SPC

www.spcoils.co.uk

HEAT PIPES

DEHUMIDIFICATION & HEAT RECOVERY

ENERGY EFFICIENT SOLUTIONS

INNOVATION WITH STYLE

About SPC

The Company

SPC is a specialist manufacturer and supplier of heat pipes, radiant panels, trench heaters, air curtains, fan convectors coil heat exchangers and HVAC equipment to the public and private sector.

SPC leads the way in HVAC technology and in responsiveness to customer needs. We thrive on innovation, on new technologies and new challenges. We stand for irresistible quality, exceptional customer care, and whole-life value for money.

For more than 25 years, we've applied our ingenuity to the heating, cooling, and dehumidifying of indoor environments - and to the delivery of HVAC equipment that withstands the grind of daily use. The result is a range of products that are aesthetic, robust, and economical to run.

But new ideas are never developed in isolation. They come from a service culture that takes pride in putting customers first. We listen and, if asked, we advise; we offer free site surveys - and we always return your calls.

Our mission is simple - to become your first-choice heat pipe supplier, and to be the one company that provides a solution that exactly matches your needs.

KEY FACTS ABOUT SPC:

- Our mission is to be your first choice for HVAC equipment
- Major supplier to local government and commercial sectors
- Unrivalled regional sales and technical support team
- Free site check / survey
- ISO 9001 and Investor in People

SPC HEAT PIPES for Dehumidification and Heat Recovery

Introduction

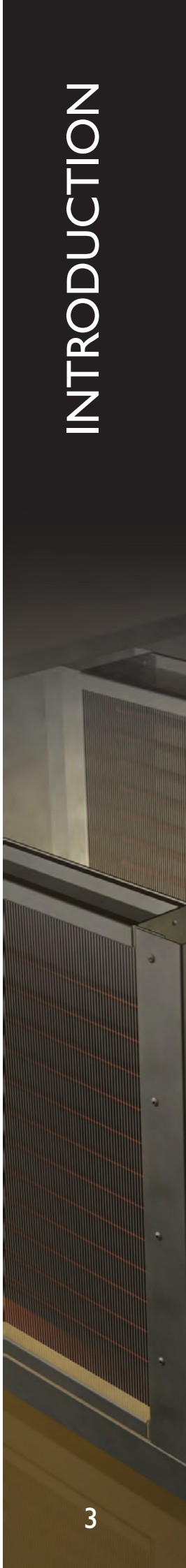
HEAT PIPES are essentially a means of transferring high rates of heat across small temperature gradients, and as such may be considered thermal "super conductors."

The simplest form of heat pipe is a thermosyphon which relies on gravity for it's operation, and is hence uni-directional. This means that heat can only be transferred from the lower to the upper end of the heat pipe and not vice versa. HEAT PIPES have, however, been manufactured which rely on the capillary action of a "wick" to provide bi-directional operation. The simplicity of the gravity return heat pipe makes this the preferred solution for a wide range of heat pipe applications.

The modern day concept of the heat pipe was first proposed in 1942, but was not developed beyond the patent stage until the early 1960's. Early applications in both the United States and United Kingdom were concerned with high temperature HEAT PIPES for the atomic energy programme. The NASA space programme in the 1960's promoted further activity and since then there has been a dramatic increase in the number and variety of applications of HEAT PIPES, which are now common place within the aerospace, electronics and air conditioning industries.

SPC have been supplying heat pipe based heat recovery systems to the HVAC industry for the last 25 years. As major manufacturers of coil heat exchangers and associated equipment, SPC have extensive knowledge and experience of HVAC heat transfer applications.

