

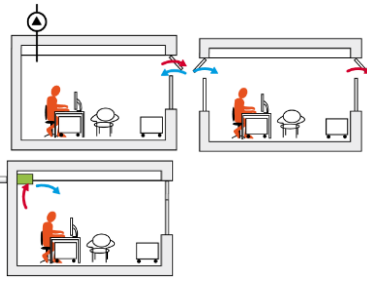


DK_Ballerup_Ballerup Kommune	
<p>Image 01: External solar shading on south wall ©Window Master</p>	<p>Image 02: Top view ©Window Master</p>
	
<p>Image 02: Ventilation strategies ©Window Master</p>	
	
Building Specifications	
Address	Parkvej 6-10, 2750 Ballerup, Denmark
Building Category	Office
Year of Construction	1957 (renovated in 2010)
Special Qualities	n/a
Location	58° northern latitude, 13° eastern longitude, located in flat land. Located in urban area in a small town 20 km northwest from Copenhagen. There is a park and recreational area located north from the building. One to two storey public and residential buildings surrounds the building in other directions
Climate	Cfb (warm temperate climate, moist with adequate precipitation in all months and no dry season, warm summer with the warmest month below 22°C)
Vent. Cooling Site Design Elements (Solar Site Design and Wind Exposure Design, Evaporative Effects from Plants or Water)	
The building is surrounded by leaf trees on the northern façade.	
Vent. Cooling Architectural Design Elements (Form, Morphology, Envelope, Construction & Material)	
<p>Form: U-shaped four-storey building with hipped roof, forming an inner courtyard</p> <p>Morphology: Cellular office building with long corridors connecting different rooms</p> <p>Envelope: Sash windows with fixed external shading along the durn</p> <p>Construction: Heavy mass brick building.</p>	
Vent. Cooling Technical Components (Airflow Guiding Components, Airflow Enhancing Components, Passive Cooling Components)	
<p>Airflow Guiding Components: Night ventilation is performed by automated upper window openings (cross ventilation principle). Automatically controlled upper window sashes are used as openings for natural ventilation system. Single sided ventilation is coupled with decentralized mechanical ventilation forming a hybrid ventilation system in 29 rooms. Mechanical ventilation is activated when natural ventilation cannot fulfil indoor air quality requirements (room temperature or CO2 concentration setpoint) and during the cold season. Some offices and sports hall are ventilated exclusively by natural ventilation using cross ventilation. In order to avoid the external noise pollution, 12 rooms facing the road are ventilated only by decentralized mechanical ventilation. Fixed external solar shading elements are mounted above the south sided windows.</p>	

IEA EBC Annex 62 Ventilative Cooling

Actuators, Sensors and Control Strategies
Chain actuators operate the openings Besides the automatic control of the windows, manual control is possible. However, after 30 minutes the windows will be switched to automatic control again Room temperature and CO2 sensors for each zone Weather station measuring wind speed/direction, rain, temperature and humidity was set on the rooftop The building is using NV Advance™ control system, to control the hybrid ventilation and heating radiators
Building Energy Systems (Heating, Ventilation, Cooling, Electricity)
Hybrid ventilation and decentralized mechanical ventilation with heat recovery The building is connected to district heating and heated up by radiators Information about electricity is not available
Building Ownership and Building Facility Management Structures
Ballerup municipality is the owner and user of the building.
Aknowledgements
n/a
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