The Vent Convector – A Simple Draught Free Fresh Air Unit

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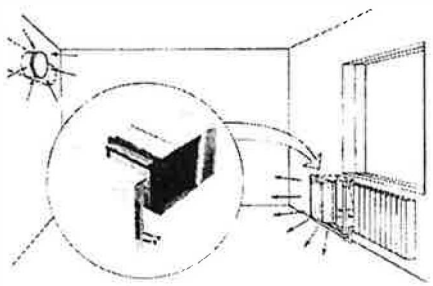
An Inlet Ventilation System Utilizing Exhaust Air Fans / Natural Draft and Water Heat

The Vent Convector is developed from and old ventilation principle. In the fifties a similar unit was marketed in Sweden. It was never a success due to the difficulties with freezing and subsequent floodings. It is now more advanced, however, and with better environment function, but still it is cheaper and simpler to install than more conventional ones, a product for the whole northern hemisphere. The successful principle can be explained as follows:

Warming the fresh outdoor air and after that filter and distribute it noiselessly, with no draught in the premises and at a very low pressure drop, it is entirely without any electric connection. These advantages and the freezing damage protection, a storm damper and a back flow damper are the most significant parts of the convector.

The Vent Convector is simple to install. That is why many technical consultants have chosen the product concerning rebuilding as well as additional building extension. The product has become a very interesting object also for new constructions.

The simplicity makes the convector cheap and easy to install. The Vent Convector is especially favourable for premises with exhaust air fan systems, but also at establishments with both exhaust- and supply air fans, where more ventilation is needed and where the entrance air system cannot be enlarged. The convector needs no special fans or channels (channels usually get dirty and can spread germs).



In a lecture room two holes are made in the corners preferably square holes (300x300 mm). The Vent Convector is installed and finally connected to the radiator circuit. After checking the exhaust fan capacity, the water circulation pump, tubing and balancing, the convector is working.

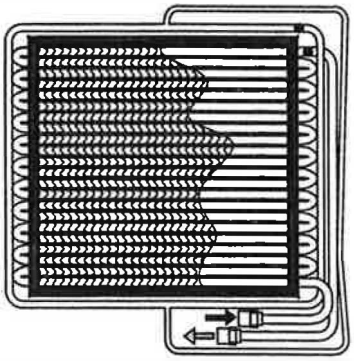
The best ventilation effect is achieved at a low location since the outlet air vents are mostly positioned opposite and at a high level..

The installation of vent convectors can be made so it suits the appearance of the building. In this picture to the right four small grids with brick in between have been used instead of a standard grid. An exhaust air system with a heat pump, and 38 vent convectors in the outer walls, was in this case considerably cheaper than installing an exhaust – and entrance air system with a heat exchanger for the heat recovering.

The absence of fans, channels and valves makes the establishment free from disturbing sounds. In non industrial applications, where noise from outside, traffic etc can be an annoyance, an inlet hood or some sound barrier in the wall is suggested. The vent convector is a quiet alternative to other systems to get healthier and fresher interior air.

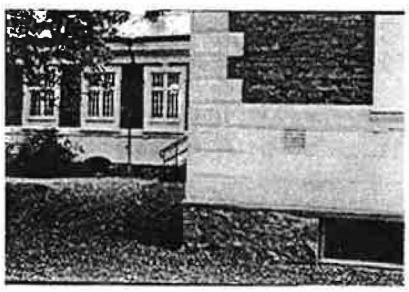
With "ThermoGuard" freezing damage protection, a patent from Sweden, there is no risk for freezing bursts in the heat exchanger. If there would be a power brake or a power failure and lack of hot boiler water the system can cope with it.

ThermoGuard is shown in the figure to the right and works as following. The water in the Al-finned Cutubing is freezing first. The water freezes later in the heat exchanger bends due to the surrounding of warmer room air. Then consequently the water freezes in the connection tubes which are connected to the expansion vessel in the building. The water expands 9 % by freezing and the water in the bends escapes through very small holes drilled between the bends and the surrounding tube inside, thus avoiding some water to be trapped and cracking the bends.



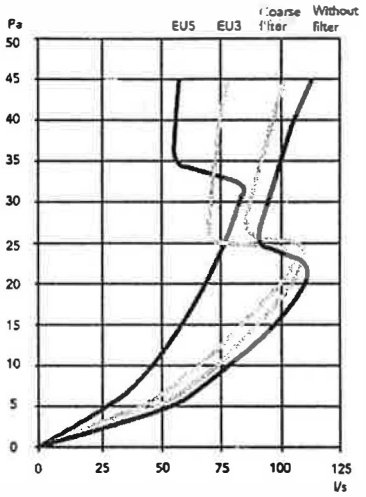
It is easy to clean the filter and perform the Compulsory Ventilation Control (OVK, in Sweden), as the heat battery is hinged. In addition there is a measuring socket.

