

Bring climate change to your office

DELTA[®]-COOL

PREMIUM QUALITY







Stay cool – even without air conditioning

Heat impairs efficiency and health at work

Heat build-up causes discomfort

A current medical health study finds that 40 % of Germans feel that their health is impaired by air conditioning.

Air conditioning consumes expensive energy

Historical buildings, churches, castles, and similar structures all have an adequate thermal-storage mass for retaining heat

energy, so that interiors remain nice and cool in summer. Modern lightweight constructions lack this thermal-storage capacity, so that room temperatures may quickly rise to a level that is equal to or even higher than the temperature outside.

The conventional way of solving this problem is to install expensive air-conditioning systems – with all their well-known economic, ecological, and medical drawbacks.

■ Change to DELTA®-COOL by Dörken, the innovative, energy-saving solution for landscape offices, lightweight and steel-skeleton structures, and other large buildings.

The easy way to a feelgood atmosphere

Smart temperature management through PCM

DELTA[®]-COOL: PCM for passive climate control

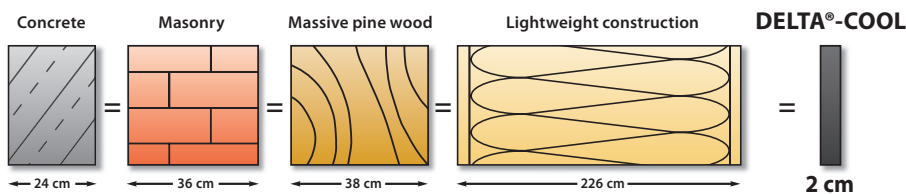
This phase change material (PCM) works like a heat storage unit. It consists of salt hydrates which, unlike paraffins, are not combustible. This makes DELTA[®]-COOL ideal for use even in buildings where fire-prevention requirements are stricter than normal.

Under the influence of heat, DELTA[®]-COOL changes its state of aggregation from solid to liquid as it reaches its melting temperature. The heat thus stored is emitted again as soon as the phase change is reversed. In this way,

temperature fluctuations may be mitigated and temperatures peaks prevented without any need to expend energy on cooling.

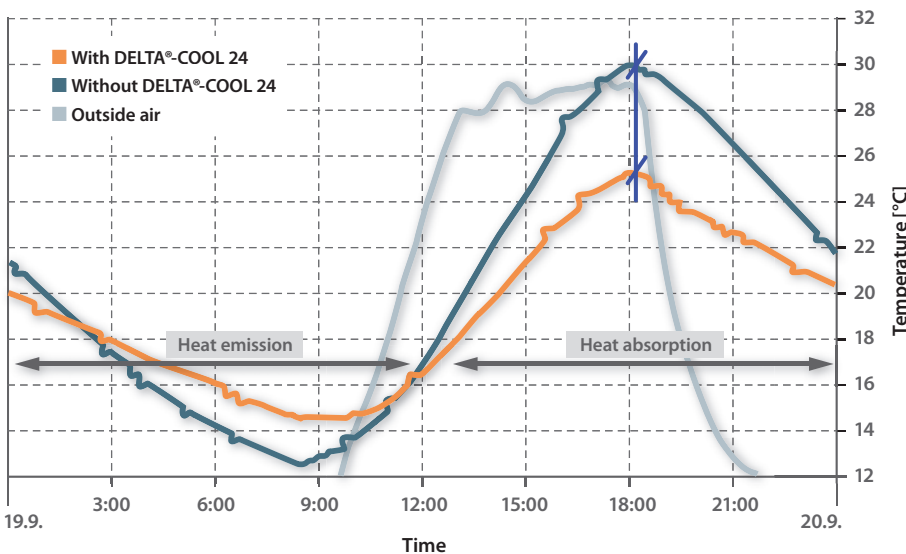
Advantages of the DELTA[®]-COOL System

- Non-combustible, non-toxic, flame-retardant.
- Comfortable interior climate without irritating noise and dangerous draughts.
- Lower perceived temperatures through additional cooling surfaces.
- High energy density at 22 °C to 28 °C; 1 litre of DELTA[®]-COOL will absorb as much energy as 10 litres of water.
- Any additional energy input that may be required can be moved to the cheaper hours of the night.
- Energy stored during the day may be used at night.
- In the event of a removal or room rededication, PCMs can be moved or rearranged.
- Little time and space required for installation.
- Another economic advantage: no servicing and operating expenses.



