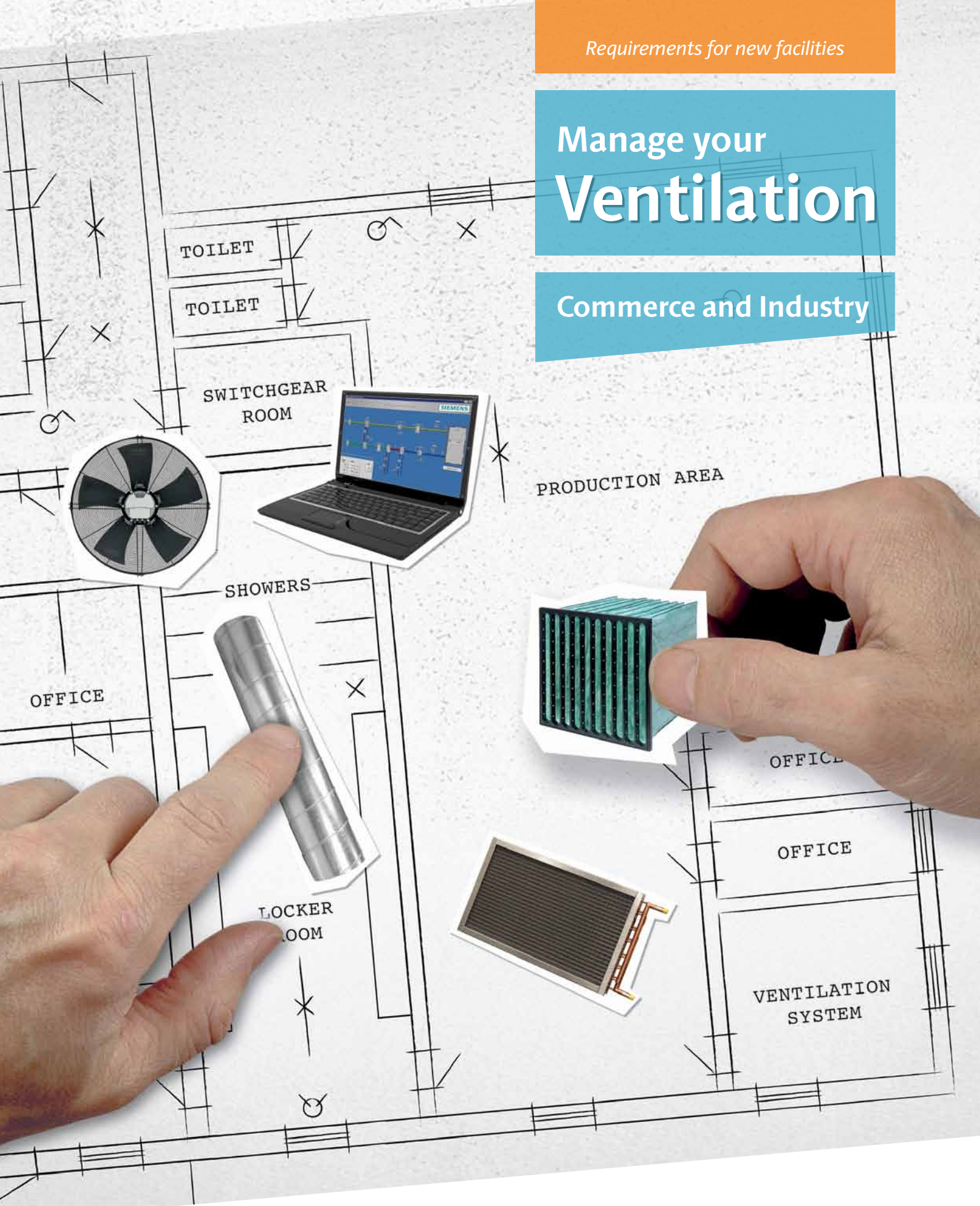


# Manage your Ventilation

Commerce and Industry



Use the Danish Energy Saving Trust's  
list of requirements  
– when planning new ventilation systems

