

Insulating Steel Roofs

The critical considerations in the design and insulation of flat or low pitch steel roofs are:

- Simplicity of installation
- Thermal performance
- Initial cost
- Life expectancy
- Maintenance cost
- Lifetime cost.

Conventional Insulation Approaches

Low-rise commercial and industrial buildings typically have metal roofs; these roofs have very large surface areas when compared to the rest of the structure. Because of this, a substantial portion of the heat loss and gain is expected through the roof. However, this also means that properly insulating and air sealing the roof can have considerable impact on reducing the building's heating and cooling bills.

A New Approach

Icynene® offers a superior, proven alternative to conventional air permeable roof insulation systems. The difference can often be a significant reduction in heating and cooling bills, even over traditional built-up exterior insulation systems. Additionally, installing Icynene® on the underside of the roof assembly provides a large reduction in condensation potential when compared to interior air permeable batt systems.

Air Leakage Control

Substantial reductions in energy consumption are achievable with Icynene® because it is a combined air barrier and insulation system. In cold weather conditions, the primary source of heat loss in insulated buildings can be hot air leaking up through cracks & joints in the roof assembly. By reducing the volume of air that leaks through the roof, annual heating bills can be dramatically reduced.

Condensation Control

Proper air sealing can also contribute to considerable reductions in condensation potential; hot air can hold a large amount of moisture, and can generate serious problems when this moisture is allowed to contact cold roof surfaces. Humid air can penetrate vapor retarders through gaps, around joints & penetrations, or at poorly taped seams; condensation that forms on the roof deck can saturate the suspended batt insulation, eventually requiring the replacement of the insulation.

As a qualified air-barrier, Icynene® inhibits the movement of humid indoor air up to the underside of the steel deck. This prevents the formation of condensation on the underside of the roof deck. Icynene® is flexible and will not shrink or de-laminate with dimensional changes in the surface to which it is adhered, providing a reliable air-seal and protection from condensation. Additional vapor retarder protection may be required where high interior humidity or extreme climate conditions exist.

Design

When using Icynene®, the roof deck is installed on purlins mounted above open web joists or red iron framing. Weather sealant is applied on the steel deck. The depth of the purlins must be adequate to accommodate the thickness of insulation specified, plus 2 inches. A spacer is installed over the top of the purlins prior to laying the roof to provide a thermal break between the purlin and the roof. The preferred thermal break material is an isocyanurate strip fastened with adhesive. The choice of roofing deck profile is governed by the goal to provide as little contact between the decking and the purlin as possible. Icynene® will fill the spaces between the purlins and the roof deck, creating an additional thermal break.

Installation of Icynene®

Site installation centers around the truck or trailer on which the application equipment is mounted. The equipment consists of spray equipment, electrical power, compressed air, and up to 300 ft of hose. Although a man-lift is required from which to work, all additional equipment is contained in the standard truck or trailer. Application rates are about 15,000 board feet per day.

Upon application, the insulation adheres to the substrate, is self-supporting, and requires no additional support system. It adheres well to steel. Icynene® can be installed in any climate zone, even extreme cold (Alaskan installations have been as low as -40 °F/C temperatures) when proper application techniques are employed.

After installation, the Icynene® is usually covered by an interior finish material. The choice of the interior finish will be dictated by appearance, maintenance and fire rating requirements. Interior finish options include, but are not limited to: a gypsum board or cementitious thermal barrier coating; suspended acoustical tile; or steel sheeting. In some situations, such as agricultural buildings, it may be possible to leave Icynene® exposed without a thermal barrier. Prior

approval should be obtained where the insulation is left exposed to interior, occupied space. The insulation can be painted, but should never be power washed.

Roof Leak Management

One of the most important features of insulating a roof with Icynene® is the way in which roof leaks can be managed. Although Icynene LD-C-50® is designed as a complete air barrier, it allows for the drainage of water in the event of a roof leak. Water drains straight down through the material, simplifying the leak location process. Once the leak has been found and repaired, the insulation dries quickly, with no deformation or degradation in insulative or air sealing performance.

Icynene®

Icynene® provides a roof insulation solution to issues of energy efficiency and condensation control with less labor, faster installation and no dependency on good weather conditions.

Additionally:

- Site traffic and material handling is reduced
- Roof leak maintenance costs are reduced
- Low insulation weight leads to thinner purlins
- Purlins do not require painting
- Simplified end-of-life roof replacement
- Paintable interior finishes
- No maintenance or replacement required of insulation, even under roof leak situations