Various material thicknesses having a heat-storage capacity of 5,700 kJ (10 °C temperature increase)

Typical circadian temperatures in rooms with and without DELTA[®]-COOL



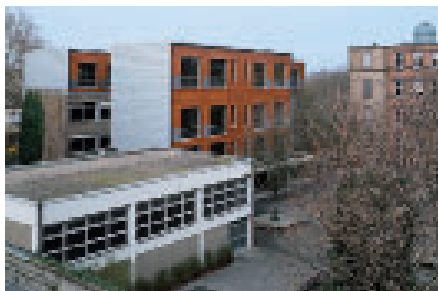
- Small volume, great effect: the cool answer to hot energy prices!



DELTA[®]-COOL: the versatile energy saver

Ideal for landscape offices and other large structures

These references speak for themselves ...



Gästehaus Pollmeier

Pollmeier Massivholz GmbH & Co. KG operates the largest and most advanced hardwood sawmills in Europe. At its headquarters in Kreuzburg, Thuringia, the company has its own guesthouse which was completed in 2006. Its elegant, lightweight design is ideal for using DELTA[®]-COOL to save both space and energy.

Typology	Commercial buildings/hotels and accommodation
Owner	Pollmeier Massivholz GmbH & Co. KG
Design	Cornelsen + Seelinger, architects, Darmstadt, Berlin, Amsterdam, www.cornelsen-seelinger.com
Floorspace	670m ²
Gross volume	4,049m ³
Primary energy consumption	16 % EnEV
Photos	Cornelsen + Seelinger Architekten, www.cornelsen-seelinger.com

Ludwig Erhard School, Karlsruhe

The pavilion on the school premises was enlarged by 12 classrooms by adding an annex and another floor. All new rooms receive light and ventilation from two sides to ensure efficiency and sustainability together with low maintenance costs. The ventilation system features latent-heat storage to optimise energy consumption.

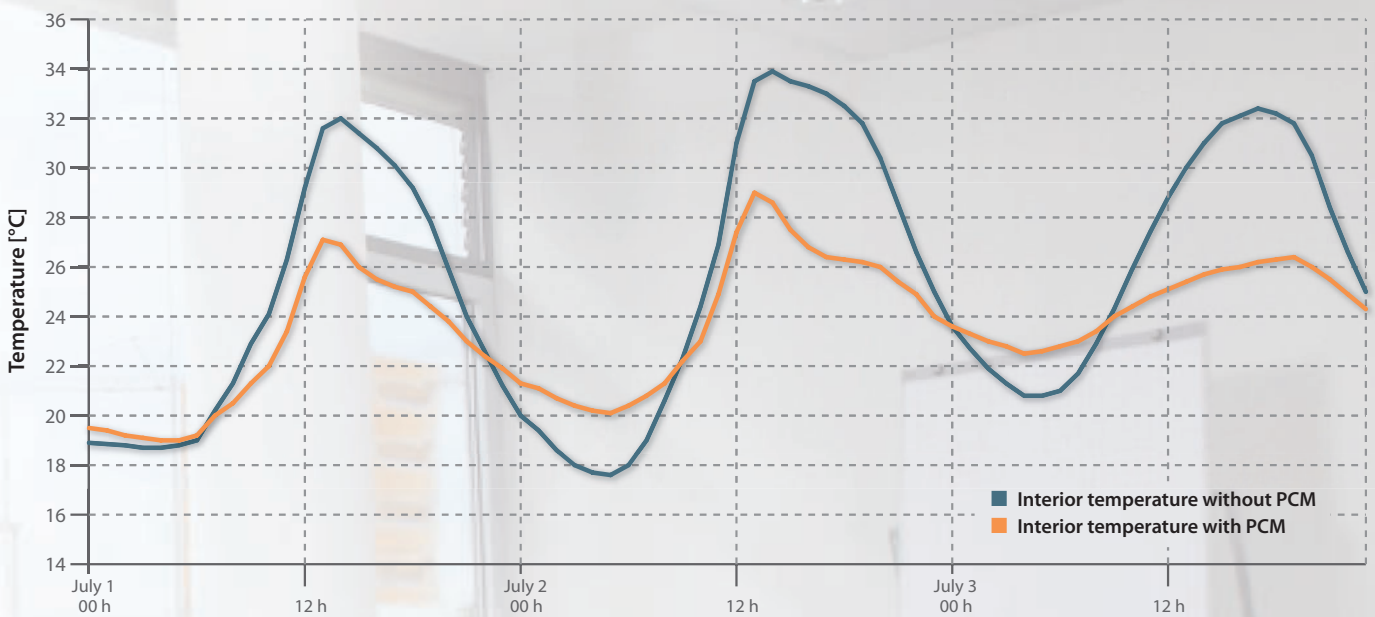
Typology	Public buildings/schools
Owner	City of Karlsruhe (Building Department)
Architects	Assem Architekten, Karlsruhe, www.assemarchitekten.de
Total floorspace	1,575m ² (extension only)
Volume	6,700m ³ (extension only)
Award	Wood construction prize, Baden-Württemberg 2009
Photos	© stephan baumann, karlsruhe, www.bild-raum.com