# Go'Energi

Danish Energy  
Saving Trust

What to check	Check that the ventilation system complies with all the requirements on the list
<b>Ventilation needs</b>	
Indoor climate requirements	<p>Check that you have the documentation for the indoor climate requirements of the ventilated rooms:</p> <ul style="list-style-type: none"> <li>• Investigate which local/regional/national requirements apply to the construction</li> <li>• Find out which working environment requirements apply</li> <li>• Be conversant with the requirements on which you base your work processes, machines and technical processes</li> <li>• Check which special requirements in your industry apply to cleanliness, cross contamination, etc. – and make sure that you always challenge and justify your requirements</li> </ul>
Impact mapping	<p>Check that you have mapped the factors that will influence the indoor climate. You must have documentation for these calculations:</p> <ul style="list-style-type: none"> <li>• Heat loss and solar warming of the building envelope</li> <li>• Energy impact of human activity, IT equipment, lighting, machines, processes, etc.</li> <li>• Any humidity discharged by processes</li> <li>• Impact of dust, gasses, odours, etc. from work processes and human activities</li> </ul>
Dimensioning	Check that you have documented calculations covering system dimensioning, and that these have been made on the basis of known requirements and impacts.
	Check that you have evaluated the operating pattern for the ventilated space, e.g. in the form of a duration graph.
	Check whether any requirements or impacts have changed since you planned the system.
	Check that you can justify any over-dimensioning of the system.
	Check that the results of the dimensioning comply with local/regional/national requirements, the requirements in the checklist, and your own requirements for the system.
<b>System design</b>	
On-demand control	Make sure that the ventilation is controlled automatically to match demand at different times.
	Check that air volumes vary automatically based on ventilation demand. Switch off system completely when ventilation is not required.
	Make sure that the primary pressure is controlled automatically if you use individually controlled zone dampers.
	Check that temperature and humidity are automatically matched to requirements.
Heat recovery	Check that you have installed the most efficient type of heat recovery based on the conditions specified.
Extraction	Check that you have extractor fans at very high discharge points such as sources of heat, dust, gasses, etc.
Zones	Avoid cooling warm air, and avoid heating air that has been cooled.
Recirculation	Make sure that you can automatically vary the amount of recirculated air based on demand.
	Check when cooling with variable amounts of fresh air that you use Enthalpy control.
	Check that recirculation takes place as close as possible to the area of demand (e.g. filter-fan-units).
	Check that the damper control system is designed to achieve the lowest possible pressure loss.
Ducts	Check that large bends are fitted with guide vanes.
	Check that you are not using flexible hoses longer than 20 cm.
	Check that the duct pressure in a system with self-regulating CAV control dampers is adjusted so there is exactly the right working pressure across the damper fitted furthest out in the system.
Control	Check that the control system allows for a suitable interval between high and low thresholds for air volumes, room pressure, temperature and humidity.

