

COOLSHAFT

Colt CoolShaft is an enhanced day-to-day ventilation system, integrated into the Colt smoke shaft ventilation system, to provide active pre-cooling of the incoming air using evaporative cooling technology.

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. 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.

Economical. CoolShaft systems offer cooling that is up to 7 times more economical than conventional air conditioning systems, with lower capital, installation and running costs. CoolShaft runs much of the year in free cooling mode, with evaporative cooling brought on-line only when temperatures rise. Typical EER values of 29 can be achieved.

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.

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, simplifying maintenance and reducing cost.

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, freeing up space.

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

Future-proof. Evaporative cooling is different to typical cooling units as the hotter and drier the outside air, the faster the water evaporates. The faster the water evaporates, the more heat energy is extracted from the air through evaporative cooling. The cooling capacity of the system, therefore, naturally increases, so that it is available exactly when you need the most cooling. Essentially, the hotter the day, the greater the cooling capacity. This means evaporative coolers are fundamentally prepared for warmer summers as predicted by many organisations and establishments.

The problem

The quest for building energy efficiency has led to very good air tightness, high levels of insulation in residential buildings and an increase in district heating schemes. This has unintended consequences for stair lobbies, corridors and entrance halls, which tend to overheat, resulting in unpleasant conditions for residents and possible issues maintaining cold water supply temperatures. Luckily Colt has a solution for this.

Integrating the smoke control and day-to-day ventilation

Integrating CoolShaft into the smoke ventilation system ensures that the ability of the shaft system to ventilate the common areas in a fire are not compromised by guaranteeing interlocks between the two parts, but also sharing a controls system, wiring network, and the same specialist contractor delivers commercial savings across the project.

CoolShaft enhances dual purpose shaft systems by providing active cooling

Outside air alone only has limited cooling capacity, especially during the warmer summer months, and often the quantity of outside air needed to help mitigate the heat gains is significant, and therefore difficult to accommodate. Hence the provision of active-cooling of the supply air to lower corridor temperatures in order to achieve the temperature criteria.

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 engineered to the client's individual application, taking into account the building's heat load, location and the particular performance criteria it needs to meet.

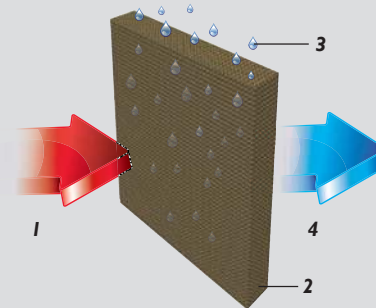
Once the design is agreed, we provide a packaged rooftop air handling solution including cooler, fans, filters, noise attenuators and ductwork components.



How it works

CoolShaft uses a push / pull approach to ventilate the corridors and lobbies. Cool air is supplied to all levels simultaneously via a series of balanced dampers in a common supply shaft. Strategically placed grilles allow cool air to flow to all parts of the corridors ensuring pleasant temperatures throughout. Warm stale air is extracted via the ceiling void and a separate common extract shaft.

The cool air delivered by the CoolShaft rooftop plant which includes a Colt CoolStream Evaporative Cooler. Within the cooler, 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].



Direct evaporative cooling involves supplying 100% fresh air and thereby boosts indoor air quality.

Optional air filters are available in the following filter classes according to ISO 16890:

- ISO Coarse 70%.
- ISO ePM10 75%.
- ISO ePM1 55%.

Performance

CoolShaft is designed to meet and exceed the requirements of CIBSE TM59 (Chartered Institution of Building Services Engineers, 2017. TM59: Design methodology for the assessment of overheating risk in homes) – ensuring average corridor temperatures do not exceed 28°C for more than 3% of the total annual hours.

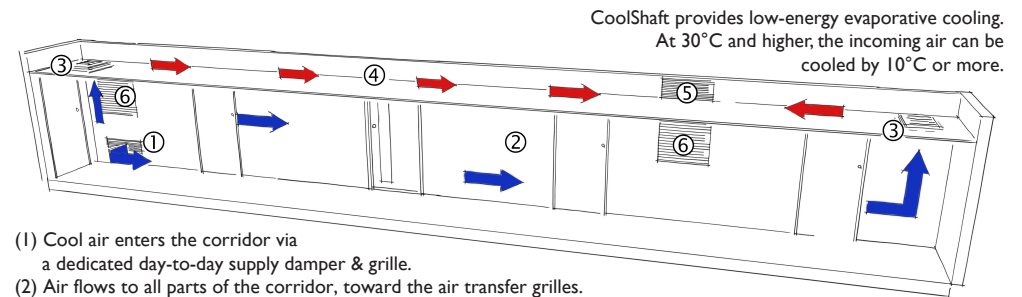
To achieve this, CoolShaft takes an engineered approach. Building heat loads and location are all taken into account to select the size of plant required to meet the performance criteria.

Heat Loads. Heat loads generally consist of losses from LTHW pipework, lighting and occasionally solar gain through glazing.

Location. Weather data most appropriate to the location is used to assess CoolShaft performance. Typically this will be CIBSE design summer year DSY1 for the 2050s, high emission, 50% percentile scenario.

Performance Criteria. Whilst CIBSE TM59 is the typical requirement, CoolShaft can exceed this and provide lower temperatures within the corridors if required.

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.

- (1) Cool air enters the corridor via a dedicated day-to-day supply damper & grille.
- (2) Air flows to all parts of the corridor, toward the air transfer grilles.
- (3) Air transfer grilles.
- (4) Warm air flows through the ceiling void, toward the extract damper.
- (5) Dedicated day-to-day extract damper. (6) Smoke ventilation shaft dampers remain closed.



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