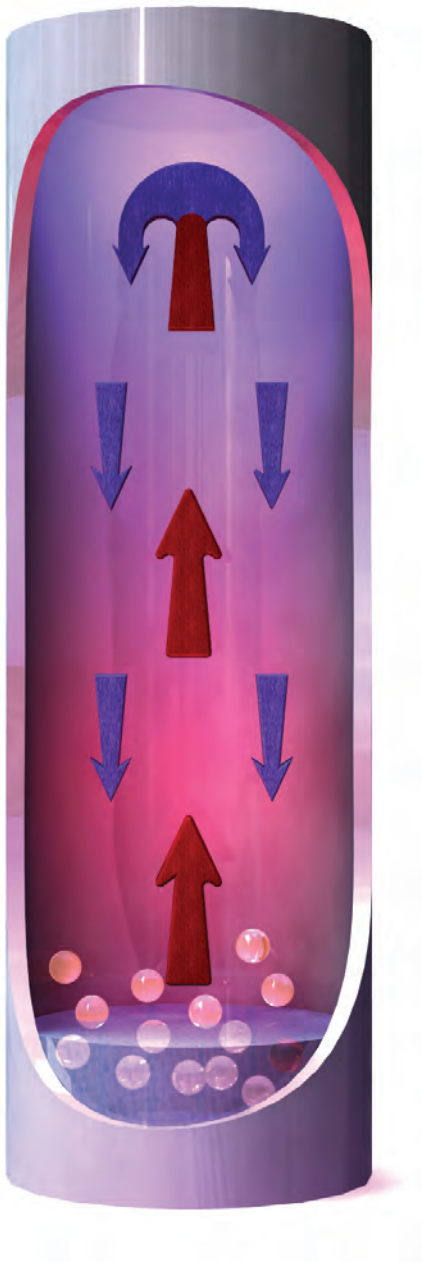
Our broad based knowledge of the HVAC industry allows us to offer the unique benefits of this patented heat pipe system, providing dramatic savings in energy costs, together with significant improvements in operational effectiveness.



SPC HEAT PIPES for Dehumidification and Heat Recovery

Technology

HEAT PIPES are the most effective passive method of transferring heat available today. In their simplest form, a sealed tube (usually copper) is evacuated and charged with a working fluid. In the case of HEAT PIPES for HVAC purposes, refrigerants such as R134A are currently used. Heat transfer occurs without the need for energy input.



BASIC OPERATION

This diagram shows the basic structure of a heat pipe and identifies the major steps in the heat pipe process. Heat is absorbed from the incoming warm air stream in the evaporator section, boiling the refrigerant. Due to it's elevated vapour pressure, the vapour moves rapidly to the cooler condenser section of the heat pipe, carrying with it the absorbed heat.

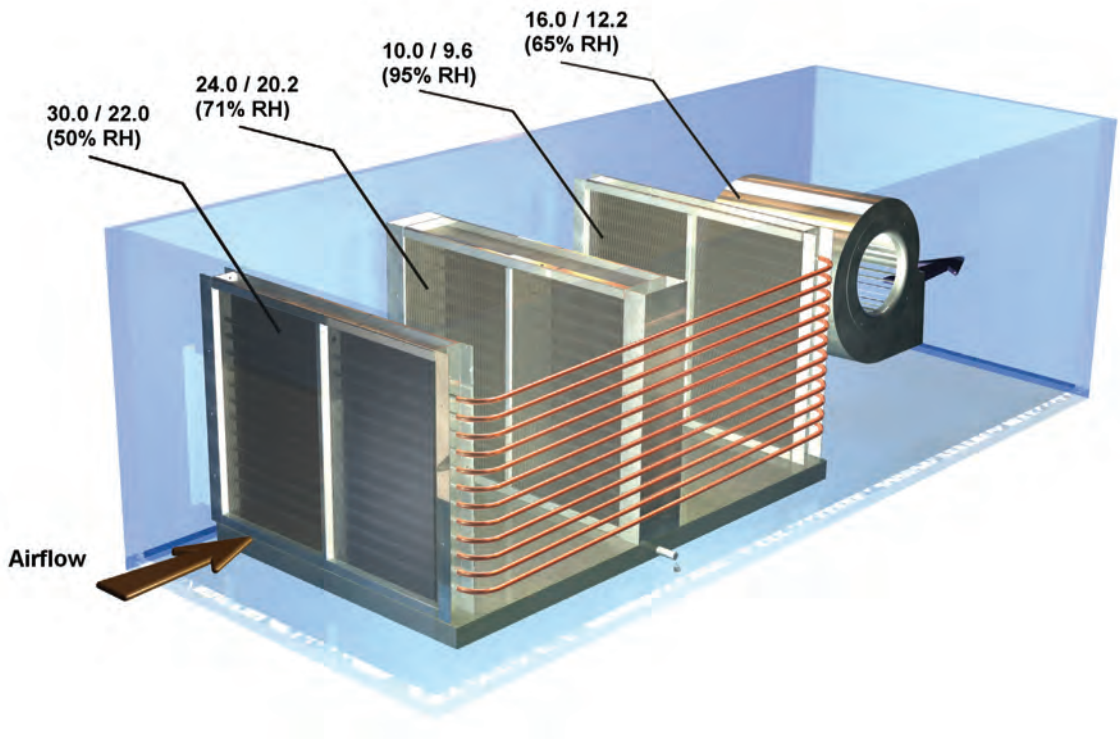
As the vapour reaches the condensing area of the heat pipe, heat is released to the cooler air and the vapour condenses. The liquid returns by gravity to complete the cycle. The entire heat transfer process occurs with a very small temperature difference along the pipe.

