WHITE PAPERS

BUILDING ENVELOPE SERIES

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PREFACE

Materials used in a food processing plant's building envelope will have an impact on energy efficiency, durability, safety and sanitation. In this white paper, we discuss the essential components that make up the building envelope, from the walls and ductwork to the roof and interior doors and how the selection of materials will impact the facility.

FIVE REASONS INSULATED METAL PANEL DUCTS ARE THE RIGHT CHOICE FOR YOUR FOOD PLANT

Insulated metal panels (IMP) are becoming the preferred material for ductwork within food plants for their efficient, hygienic and durable qualities. IMPs consist of two steel skins injected with urethane foam insulation, providing a better-insulated solution than traditional ductwork. The steel skins can be constructed of standard pre-finished metal or stainless steel to meet the required sanitary specifications. Panels are cut and fabricated to meet the specific size and space requirements of a facility, and joints are installed together with caulks, urethane spray foam, sealants, vapor barriers and fasteners for an air/vapor-tight construction.

Installing IMP ductwork offers food processing plants many advantages over traditional galvanized or stainless steel:

1. Energy efficient – IMP ductwork panels offer a higher insulation value, allowing the air being transported through the duct to maintain colder temperatures, thus reducing energy costs. IMP ducts offer superior R-values for enhanced energy efficiency.
2. Weatherproof – Standard ductwork with exterior insulation and jacketing tends to deteriorate much quicker than IMPs. The pre-finished steel skins of IMPs withstand the elements of wind, hail, rain, and snow better, resulting in a longer life span.
3. Cleaner air – The stainless steel interior of IMP ducts provides a more hygienic environment so the air that passes through the ducts is cleaner, an important concern for food processing plants with high sanitation standards.
4. Durable – Stainless steel is often the preferred material within food processing plants because of its ability to stand up to caustic cleaners. The exterior of ducts may be subject to wash downs in plants and IMPs can withstand the harsh chemicals.
5. Less maintenance – IMP ducts require less maintenance than traditional materials due to their construction, which consists of a steel interior skin adhered by injecting urethane foam in between it and the exterior steel skin. This forms the IMP as a single material versus standard metal ductwork that is composed of three separate components - an interior metal skin, a board stock insulation, and a protective jacketing.

FIVE ADVANTAGES OF TPO SINGLE-PLY ROOFING SYSTEMS FOR COLD STORAGE FACILITIES

In cold storage environments, thermoplastic polyolefin (TPO) single-ply roofing systems have become the roofing system of choice due to their energy efficiency, reliability, labor-saving installation, and maintenance advantages.

There are many factors that determine what roofing materials are most appropriate for a facility. For example, how much foot traffic will occur on the roof? What mechanical equipment will be located on top of the building? What are the geographic and climate requirements? What is the building's interior environment?

TPO single-ply roofing systems offer five distinct advantages for a cold storage facility:

PRODUCT

1. Energy efficiency — The white membrane of a TPO single-ply roofing system reflects the heat of the sun, which maximizes the facility's utility efficiency and helps reduce energy costs. Sometimes referred to as "cool roofs," a white TPO single-ply roof helps your facility maintain a cooler interior environment.
2. Wind uplift design — TPO single-ply roofing systems are robust and adaptable to all geographic locations, including areas where roof systems must meet the most stringent wind uplift codes. As part of an overall roofing assembly, a mechanically-fastened TPO single-roofing system can be designed to meet the strongest uplift requirements in the industry.
3. Reliability — A TPO single-ply roofing system can achieve a manufacturer's watertight system warranty for up to 25 years depending on the system design. Upon project completion, a manufacturer's technical representative will inspect the TPO roofing installation for proper detailing and specification adherence.
4. Installation — With regard to a cold storage application, TPO single-ply membranes are pliable and have a low perm rating and make excellent vapor barriers. With the proper design, TPO membrane is used to make superior air infiltration details at critical areas of cold stage construction, such as the roof / wall junction. Typically, installation of a TPO single-ply roof is quicker, cleaner and more cost-effective than other types of roofing systems. BUR and other asphalt-based roofing systems tend to be labor and equipment intensive and not as conducive to low temperature roof detailing.
5. Maintenance — TPO single-ply roofing systems require minimal maintenance but your maintenance team will want to inspect the roof on a regular basis for any signs of membrane damage due to debris on the roof caused by weather or personnel. On a TPO single-ply roof, tears and punctures are easy to locate, isolate and repair.

