

Ventilation Systems

1 Technical Introduction

1.1 General function of ventilation systems

A ventilation system provides a building with fresh air which is important for the indoor air quality and the occupant's well-being. With centralized or decentralized ventilation systems the air exchange can be managed as well as closely monitored.

1.2 Integrated heat recovery

Function of heat recovery:

- Minimizes energy losses by ventilation
- Preheating of the air in winter and precooling in summer
- Winter: outside air is heated by warm extracted air in the heat recovery core and released preheated into the rooms
- Summer: the outside air is guided through a bypass at night to reach the indoor rooms fresh and cold

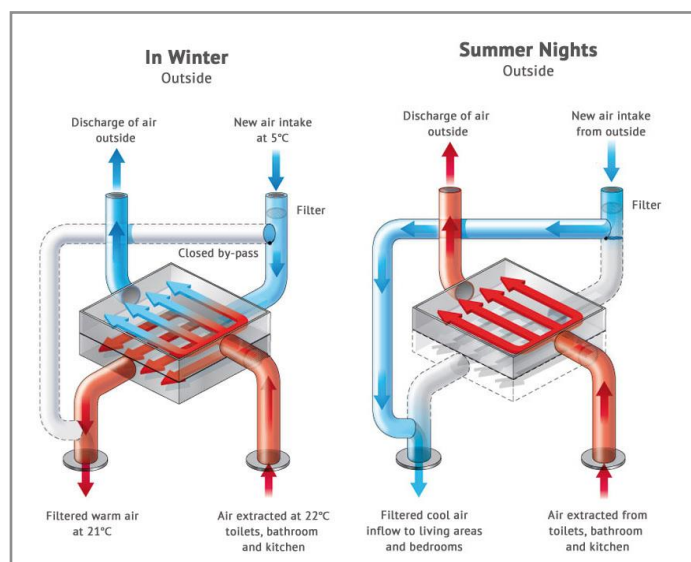


Figure 1: General function of heat recovery in winter and summer.
Source: Atlantics Australasia [1]

Different types of heat recovery

- **Recuperative heat recovery:** heat is directly transferred from air to air through metal sheets, e.g. plate heat exchanger
- **Regenerative heat recovery:** heat is transferred to intermediate medium and then to air again, e.g. rotary thermal wheels, heat pipes, circuit connected system
- **Heat recovery and heat pumps:** heat recovery systems can be combined with heat pumps either for air heating or hot water production
- **Earth heat exchanger:** the outside air can be preheated by the ground temperature either directly with an air pipe in the earth or indirectly with a pipe carrying a medium

System comparison

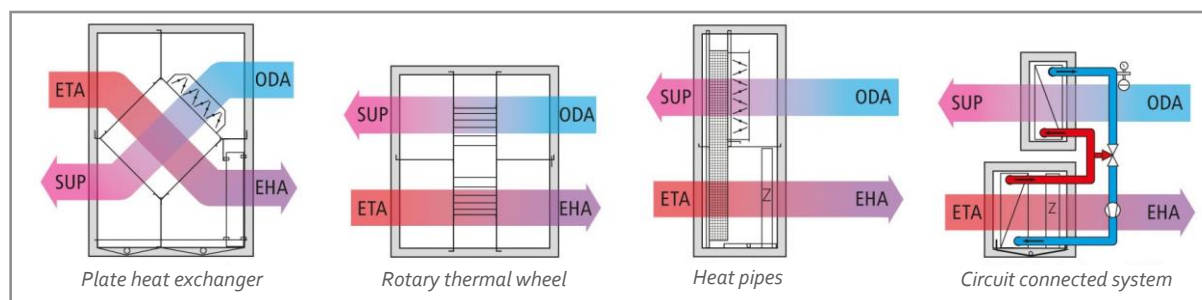


Figure 2: Heat recovery schemes. Source: KLAISS GmbH Apuso Lüftungstechnik [2]

Every system has different advantages and disadvantages which means that each situation requires an analysis according to which the system will be chosen.

2 Implementation

- The unit size is based on air flow volume and design
- Operation planned at 75% of max. -> system resistance
- Supply and exhaust air pipes are installed
 - In or under the ceiling,
 - In a shaft,
 - On the floor
- Silencers are installed to minimize noise pollution
- Diffusers must be installed in an accessible way for cleaning, maintenance
- Kitchen fumes are extracted with filters to prevent grease pollution
- Various countries have funding programs for ventilation systems, because they are an essential part of energy efficiency, by reducing consumption and heat loss from natural ventilation.

3 Conclusion

- Ventilation systems enable the controlling and monitoring of the air exchange of a building. This way the air can also be filtered.
- Integrated heat recovery uses the energy of the exhaust air to preheat or precool the fresh supply air. This can result in significant energy saving potentials and economical benefits.
- The choice of the appropriate system depends on the situation and must be carefully chosen to ensure an ideal utilization.

4 References

- [1] Atlantics Australasia. <https://atlantics.com.au/optimococy-ventilation/>
- [2] KLAISS GmbH Apuso Lüftungstechnik. <https://www.apuso.de/lueftungstechnik/waerme-rueckgewinnung/>

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