porterSIPS™
structural insulated panels

Technical Bulletin

Bulletin #0400
July 2010

Air Exchangers
HRV and ERV

PorterSIP juncture details have evolved and have been refined greatly over the last 15 years, with the emphasis on energy conservation and efficiency and building durability. As a result of these sealing efforts, and the solid-core nature of SIPs, SIP structures are extremely air-tight when compared to conventional structures.

When a structure is efficiently sealed, it can create a problem of indoor air pollution. Fresh air has been reduced or stopped from infiltrating and replacing stale air. Moisture, fumes from adhesives, cleaning agents, and other gases and particulates can become trapped within the structure, potentially creating an undesirable environment.

An air exchanger is a unit that can continually exchange stale inside air for fresh outside air, while also using the heat (or cold) from the exhaust air to raise or lower the temperature of the incoming air. This creates a healthier living environment while retaining energy efficiency. Air exchangers are available in two types: heat recovery ventilators (HRVs) and energy recovery ventilators (ERVs). The difference between the two is that ERVs can exchange heat as well as moisture, while HRVs only exchange heat. Typically, HRVs are used in colder climates and ERVs are used in warmer climates.

Air Exchangers in Detail
Fresh air is drawn in from a port open to the outside of the building, and passed through a chamber, also known as the exchanger, that is surrounded by indoor air. In cold climates, as the two air streams pass each other within the exchanger, highly conductive metal or other materials removes the energy (heat) from the warmer indoor air and gives it to the cooler fresh air. In warm climates, the opposite exchange takes place. The fresh air is then ducted into the house, and the stale indoor air is ducted to a port and expelled outside. During the energy exchange, moisture (humidity) condenses into water, appearing on the exhaust side of the medium. The excess moisture is removed and drained away. ERVs work very similarly except that they often use a turning wheel made of a highly conductive material to exchange the heat. This wheel will also contain a desiccant that is capable of exchanging moisture.

When using an HRV in areas where warm, humid air exists, the two airstreams will follow the same routes, but as they pass within the unit, heat is drawn from outside air. Its ability to hold moisture decreases as it cools. Condensate is left behind as before, except that the condensate forms on the opposite side of the medium. Thus, the fresh incoming air is cooled and dried before being introduced into the living area.

In both environments, up to 80% of the energy can be exchanged. According to ASHRAE standards, an air exchange system should be designed to perform 0.35 air changes per hour for a healthy indoor environment.

Planning and Installation
Air exchangers require some planning before construction. The main unit should be placed in a temperature controlled area, basement, garage, attic, mechanical room, etc. Ductwork is typically run from rooms such as bathrooms, laundries, and kitchens to the air exchanger. Insulated ductwork is then run from the exchanger to the exterior of the building. A separate system of fresh air ductwork is run from the exterior of the building to the unit and continued to the fresh air drop, often a return air of a furnace.

Please consult a local HVAC engineer or contractor, or reference ASHRAE (American Society of Heating, Refrigerating and Air Conditioning Engineers) Standards for design and installation of air exchangers as part of a complete HVAC design.

PorterSIPs - A Brand of PorterCorp
Corporate Headquarters 4240 136th Ave., Holland, MI 49424

Office: 616.738.0995 **Fax:** 616.928.0076
Email: info@portersips.com **Web:** www.portersips.com