Rehabilitation and reconfiguration of a reception area at a corporate head office

The owner wished to rehabilitate his head office from the ground up and create office floorspace that is flexible enough to permit readjusting the ground-plan effortlessly for years. The central corridors are multi-functional areas offering space for copiers, cabinets, and a tea point. The offices are remarkable because they are not equipped with conventional air conditioning. Instead, climate control is assured by DELTA[®]-COOL latent-heat storage units installed in the ceiling.

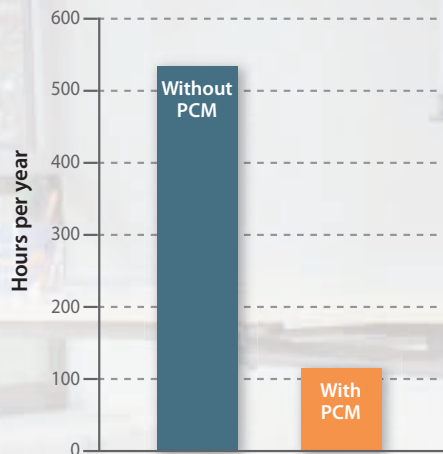
Typology	Commercial buildings/administration buildings
Owner	Dörken Service GmbH
Architects	Frielinghaus Schüren Architekten, Witten, www.frielinghaus-schueren.de
Net floorspace	c. 1,150m ² overall
Volume	c. 10,500m ³
Photos	© Peter Strehl, ps@frielinghaus-schueren.de ; © michael schilderoth, herdecke, www.schilderoth.com

Interior climate improvement with DELTA®-COOL – typical simulation

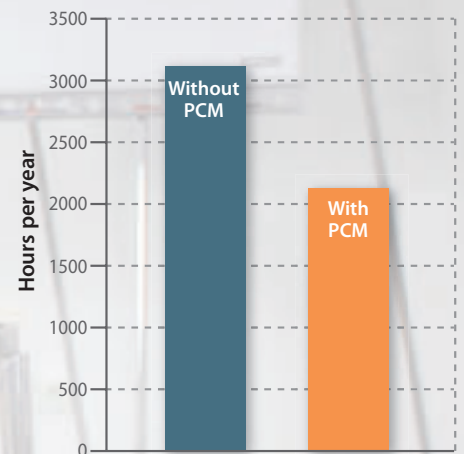


Histogram showing interior temperatures in a rehabilitated lightweight building with and without PCM in midsummer

Dynamic building simulations serve to generate meaningful histograms. This example shows three simulations of a rehabilitated canteen in Aschaffenburg. Room size: 15 x 30 m. Roof sloping from 3 to 4 m. 30 m southern facade with 42 % of externally shaded windows. Standard glazing. Floor and outer wall of reinforced concrete. Interior walls and flat roof of lightweight construction. Max. heat load 55 W/m². No mechanical ventilation. Free exchange of air at a rate of 0.2 l/h. Suspended plasterboard ceiling completely covered with DELTA®-COOL.



Hours of excessive heat with temperatures above 26 °C



Hours of heating with temperatures below 21 °C

The result: the interior climate remains balanced even in midsummer periods of heat, and temperatures peaks are mitigated.

See for yourself! All the data you need for your own thermal simulation programme are obtainable from Dörken.

