How to implement de-stratification fans

Introduction

In high-ceilinged, heated buildings, warm air naturally rises and becomes trapped under the ceiling leading to excessive heat loss through the roof. De-stratification fans blow this warm air back to ground level where it is required.

In appropriate applications, the use of de-stratification fans can reduce heating energy use by up to 20%, commonly achieving payback periods of less than 4 years.

The technology

Two principal types of de-stratification fans are available:

Typical low velocity 'punka' fan

Typical high velocity axial fan

Both types can be thermostatically controlled such that the fans switch on when the temperature in the roof reaches the temperature required at floor level. In addition, speed control can be added to vary the air velocity.

Application

De-stratification fans can be successfully applied to most heated spaces with a ceiling height greater than 5m.

The following table summarises how alternative types can be used. It should be noted that areas heated using radiant systems are rarely suitable for de-stratification fans as the temperature build up in the roof is much lower with this form of heating (leading to extended payback periods).

Heating Type	Building Height (m)	De-stratification fan type
Warm air	5-10	Low velocity 'punka' fan
Warm air	10-20	High velocity axial fan in a box
Radiant	Any	Not generally applicable

Warehouses, large retail stores and high bay manufacturing units typically benefit. In most cases the additional fan noise from low velocity fans is readily acceptable, whilst high velocity fans need careful consideration if operating in quiet environments such as churches or music/drama halls.

Specification checklist

The following table lists the key parameters that you should define through discussion with your supplier when carrying out a project to help specify the system:

Item No	Parameter	Comments
1	Type of heating	Warm air heating systems are applicable.
2	Ceiling height	Maximum distance above floor level i.e. apex of roof.
3	Building dimensions and volume	Calculated volume of building m^3.
4	Type of task at floor level relevant to noise level	How noisy is the fan to the people in the room?
5	Potential access to fan positions in the roof	As dictated by the building design apex of building, proximity to obstructions i.e. lights, columns and walls.
6	Heating controls	Switch on with heating only, control of fan dependent on ceiling temperature. Position the control adjustment at floor level. Add speed control to trim local velocity and summer override for cooling effect.

Commissioning procedures

It is important to insist on final commissioning of the de-stratification system **during the heating season** to ensure:

- fan thermostat control reduces ceiling temperature to that at floor level throughout the heated area
- air velocity is acceptable at floor level
- noise level at floor level is acceptable

Training in the use of the controls should also be given.

Common problems

De-stratification fans can be widely applied to existing and new warm air heating systems but they do have some particular characteristics which require attention at the specification/installation stage if subsequent problems are to be avoided. These are:

- Air velocity. Positioning fans too low for the application can case nuisance draughts. This can be overcome by fitting variable speed control to the fans.
- Noise. Care must be taken to use the correct type of fan to avoid excessive noise.

Overall, most problems can be avoided if the de-stratification fans are selected, installed and commissioned by an experienced contractor.

Finding a supplier

De-stratification fans should always be specified by a reputable HVAC supplier or contractor.

If you do not already know a suitable contractor try contacting a recognised Trade Association for details of their membership, for example:

- The Heating and Ventilating Contractors Association (HVCA) – telephone number 020 7313 4900 – www.hvca.org.uk

The business case

The following example is based on a 7m tall warehouse (floor area 800m^2) operating in a single shift, 5 days per week.

Annually, a conventional warm air heating system might be expected to consume around 56,000 kWh/year of gas in this application.

The addition of a de-stratification system should save around 20% of this consumption (i.e. 11,200 kWh/year), which at a typical gas price of 2.5 p/kWh would give an annual saving of £280/year.

The additional cost of retrofitting a fan would be around £700 giving a payback of approximately 4.1 years dependent on access for installation.

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