What to check	Check that the ventilation system complies with all the requirements on the list
<b>Efficiency</b>	
Energy consumption	Check that you have annual energy consumption calculations for the defined operating pattern. Electricity, cooling and heating consumption should be calculated on the basis of climate data for reference years.
SFP (specific fan power)	Check that the specific consumption by fans across the whole system (supply and extraction) is less than 2.1 kW/(m <sup>3</sup> /sec) for VAL and 1.8 kW/(m <sup>3</sup> /sec) for CAV.
Ventilator efficiency	Check that you have installed energy saving fans, and that you choose the optimal operating point. The efficiency rating must be over 72% under normal operating conditions.
	Check that you have installed IE2 motors or better (e.g. PM motors are particularly suitable for long-term operation at low loads).
	Check that the efficiency rating of belt drives is over 95%, or that you use direct drive.
	Check that you have installed variable speed drives, and that cabling is installed per the recommendations of the supplier.
Heat recovery	Check that the efficiency rating is more than 80% for rotary heat exchangers, 70% for crossflow heat exchangers and 60% for liquid coupled heat exchangers. Pressure loss should be less than 150 Pa.
Filters	Check that the pressure is always less than 200 Pa for a normal filter, and less than 80 Pa for a coarse filter immediately before replacement.
Cooling and heating coils	Check pressure loss is less than 25 Pa for heating coils and under 130 Pa for cooling coils.
Cooling coils	Pressure loss in the coolant circuit should not exceed 15 Pa in standard (not dehumidifying) cooling coils with a capacity under 30 kW/(m <sup>3</sup> /sec). Pressure loss should not exceed 25 Pa in coils with a capacity over 30 kW/(m <sup>3</sup> /sec) if these are also used as dehumidifiers.
	Check that the temperature of the cooling fluid is never more than 3-5 °C less than the required supply air temperature on the output side of the cooling coil. Unnecessarily low cooling fluid temperature results in lower COP and reduces the number of fresh air cooling hours.
	Either you or the Building Monitoring System (BMS) should be able to vary the temperature of the water passing into the cooling coil between 6 and 13 °C.
Heating coils	Check that the pressure loss in the fluid circuit does not exceed 10 Pa.
	Hot water temperature must be as low as possible. Use a supply air temperature to the heating coil of 60 °C and an extract air temperature of 30 °C. Low temperatures increase the potential for heat recovery from process heat.
	Avoid using heating coils heated by electricity or steam.
Ducts	Check that any adjustments result in the correct air distribution and the least possible pressure loss across the dampers.
	Check that the pressure loss per metre is less than 1.0 Pa in the main ducts.
<b>Delivery and commissioning</b>	
Measurement points	Check that all measurements and responses from the system are shown correctly on the BMS display.
Control signals	Check that signals for controlling fan motors, dampers, valves, pumps and rotary motors result in the correct response at the components.
Adjustment	Check that the system can control the fans as required. Use timer control and work with as big an interval as possible between the high and low thresholds for temperature and humidity values.
	Check that all adjustments are thoroughly tested on delivery, and that the settings, alarm thresholds and timer control are correct.
<b>Energy control and measurement</b>	
Meters	Check that you have installed meters to measure electricity, cooling and heat consumption.
Display	Check that the test data is collected and shown via CTS, or on a local data logger.
<b>Operation and maintenance</b>	
Plan	Check that you have a detailed plan showing how to maintain the system, including BMS and instrumentation.

## To be completed by specialist

### Ventilation system delivered to:

Company: \_\_\_\_\_ Date: \_\_\_\_\_

Unit (unit no.): \_\_\_\_\_ Building: \_\_\_\_\_

Commissioning report: \_\_\_\_\_

Unit (unit no.) referred to: \_\_\_\_\_

Main activities in ventilated rooms (design basis): \_\_\_\_\_

Estimated energy consumption: Electricity: \_\_\_\_\_ MWh Heating: \_\_\_\_\_ MWh Cooling: \_\_\_\_\_ MWh

### Key metrics measured:

SFP for complete system: \_\_\_\_\_ kW/(m<sup>3</sup>/sec.)

Efficiency rating of all fans: Supply: \_\_\_\_\_ % Supply: \_\_\_\_\_ % Output: \_\_\_\_\_ % Output: \_\_\_\_\_ %

Pressure increase across fans: Supply: \_\_\_\_\_ Pa Supply: \_\_\_\_\_ Pa Output: \_\_\_\_\_ Pa Output: \_\_\_\_\_ Pa

Efficiency of heat recovery: \_\_\_\_\_ %

The ventilation system is linked to other energy services that also need to work optimally. See Checklist for heating and cooling systems.

### Expected operational hours under different operating conditions:

Description (e.g. night operation)	Hours per year	Air volume, temperature and humidity requirements

Carried out by Company/Name: \_\_\_\_\_

Appendix enclosed. Attach the appendix separately if there is insufficient space on this page.