Apart from air conditioners, HEAT PIPES have been used in many applications, including the cooling of casting dies, electronic circuitry, nuclear powered generators, energy conservation, defrosting applications and in the food industry.

SPC HEAT PIPES for Dehumidification and Heat Recovery

Dehumidification

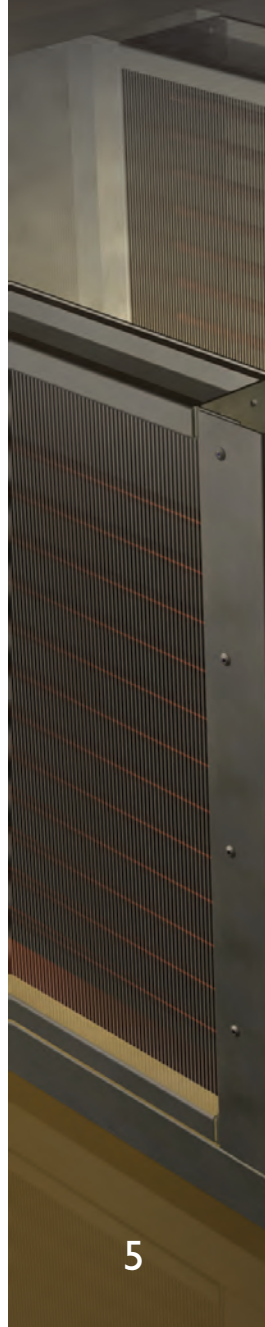
When applied to HVAC, HEAT PIPES provide significant dehumidification enhancement and improved indoor air quality. The additional benefit of energy saving occurs in many situations, especially where reheat is required. Depending on conditions, HEAT PIPES can double the amount of moisture removed by an air conditioner's cooling coil.



By circuiting HEAT PIPES in sections before and after the cooling coil (as above diagram) heat is removed from the air stream before it encounters the cooling coil. This passively pre-cooled air means less sensible cooling is required by the coil, providing more latent capacity, and superior dehumidification ability. The now "over-cooled" air passes across the re-heat section of the heat pipe, bringing the air temperature to a comfortable supply condition.

This free reheat is provided by the same heat energy which was absorbed from the incoming air stream. In the case of fresh air treatment, HEAT PIPES can be used to pre-cool the incoming outside air before it is cooled and dehumidification by the cooling coil. The heat pipes then reheat the air to the "neutral" supply temperature.

HEAT PIPES are particularly useful in displacement ventilation systems where air is supplied directly into the occupied space at low level. When combined with ceiling cooling systems the primary air must be dehumidified to prevent sweating of the ceiling as well as reheated to a few degrees below the space temperature. Incorporation of heat pipes allows substantial energy saving to be realised.