The Vent Convector has an self-regulating, aerodynamic storm damper which limits intake of air. It also has a self-regulating "back flow damper" (patented). So the proper air flow comes into the room with the wanted temperature and newer flows backwards with energy losses.



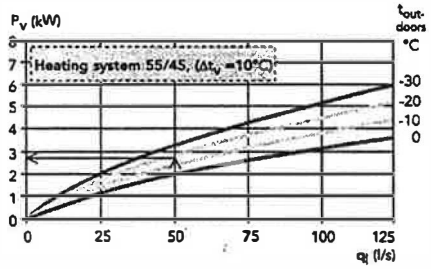
More and more people suffer from allergy and asthma due to the bad indoor air. The problem is especially big in schools, offices and other working places. These rooms where we spend long hours, must have a well working ventilation system, which is effective also after being used for many years and which does not gather dust and germs. The Vent Convector is part of such a system. It can be installed in all kinds of rooms e.g. industrial premises, work shops, schools, nurseries, hospitals, offices, flats, one family houses, staircases, drying rooms etc.

The simplified ventilation system at issue is more sensitive to wind- and thermal forces. The wind can easily give 50 Pa pressure difference over the wall. Therefor a storm damper is put in which brings down the air flow in the storm gusts to a level where the heat capacity can cope with it.



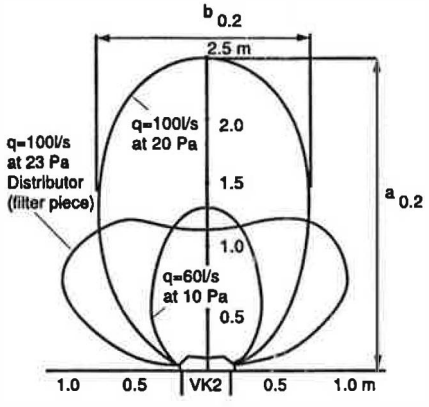
The upper graph to the right explains the air flow vs. total pressure difference in the vent convector using different filters. At about 25 Pa pressure difference the storm damper closes. That corresponds to a wind power of about 6 m/s when the exhaust fan gives -7 Pa pressure in the house and the thermal forces gives - 3 Pa at the same time. Of course all depends on how the building is situated in the nature etc.

Tests have shown that fans shaping more than -20 Pa room pressure should not be used. To get the building air infiltration to a minimum the window tightness etc should be kept on a Nordic standard.



The lower graph to the right shows the heating power of the heat exchanger at different air flow and outdoor temperature.

The vent convector has a thermostat with a sensor in the inlet air. Furthermore the convector is working in co-operation with the radiators in the room which all should have thermostats.



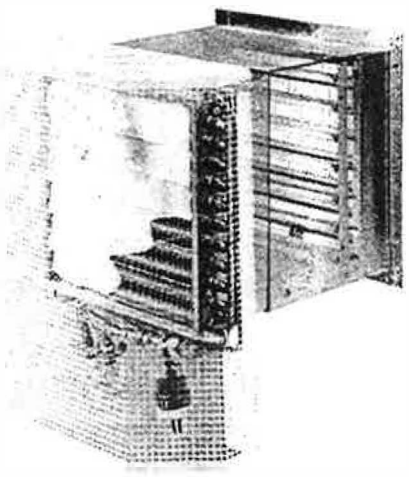
The flow pattern and throw are very important for the air experience in the room. The room temperature is 21 °C. The graph to the left shows some isovels for 0,2 m/s at 3 °C lower temperature and at different air flow.

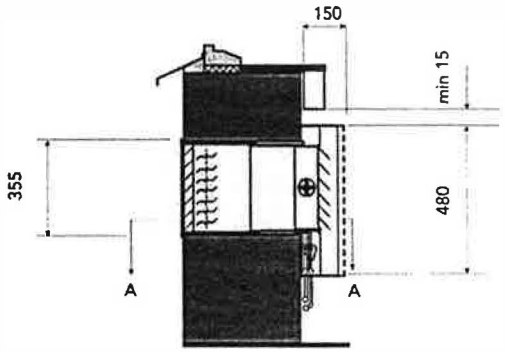
The most typical in the design of a vent convector is the necessity of keeping the pressure losses low in all parts on both the air and the water side. The inlet grid, the opened storm damper, the telescopic wall duct, the heat exchanger, the back flow damper, a coarse filter (-pollen) and the terminal device should totally not give more than 20 Pa air pressure drop at 100 l/s.

In the future more performance based fans will be used. They will be controlled from a time clock, person attendance, out- or indoor temperature, carbon dioxide, air moisture etc and the lack of internal heat recovery in the vent convector will not be a relevant disadvantage. If heat recovery is important in a system the best equipment for that is an exhaust air heat pump carrying a superior COP. It can transfer the energy to the both the hot-water and the radiator water.

The Advantages of the Vent Convector

- Healthy interior environment
- Economical
- Quiet
- Adaptable
- Easy installation and maintenance
- Back flow and storm damper
- ThermoGuard protection
- No electrical supply required





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