

WHITE PAPER

ARCHITECTS POISED TO SHAPE THE FUTURE OF HIGH PERFORMANCE COMMERCIAL BUILDINGS

Using spray foam insulation to create healthier, quieter, more energy efficient buildings where we work, shop, play, and learn



ICYNENE®

OVERVIEW

On average, 30% of the energy used in commercial buildings is wasted. The financial impact of this waste alone is staggering considering commercial buildings cost their owners more than \$100 billion annually in energy costs.¹

There is also an environmental impact. Commercial buildings account for 18% of the nation's energy use and nearly 18% of our greenhouse gas emissions.¹

Architects are in a unique position to shape a more energy efficient future of commercial building design and construction. Consider that, by 2035, 75 percent of all buildings will be either new or renovated.¹

Spray foam insulation like ICYNENE can play a major role in this effort. It offers commercial architects compelling reasons to go beyond the code when specifying insulation to create buildings that exceed expectations for comfort, performance and functionality.

By specifying spray foam insulation in commercial buildings architects can:

- Reduce ongoing energy costs by up to 50% by minimizing air infiltration while providing optimal thermal (R-value) performance
- Lower equipment costs by specifying systems appropriate for reduced HVAC loads
- Improve indoor environmental quality to enhance productivity and performance in workplaces (an important ROI for building owners and managers)
- Easily manage hard-to-insulate areas like service entry points
- Explore design options, not feasible with other forms of insulation

REASONS TO MAKE SPRAY FOAM INSULATION AND ICYNENE A PILLAR OF COMMERCIAL BUILDING PROJECTS

For architects, who typically specify fibrous or rigid board insulation, here are three compelling reasons to make spray foam insulation a pillar of their commercial building projects:

Reason #1 – Air barrier enables optimal building performance

A Wall Energy Rating (WER) study² shows that, without an air barrier, insulation cannot deliver optimal energy efficiency and comfort. This is why air barriers are now a critical part of Code and industry standards such as ASHRAE 90.1.

For commercial projects spray foam insulation delivers optimal building performance by providing an insulation and air barrier in one step to:

- Control conductive heat loss
- Help eliminate convection in wall and ceiling cavities
- Control air leakage into and out of the building

Spray foam offers substantial advantages over conventional air-permeable, fibrous insulation materials:

- Fibrous insulation cannot control air flow without time consuming, labor intensive and costly detailing.
- Unlike fibrous materials, spray foam insulation offers a more reliable way to consistently deliver superior energy efficiency over the life of a commercial building because it won't settle and sag, creating air gaps.

Using spray foam insulation to create a continuous air barrier also delivers noticeable benefits for building durability and comfort, including:

- Improving comfort by eliminating hot/cold spots
- Providing more control over air quality by minimizing the intrusion of airborne irritants (such as dust, pollen, and humidity). Combined with appropriate mechanical ventilation it creates a healthier indoor environment with fewer moisture and air quality issues
- Reducing potential for concealed moisture problems, such as those caused by wind-driven rain
- Controlling condensation by preventing conditioned internal air from meeting hot/cold outdoor air
- Reducing sound transmission (particularly mid frequency sounds, such as street traffic), which is a key selling point for those who consider sound control a must-have (i.e. office buildings and schools)

REASONS TO MAKE SPRAY FOAM INSULATION AND ICYNENE A PILLAR OF COMMERCIAL BUILDING PROJECTS

High-Performance Design Strategy for Architects

Spray foam insulation, including ICYNENE's portfolio of open and closed-cell products offers a solution to commercial building design with optimal R-values and air leakage control. It is also the solution that will deliver the greatest cost-efficiency to the building owner.

The question remains, though, what is the ideal approach to specifying spray foam insulation for commercial projects, including the use of open or closed cell products?

Here's one strategy:

Use light density (open-cell) spray foam insulation to insulate wall and roof cavities to:

- Help deliver a continuous air barrier
 - Cost-effectively add R-value. Figure 1 illustrates how heat flow is reduced as R-value is increased. Around R-20, the curve begins to flatten and we begin to see diminishing returns from increased insulation thickness. At that point, it makes much more sense to provide continuous insulation over structural features that otherwise act as "thermal bridges" through the insulation
 - Address thermal bridging by setting non-structural walls inward (from the interior of outside walls) and then delivering a continuous, seamless layer of open-cell spray foam in the cavities
- NOTE: This is an alternate design option from insulating the building's exterior to address thermal bridging (discussed on the right)*
- Facilitate drying of the assembly due to its open-cell structure. Open-cell foam allows just enough moisture diffusion to occur to let adjacent building materials breathe and help prevent moisture entrapment. This 'breathability' allows building materials to dry, minimizing moisture build-up and related problems such as mold

Create a continuous layer of medium density (closed-cell) spray foam insulation on the building's exterior to:

- Help deliver the continuous air barrier
- Control heat loss through thermal bridges, which is particularly advantageous when insulating metal buildings (which are highly conductive)
- Deliver maximum R-value in minimum space

Insulation Performance

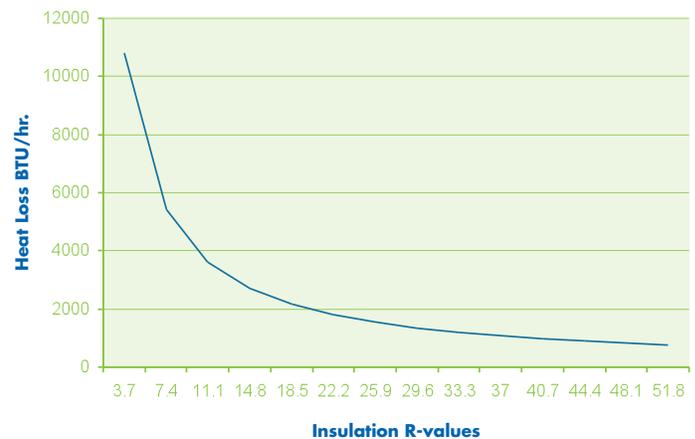


Figure 1: Conductive Heat Flow Reduction

REASONS TO MAKE SPRAY FOAM INSULATION AND ICYNENE A PILLAR OF COMMERCIAL BUILDING PROJECTS

Reason #2 – Spray foam insulation helps commercial projects qualify for LEED status

For architects, LEED project certification (the U.S. Green Building Council's internationally recognized green building program) is an opportunity to obtain highly marketable proof of their leading edge, sustainable design.

LEED buildings offer numerous selling features for building owners and their tenants, including:

- Reduced energy consumption and environmental impact
- Lower operating costs
- Better indoor environmental quality
- Average building life cycle savings that are ten times the initial investment in construction costs
- Comparable construction costs to buildings not seeking LEED certification
- Higher occupancy rates and building values

(source: U.S. Green Building Council - www.usgbc.org/DisplayPage.aspx?CMSPageID=2331)

Spray foam insulation, like ICYNENE, can play multiple roles in helping architects achieve LEED accreditation under two rating systems relevant to commercial buildings:

LEED for New Construction Rating System

ICYNENE can help projects:

- Earn up to 5 points for Energy Performance
- Meet Indoor Air Quality Performance prerequisites
- Earn credits for the use of rapidly renewable material based on cost (ICYNENE LD-R-50)

LEED for Schools Rating System

ICYNENE can help projects:

- Meet minimum energy performance prerequisites
- Earn up to 5 points for Energy Performance (ICYNENE MD-C-200)
- Earn credits for their use of rapidly renewable material based on cost (ICYNENE LD-R-50)
- Meet Indoor Air Quality Performance prerequisites
- Meet prerequisites for Acoustical Performance
- Earn one point for use of Low-Emitting Materials
- Earn up to one point for Mold Prevention

REASONS TO MAKE SPRAY FOAM INSULATION AND ICYNENE A PILLAR OF COMMERCIAL BUILDING PROJECTS

Reason #3 – Spray foam insulation lets architects design without compromise

Spray foam insulation like ICYNENE expands the horizon of design opportunities for commercial architects beyond what is feasible with fibrous or rigid board insulation options.

This means that architects can push the design envelope while meeting the energy efficiency, overall performance and functional needs of a building. Spray foam insulation tackles design challenges and problem areas that are difficult or impossible with other types of insulation including:

- Cathedral ceilings
- Steel structures
- Domed ceilings
- Arches and other unusual shapes
- Plumbing, electrical, telecommunications and other service entry points

With spray foam insulation like ICYNENE, complex detailing is simplified, without having to compromise on energy efficient or overall building performance.

End notes

1. (Source: 2011 Fast Facts: ENERGY STAR Commercial Building Design).
2. National Research Council Canada (NRC) produced a Wall Energy Rating factor that compared the performance that was delivered during testing versus the expected performance based on Nominal R-value. Spray foam consistently performed at more than 90% of nominal R-value whereas air-permeable, fibrous insulation performed in the range of 35% to 65% of nominal R-value. See: Development of energy ratings for insulated wall assemblies, Elmahdy, A.H; Maref, W.; Swinton, M.C.; Saber, H.H., Glazer, R., October 2009, <http://www.nrc-cnrc.gc.ca/obj/irc/doc/pubs/nrcc51419.pdf>

ICYNENE is a registered continuing education provider. For more information visit www.icynene.com/continuing-education.

Learn more about the application of ICYNENE and spray foam insulation for commercial building design and construction. Call 1.800.758.7325 or email commercialapplications@icynene.com.

Explore the gallery of commercial building projects at www.icynene.com/commercial.