Passive climate control: innovative and cost-efficient

The DELTA[®]-COOL method

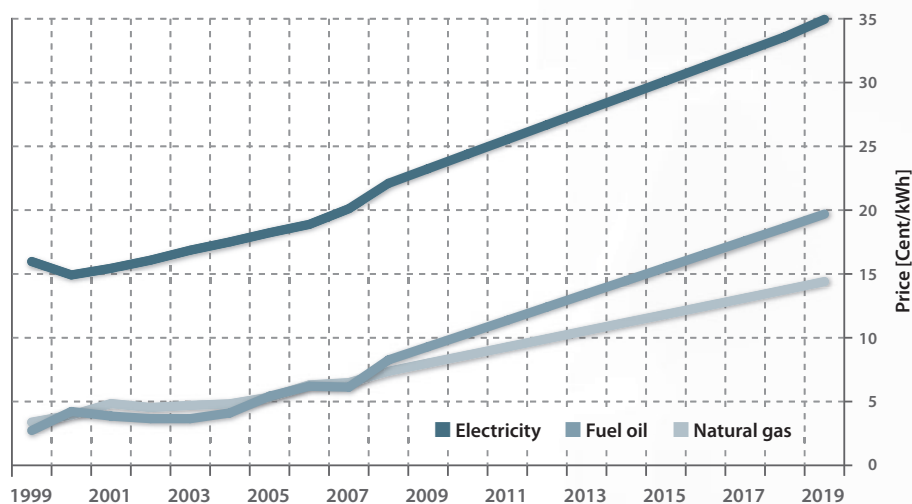
Protects your purse and the environment

The DELTA[®]-COOL System solution can be installed quickly and lasts extremely long. Tests demonstrate the capability of the material to continue functioning safely for 25 years without maintenance or loss of performance. Its life is markedly longer than that of a conventional air conditioner.

Structural prerequisites for the DELTA[®]-COOL System

- Ceiling panels should have good heat conductivity; metal panels are ideal.
- Whenever insulating materials such as mineral fibres or plasterboard are used, make sure that air from the room can flow around DELTA[®]-COOL in the ceiling cavity.
- There should be natural or mechanical ventilation to ensure that charged PCMs can release their heat at night.
- Like any other natural cooling system, PCMs should not be exposed to extreme heat, such as direct insolation.

Histogram showing the prices of electricity, fuel oil and natural gas







The economical solution

DELTA®-COOL: this cooling system soon breaks even

Sample calculation

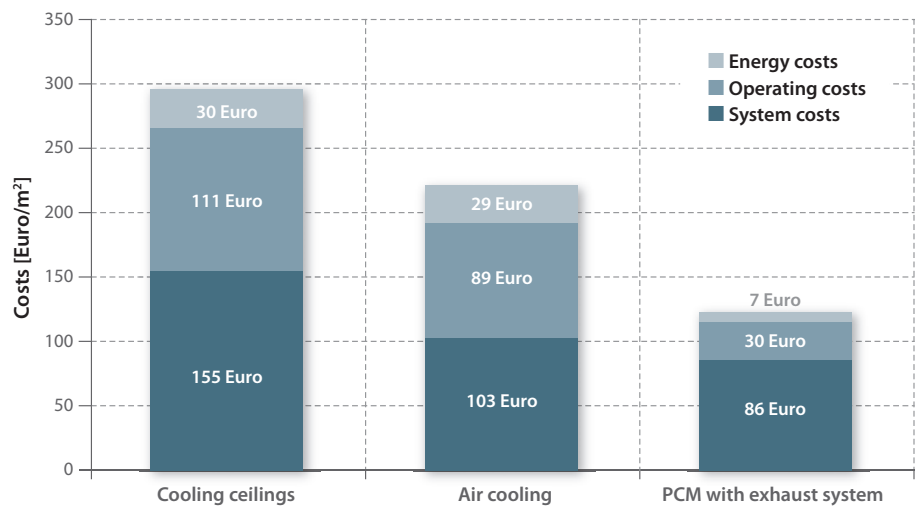
In this example, the efficiency of a new office building was calculated in conformance with the annuity method as laid down in VDI 2067. The following constraints apply:

- Night-time cooling through electronically controlled ventilation flaps
- Functioning interior cross-ventilation
- Period under consideration: 25 years
- Interest factor: 6 %;
price increase rate: 3 % p.a.

The result:

Savings on maintenance and operating costs quickly surmount the somewhat higher cost of investment. All in all, there will be annual savings compared to other cooling systems.

Specific costs over 20 years



Electricity consumption

