

# COOLSHAFT

*Colt CoolShaft is a combined smoke and day-to-day shaft ventilation system which uses evaporative cooling technology to provide active pre-cooling of the incoming air.*

*This is achieved without compromising the ability of the shaft system to ventilate the common areas in a fire – and with exceptionally low energy consumption.*

*Its features and benefits are described overleaf.*



**FEATURES AND BENEFITS**

It doesn't need to cost the earth to cool a building; using the cooling power of water, it's possible to achieve low energy cooling.

**Cooling of corridors.** Whereas basic day-to-day ventilation systems for common corridors and lobbies use outside air to ventilate the space, the CoolShaft provides active cooling of incoming air, providing highly desirable conditions for the residents. If the ambient air is 30°C or above, the supply air can be cooled down adiabatically by at least 10°C. In general, the hotter the weather, the more efficient the cooling is.

**Economical.** CoolShaft systems offer cooling that is up to 7 times more economical than conventional air conditioning systems, with lower initial costs. CoolShaft runs much of the year in free cooling mode, with evaporative cooling brought on-line when temperatures rise. CoolShaft units consume only around 1 kW and 50 litres of water per 10,000 m<sup>3</sup>/h of supplied air, equivalent to more than 30 kW cooling power, depending on the configuration chosen.

**Low energy use.** Evaporative cooling is up to 90% efficient. CoolShaft only needs a small quantity of electricity for the fan that circulates the air and for the water pump. As standard CoolShaft is available with a 400 V highly energy-efficient EC motor.

**High cooling capacity.** One CoolShaft unit can cool multiple floors, and often the complete building, owing to its inherent high cooling capacity.

**No refrigerants.** CoolShaft is free from refrigerants, thus there are no F-gas compliance issues, and there is no need for refrigerant / water pipework in the building.

**Hygiene certificate.** CoolShaft has an integrated water quality system using simple and robust technology. It provides safe circulation with temperature control and regular renewal of water to avoid the growth of bacteria and scale. It has been extensively tested and certified hygienically in compliance with VDI 6022 ("Hygienic Requirements for Ventilation Systems and Units for Internal Spaces"). This is a rigorous standard for air conditioning systems and confirms the high quality of supply air.

**A space saver.** CoolShaft has a smaller rooftop footprint and saving on rooftop ductwork compared to conventional air conditioning systems, thereby freeing up space.

**Lightweight.** CoolShaft is more lightweight than conventional air conditioning systems.

**Using the equipment specified for smoke control for day-to-day ventilation**

It is possible to provide a simple and effective cross flow ventilation system to extract warm, stale air from common areas and their ceiling voids in residential buildings by using the equipment specified to provide smoke control.

**CoolShaft enhances dual purpose shaft systems by providing active cooling**

While a ventilation system supplying untreated outside air is able to achieve temperatures in the corridor at typically 3-5°C above the outside ambient, a CoolShaft system is able to reduce temperatures to below the outside ambient by providing active cooling in the corridors.

Since CoolShaft is a combined smoke and day-to-day shaft system, our design ensures that if there is a fire there is no compromise in its ability to ventilate the common area and allow smoke to escape.

**Sizing and selection of components**

Each Coolshaft system is designed for the client's individual application and is sized to suit that building's heat load.

We offer G4 filters for improved air quality, as well as a wide variety of noise attenuators to meet any requirements to limit noise either within the building or externally.

**Controls**

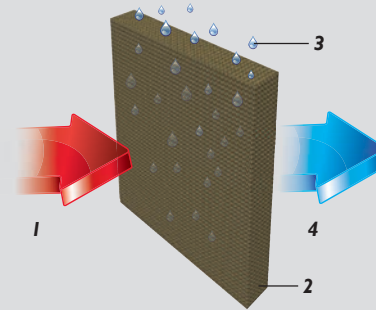
We offer a fully integrated control system with temperature sensors on each floor.



**How it works**

Evaporative cooling is an efficient and effective alternative to conventional air conditioning. Evaporative cooling systems are up to 7 times more economical than comparable AC systems, and the initial costs are lower.

Warm outside air [1] flows through the desorption medium [2] that is kept moist [3]. The water evaporates and removes energy from the air, which results in a significant reduction in air temperature [4].

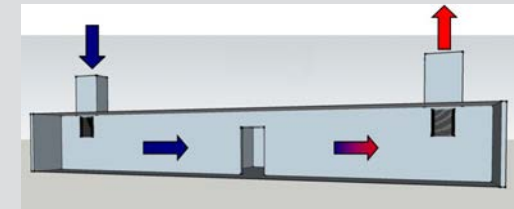


Evaporative cooling involves supplying 100% fresh air and thereby maintains air quality. The shaft system can be used for day to day ventilation when temperatures rise and the cooling function is only operated when conditions dictate. Heat is normally removed at each level via the shaft system, providing a pleasant temperature in the corridors.

**Performance**

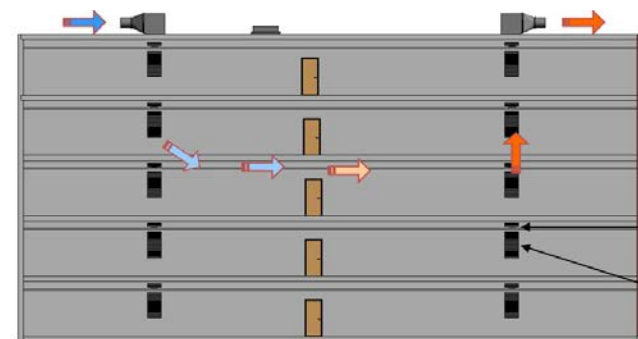
The weather data from CISBE Guide C is used to determine the likely performance of the system. Usually the system is designed using the 99th percentile weather data and would achieve results as shown in the diagram here.

Whilst an average of 24°C in the corridor is the normal design upper limit, even under excessive external temperatures reasonable internal conditions can be achieved hence keeping the building under the CIBSE limit of "28°C for 99% of the year" under most conditions. In fact the hotter it is, potentially the better the system works, and the limiting factor is the air humidity. So, if the external air is above 90% RH, then the system cannot actively cool the air, but this is an unusual condition in the UK unless the temperature is low, in which case active cooling is not required.



With CoolShaft, the incoming air is pre-cooled adiabatically when temperatures reach a set point

**The principle of day to day conditioning using CoolShaft systems**



CoolShaft provides low-energy evaporative cooling. At 30°C and higher, the incoming air can be cooled by 10°C or more.

Dual shafts in day to day ventilation mode