989-636-4400.

WARNING: Rigid foam insulation does not constitute a working walkable surface or qualify as a fall protection product.

Dow Polyurethane Foam Insulation and Sealants
CAUTION: When cured, these products are combustible and will burn if exposed to open flame or sparks from high-energy sources. Do not expose to temperatures above 240°F (116°C). For more information, consult MSDS, call Dow at 1-866-583-BLUE (2583) or contact your local building inspector. In an emergency, call 1-989-636-4400 in the U.S. or 1-519-339-3711 in Canada.

GREAT STUFF PRO™ Insulating Foam Sealants contain isocyanate and a flammable blowing agent. Read the label and Material Safety Data Sheet carefully before use. Eliminate all sources of ignition before use. Wear long sleeves, gloves, and safety glasses or goggles. Provide adequate ventilation or wear proper respiratory protection. Contents under pressure.

GREAT STUFF PRO™ Gun Cleaner is flammable and contains acetone and propane. Read the label and Material Safety Data Sheet carefully before use. Eliminate all sources of ignition before use. Wear gloves, and goggles or safety glasses. Provide adequate ventilation or wear proper respiratory protection. Contents under pressure.

FROTH-PAK™ Spray Polyurethane Foam contains isocyanate, hydrofluorocarbon blowing agent and polyol. Read the instructions and Material Safety Data Sheets carefully before use. Use only with adequate ventilation. Wear protective clothing (including long sleeves), gloves, goggles or safety glasses, and proper respiratory protection. Do not breathe vapor or mist. Use only with adequate ventilation. Decrease ventilation significantly reduces the potential for isocyanate exposure, however, supplied air or an approved air-purifying respirator equipped with an organic vapor sorbent and a particulate filter may still be required to maintain exposure levels below ACGIH, OSHA, IEEE or other applicable limits. For situations where the atmospheric levels may exceed the level for which an air-purifying respirator is effective, use a positive-pressure, air-supplying respirator. Contents under pressure.

Building and/or construction practices unrelated to building materials could greatly affect moisture and the potential for mold formation. No material supplier including Dow can give assurance that mold will not develop in any specific system.