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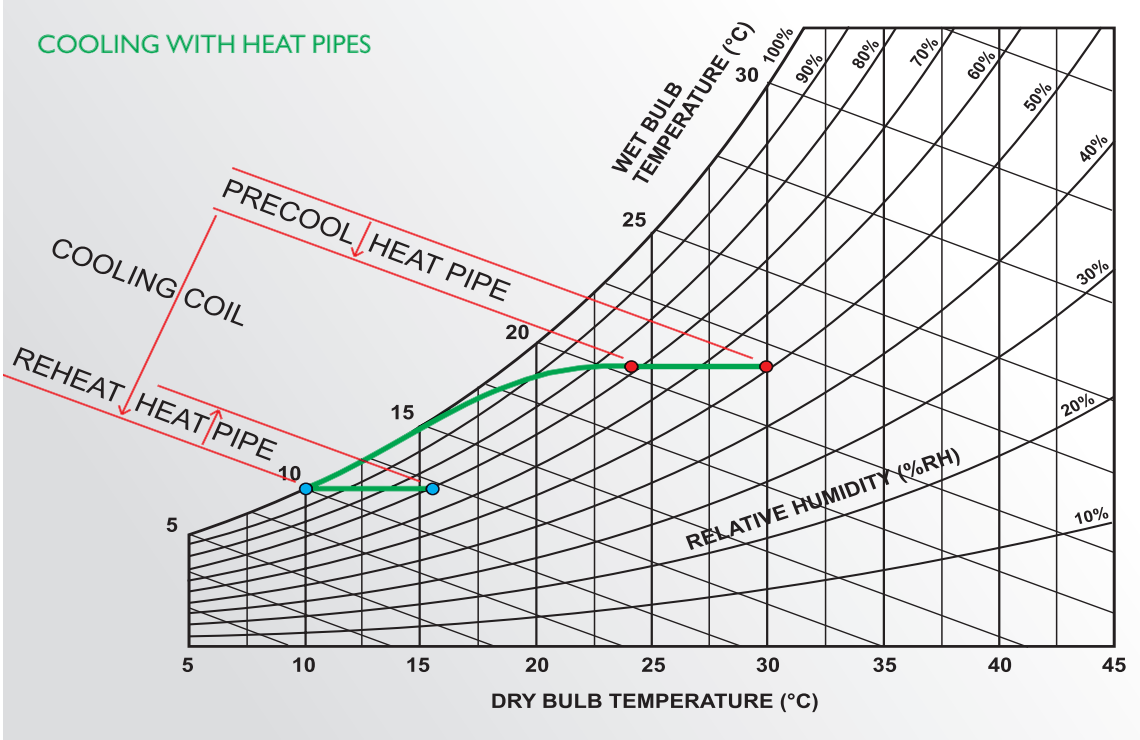
Dehumidification

HEAT PIPES AS APPLIED TO AIR CONDITIONING

The cooling coil in the standard air conditioner provides both sensible and latent cooling. The following chart shows how the heat pipe provides pre-cooling before the cooling coil. This then increases the latent cooling ability of the coil before the heat pipe re-heats the air back up to a comfortable condition.

Using HEAT PIPES will increase the latent cooling capacity at reduced cost.



BENEFITS AND COST ADVANTAGES

Apart from the above indirect cost savings, HEAT PIPES have no moving parts to break or wear out and are virtually maintenance free. Because of simplicity in design, HEAT PIPES will most likely outlast the air conditioning equipment itself.

Because the cooling coil has less work to do, a reduction in size of coil may be achievable. Also the heat pipe is not using any external energy, so is effectively free to operate. As a result very short pay-backs can be achieved.

