INSULSPAN®
STRUCTURAL INSULATING PANEL SYSTEM
Better building ideas from PFB™

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Product Information Bulletin

Heating, Ventilation and Air Conditioning (HVAC) System Requirements

This bulletin highlights HVAC system design requirements for energy efficient buildings built with the Insulspan® Structural Insulating Panel (SIP) System.

Insulspan SIP System Warranty

The Insulspan SIP System warranty states under section 4 that it does not cover damage caused by inadequate design, performance or maintenance of the heating, ventilation and air conditioning (HVAC) system for the building. In other words, building owners are responsible for ensuring adequate design and maintenance of the building HVAC system.

Design Considerations for Heating and Air Conditioning System

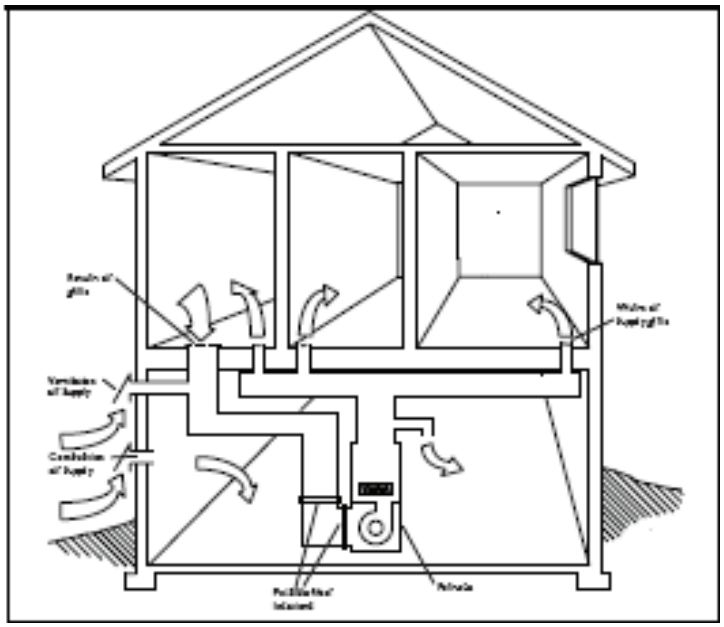

Figure 1 - Forced Air Heating System with Naturally Aspirated Furnace

The Insulspan SIP System results in an energy efficient building envelope with high thermal resistance and reduced air leakage. This will typically allow savings in the size of heating and air conditioning equipment for a building. HVAC system contractors need to ensure that their design calculations take into account the higher effective R-value and increased air tightness provided by the Insulspan SIP System resulting in significantly reduced HVAC heating and cooling requirements.

Proper sizing of the HVAC system is crucial because an oversized system will fail to reach a steady operating rate. Short cycling equipment will be less energy efficient and require more maintenance than properly sized equipment.

Ensuring Adequate Ventilation

Buildings built with the Insulspan SIP System are typically extremely airtight and require some type of controlled ventilation to exhaust fumes from sources within the building as well as to control the interior relative humidity. Ventilation is the removal of stale air and excess moisture from the occupied zones of the building and the introduction of outdoor air to dilute indoor air contaminants. Ventilation should be distinguished from air filtration and air cleaning.

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Only systems which remove air from the building or supply outside air to the building are referred to as ventilation systems. Mechanical ventilation will provide reliable control over air exchange, improve indoor air quality under all circumstances except where outdoor air quality is worse than the indoor air quality and reduce indoor relative humidity levels in winter when applicable thereby reducing surface condensation on windows and other cold surfaces.

Types of Mechanical Ventilation

The following describes three options for mechanical ventilation systems

1. **Supply-only systems:** Supply-only ventilation is a method of ventilation in which only outdoor ventilation air supply is provided mechanically and is not mechanically exhausted. A naturally aspirated furnace with an outdoor air supply into the return air plenum is a common example. This is typically not a recommended system in an airtight building because it carries the risk of building pressurization leading to excessive air leakage and the potential of moisture damage.
2. **Exhaust-only systems:** In exhaust-only ventilation, the exhaust is provided mechanically; the supply air is drawn in through cracks and holes in the building envelope, or through passive wall diffusers. A typical building with kitchen and bath fans or a central exhaust ventilator is a common example. Exhaust-only systems generally have the disadvantages of poor control over the supply and distribution of ventilation air as well as an inability to filter incoming air. Exhaust-only systems can also cause back venting of combustion appliances and entry of soil gases unless preventive measures are taken.
3. **Balanced Ventilation Systems (Heat Recovery Ventilators):** A balanced ventilation system provides a fresh air supply and stale-air exhaust at equal rates by moving both the exhaust air and supply air with fans. This type of system typically uses a heat recovery ventilator (HRV). Balanced systems eliminate most of the problems encountered with supply-only and exhaust-only systems, although they generally cost more. They contain one or two fans and a heat-exchange core. One of the fans extracts stale air from the building passing it through the heat exchange core, while the other fan brings in outside air through the heat-exchange core. The two airstreams do not come into direct contact in the core, but the incoming air stream is warmed by the heat lost from the outgoing air stream.

Regardless of the ventilation system chosen for a building, the design professional responsible for the overall design of the building needs to be directly involved with the design of the HVAC system. Sources for additional information on the design of HVAC systems for residential applications include:

Canada Housing and Mortgage Corporation
http://www.cmhc-schl.gc.ca/en/co/co_001.cfm

US Department of Energy – Energy Efficiency and Renewable Energy
http://www.eere.energy.gov/buildings/info/components/hvac