FACTORS TO CONSIDER WHEN SELECTING DOORS FOR YOUR FOOD PROCESSING PLANT

Selecting the proper doors for your cold storage facility is an important part of the decision process for your building envelope. Your food plant design firm will want to look at all aspects of your plant's operations to determine the most appropriate door types and materials. Installing the proper door will have a positive impact on the facility's energy costs and productivity, while selecting the wrong type of door can result in down time, costly damage, and unsafe conditions.

There are a number of factors to consider when selecting doors for your facility:

DOOR OPENING CHARACTERISTICS

1. Operating temperature/humidity — Consider the normal and extreme operating parameters of your plant to ensure doors are equipped to withstand the conditions.

2. Opening frequency — Anticipate the number of times per day and per hour an opening will be used. This could influence the desired speed of the door operation and its suitability for high-cycle applications.

3. Type of use — Will forklifts, motorized pallet jacks, push carts, or personnel pass through the door? This affects the opening size and may impact the opening and closing speed. Clearance for safe equipment passage must also be considered. The size of the opening, especially height, can have an impact on air movement and energy efficiency.

4. Clearances — Room layout and structure may prohibit some door types that need side or head clearance. Doors with housing frames and those that swing or slide open need additional clearance space.

5. Pressure differential — Significant pressure differences can eliminate some door types or affect the way they are constructed. Higher pressure differential can cause rapid air changes and result in possible condensation and/or ice formation.

6. Door construction — Your plant's wash-down procedures and cleaning solutions will also impact door selection. Sturdy, damage-resistant doors are the best choice for plants that require more physical, high-pressure wash downs. Corrosion-resistant doors can provide protection for harsh, caustic cleaning materials.

7. Budget — Consider the upfront cost of the door as well as the operating costs, including energy use, repair and maintenance.

OPERATIONAL CONSIDERATIONS

8. Safety — Most doors will include built-in and optional safety features. You may also consider internal controls to prohibit foot traffic through high-powered, motorized doors where heavy equipment passes.

9. Operational habits — Do equipment operators respect and protect doors or are they frequently hitting them and causing damage? If so, your plant should consider impact-resistant or impactable doors.

10. Activation method — Determine how a power door will be activated, as this will determine the speed at which equipment can pass through and the potential for damage. For example, pull-cord activation may slow down the equipment temporarily, but will increase safety and operational habits.

11. Time delay close — Automatic close options help close powered doors, yet the door can potentially close on moving equipment and pedestrians. Standard reversing systems may not be enough. Your plant may consider adding optional safety sensors to doors that include a time-delay close to enhance protection of equipment and pedestrians and reduce damage to the door.

SIX KEY BENEFITS OF INSULATED METAL PANEL WALLS

Insulated metal panels (IMPs) installed on a building exterior provide an excellent thermal envelope. In contrast to other envelope assemblies, IMPs more effectively reduce thermal bridging. With the industry continually striving to build more sustainable designs, IMPs are by far the best and most thermally efficient product available today.

Panels are typically double tongue and groove with the highest R-values per inch of any insulation material used in construction today. The facings are available in USDA-approved white, galvanized, and stainless steel, which make them a great choice for food processing facilities.

IMP walls offer six significant benefits over traditional materials, including:

1. Installation — IMPs (a single-component system) increase project build speed, minimize delays and decrease the need for multiple trades. Their solid, lightweight nature makes them easier to maneuver and position. They can be installed in all weather conditions and perform effectively in all seismic zones.
2. Integrity — IMPs have a closed seam at the side joinery, which makes them the ideal choice in food processing construction, providing owners with the easiest panel to face seal. Panels for cold storage construction include minor profiling in the facings (while providing required structural integrity and flatness tolerances) to make it easier to apply vapor barrier tapes and sealants for freezer application, eliminating the need for deep ribs that can allow the possibility of air and water vapor leaks. Closed cell polyisocyanurate insulation and self-aligning, double interlocking tongue and groove joints with concealed fasteners create an airtight and watertight seal to stabilize interior environments.
3. Energy efficiency — IMP walls provide superior thermal insulation capabilities specifically engineered to maintain interior climate control regardless of external weather conditions.
4. Sanitation — IMP walls provide a more sanitary finish that can easily be washed down and withstand harsh chemical cleaning. IMP walls also meet plant owner's needs for a more sanitary surface at floor and curb levels.
5. Maintenance — Because inside plant walls can be damaged by large equipment and machinery, insulated metal panel walls provide easier repair solutions that can be completed in a cosmetically appealing and hygienic manner.
6. Sustainable — IMPs include a minimum 30 percent recycled steel content, making them 100 percent recyclable and reusable, contributing to LEED credits and Net-Zero Energy targets.

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