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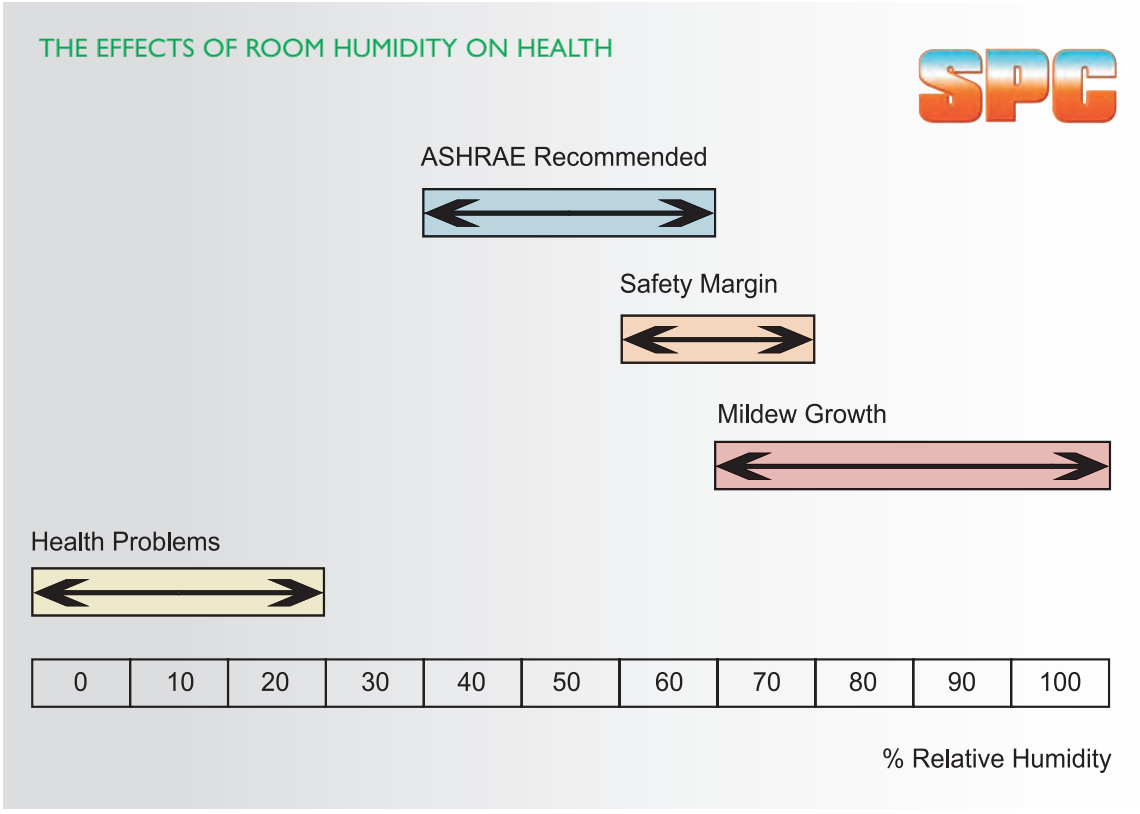
Indoor Air Quality

HEALTH BENEFITS

Depending upon environment, HEAT PIPES can increase an air conditioner's moisture removal capability by 50 to 100%. Because many of today's primary indoor air quality concerns are humidity related, the health benefits of HEAT PIPES are paramount. The unique ability of the HEAT PIPES to perform effective dehumidification whilst saving energy is a substantial "bottom line" bonus.

Along with the heat pipes ability to remove excess moisture and hence control the humidity level within the space, the reheat that they generate helps to prevent health problems.

A conventional system cools and dehumidifies air with the resultant air being fed to the ductwork in a saturated state. As the heat pipe reheats the air its relative humidity is reduced below the level at which mould, mildew and fungus are encouraged to grow. This ensures that the inside surfaces of the ducting do not become sources of contamination to the spaces that they serve.



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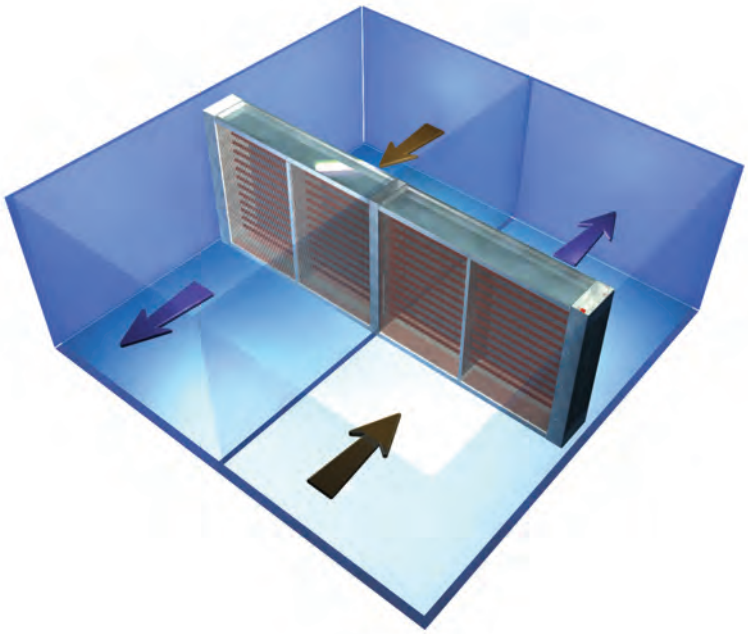
Heat Recovery

HEAT PIPES FOR HEAT RECOVERY

With increasing demands for energy efficient buildings, it is essential that energy is not wasted. Utilising a heat pipe, thermal energy can be recovered from warmer air and added to cooler air. In temperate climates this permits energy saving to be realised through preheating of the outside air. Conversely, in hot climates the savings are associated with pre-cooling of the outside air.



HEAT PIPES can be arranged with airstreams side by side using tubes sloping down to the warmer air. Alternatively the air streams can be stacked with the warmer airstream at the bottom. This coupled with flexibility of sizing to suit the ductwork or air handling unit makes HEAT PIPES the ideal heat recovery solution.

BASIC COMPARISON INFORMATION

Many types of heat exchangers are available for heat recovery applications. However each type of heat exchanger has certain advantages and drawbacks:

RUN-AROUND COILS are relatively inexpensive, but require a pump pack and expansion tank to operate. Run-around loops used in cold climates must be charged with anti-freeze to prevent frost damage. They are however the best solution for 'separate' air streams.

PLATE TO PLATE heat exchangers are quite effective, but are bulky, expensive and very difficult to clean. They can trap condensate resulting in the growth of moulds.

HEAT RECOVERY WHEELS are maintenance intensive and prone to cross contamination and do not effectively drain condensation.

Only HEAT PIPES offer all the benefits combined: no moving parts, high effectiveness, low air-pressure drop, easy drainage of condensation, no direct energy requirement and zero cross-contamination. They are also proven to be long lasting and virtually maintenance-free.

Additionally, HEAT PIPES can be treated to withstand corrosive environments such as swimming pools and some process applications.

SPC HEAT PIPES for Dehumidification and Heat Recovery

Controllable Heat Pipes

Whenever HEAT PIPES are used in the treatment of outside air they should be utilised to their full potential in order to maximise the energy savings that they provide. This is achieved by the use of standard uncontrolled HEAT PIPES.

In certain specialised applications, however, it may be beneficial to take advantage of the options for additional control that can be offered. For example, should the SHR of the load that is being treated vary markedly then the heat pipe performance can be controlled to match the process load to the system load. The best means of achieving this is via the use of a secondary cooling coil which can be supplied integral to the heat pipe and acts to offset the reheat.

It should be borne in mind that the additional costs and complexity associated with controllable HEAT PIPES cannot normally be justified for use with 100% outside air units. In the vast majority of such cases the heat pipe should be allowed to run wild in order to maximise the moisture removal capacity of the system with the only control being over the cooling coil.

Please contact SPC for assistance with your enquiries; advice will be given regarding the most suitable system for your application.

SOFTWARE

A range of self selection software is available free of charge from SPC. These are freely downloadable from our website www.spcoils.co.uk or on CD-Rom. These include calculations of pay back periods in addition to unit selection.

APPLICATION NOTES

The use of HEAT PIPES for enhanced dehumidification, heat recovery and displacement ventilation systems is discussed in detail in SPC's range of Application Notes. Please contact our Technical Sales Team for your copy, or alternatively download them freely from our website.

CPD PRESENTATION

SPC are able to offer a presentation on HEAT PIPES and their application in the HVAC industry. Please contact our office for further details.

SPC HEAT PIPES for Dehumidification and Heat Recovery

Examples

ROYAL MIRAGE, DUBAI

CONVENTION CENTRE, DUBAI

DHOW PALACE, DUBAI

DUBAI BANK

EXHIBITION HALLS, DUBAI

EMMAR HQ, DUBAI

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Examples

GOLF TOWERS, DUBAI

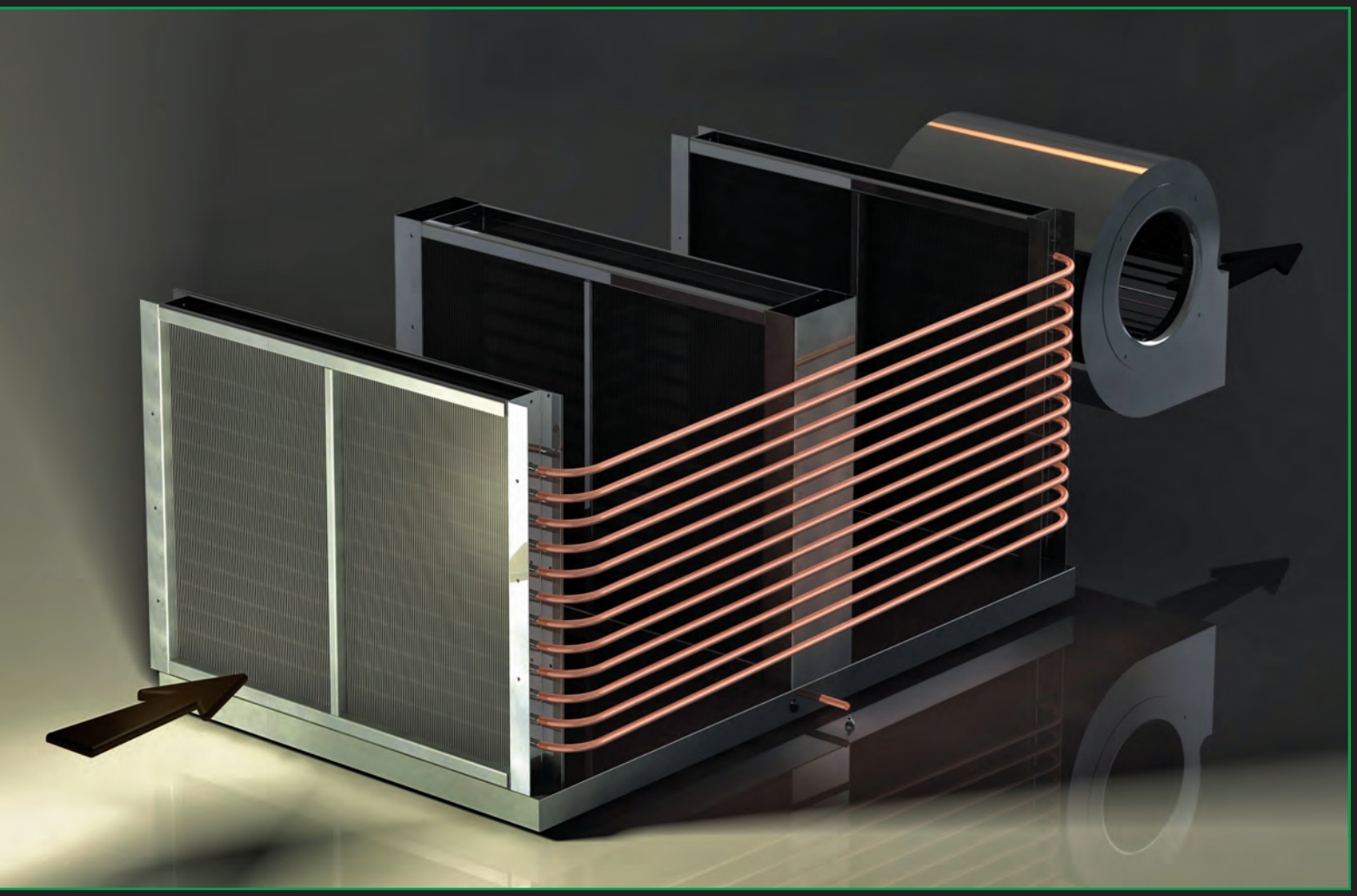
EXPRESS BY HOLIDAY INN, DUBAI

KNOWLEDGE VILLAGE, DUBAI

LOB BUILDINGS, DUBAI

MADINAT JUMEIRAH, DUBAI

MANKHOOL TOWER, DUBAI



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