

# Smoke Control in Single Storey Buildings and Warehouses



# Introduction

## Front cover shot

L'Oréal Warehouse, Sherwood Park, Nottingham.  
Pneumatic Seefire ventilators.

## INTRODUCTION

When a fire breaks out, the consequences can be devastating. A smoke control and smoke clearance system can help to reduce damage to buildings and stock.

Occupants are provided with a clear escape path, permitting them to exit the building far more quickly and safely. Where travel distances are to be extended, a smoke control system may be installed as a compensatory measure in order to comply with the Building Regulations (see page 4).

Firefighters can enter the building and tackle the fire at source, saving considerable time and damage.

Cleaning up time can also be significantly reduced, allowing normal activities to resume as soon as possible.

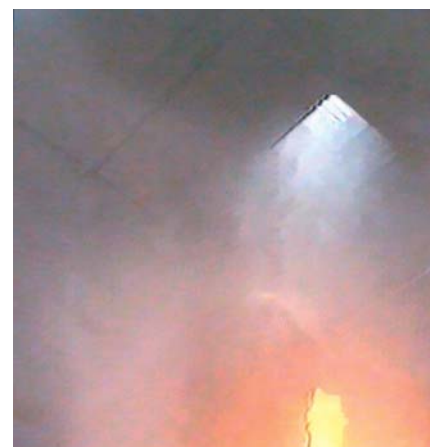
Recent research shows that there are around 4,000 warehouse fires per year and some of these have led to fatalities. From April 2006 to March 2007 in the UK, there were 11 fires in warehouses with losses due to fire and smoke damage greater than £250,000, and these losses amounted to £10,141,000. (Source: Fire Risk Management Journal, March 2008).

Effective smoke control is a long term investment when considering all the possible consequences.

## INSURANCE

Some insurance policies do not cover business interruption or the legal costs related to a fire claim.

In many cases, this is often equal to or more than the original claim itself.



“Smoke logging will seriously delay the time it takes to extinguish a fire”



*These images are taken from live video footage of Colt-researched tests, that show the effects of fire and smoke within large industrial buildings and their interaction with sprinkler systems.*

#### PURPOSES OF SMOKE CONTROL SYSTEMS

In single storey storage and industrial buildings, there are various uses to which smoke control systems can be put in the case of a fire:

- To facilitate escape by providing smoke free escape routes.
- To reduce the likelihood of damage or loss to production or stock.
- To enable the fire-fighters to better see the fire and therefore to extinguish it more speedily and effectively.
- To permit greater travel distances to exits to be designed in, without the need for compartmentation, resulting in a larger building plan.

A well designed smoke control system should be able to maintain adequate smoke free escape conditions at low level to allow the building to be evacuated with minimum risk of smoke inhalation, injury or death.

# Legislation and Standards

“In the 12 months to March 2007, losses from 11 major fires in warehouses amounted to 10.1m”\*

## LEGISLATION AND STANDARDS

The applicable legislation and standards are:

- SVA Guide issue 3
- BS 7346 Parts 4 & 5
- BS EN 12101 Parts 1-10\*\*
- BS 7974
- The Regulatory Reform Order
- Local Acts
- Building Regulations, Approved Document B
- Scottish Building Regulations, Technical Standard D
- The Building Regulations (Northern Ireland) Technical Booklet E Fire Safety
- BS 5588 Parts 1-12
- Technical Guidance Document B (Republic of Ireland)

## APPROVED DOCUMENT B (2006)

ADB gives recommendations on the fire safety requirements for industrial and storage buildings in England and Wales. Where these recommendations cannot be met, then trade-offs are allowed. One key trade-off is in the limitations on travel distances. In such buildings there is a limit of the travel distance of 25m where travel is possible in one direction and of 45m where travel is possible in more than one direction.

Where travel distances are to be extended, a smoke control system designed to BS 7346-4 may be accepted as a compensatory measure as part of an engineered scheme. Building Control will want to approve the design methodology. Colt is able to provide the necessary data and calculations.

ADB also specifies that the maximum floor area of an unsprinklered single storey building which is under 18m high should be no greater than 20,000 m<sup>2</sup>. A smoke control system may be installed as a compensatory measure as part of an engineered scheme to increase the floor area.

Please refer to the equivalent documents for Scotland, Northern Ireland and the Republic of Ireland.

## LOCAL ACTS

Where Local Acts are in force, these require additional fire protection measures to ADB for industrial and storage buildings. Typically, where such buildings exceed 7,000m<sup>2</sup> then either a sprinkler or a smoke control system is required for fire fighting access and where such buildings exceed 14,000m<sup>2</sup> then both a sprinkler and a smoke control system is required. Colt is able to provide the necessary data and calculations and assist in getting the scheme approved by the Authority.

## THE REGULATORY REFORM (FIRE SAFETY) ORDER (RRO)

The RRO makes it obligatory in any workplace that the responsible person maintains a current fire risk assessment and ensures that all relevant fire safety equipment is regularly tested and maintained in effective working order by competent persons.

## DESIGN METHODOLOGY (BS 7346 PARTS 4 & 5)

The design methodology is explained on page 8.

\* Source: *Fire Risk Management Journal*, March 2008

\*\* Some parts are still to be published

# The Benefits of Smoke Control Systems

“If production is halted for even just a few hours, it can cost us millions in lost revenue”

## INDUSTRIAL BUILDINGS

Colt have supplied smoke control systems to many manufacturers throughout the world. The very first UK smoke control scheme was installed by Colt at the Vauxhall Motors plant in Luton in 1956.

The motor industry cannot afford to stop a production line for long, since this can result in millions of lost revenue even after just a few hours. Everything is done to ensure fires can be put out as early as possible with minimal clean up time.

Smoke control is a valued contributor to the overall fire safety system.

## COMMERCIAL AND PUBLIC BUILDINGS

Many large commercial ‘superstores’ are protected by a smoke control system.

It is paramount in buildings that contain a large number of people that they can escape quickly and safely.

Allowance must be made for the elderly, disabled, and families with children.

Natural smoke control systems may also be used to provide natural ventilation to reduce the cooling loads or internal temperatures in hot weather. Natural ventilators may be supplied with transparent or translucent louvres or flaps to provide daylight entry into the building.



Motor Industry



Retail



Manufacturing

# Basic Principles

## 1. EARLY STAGES OF A FIRE

When a fire starts in a large building, for instance a warehouse, it is not like a fire at home.

If a fire started at home all the doors and windows would be closed. Generally this would cause the fire to be suffocated and reduce rapid growth.

In a large industrial building, the amount of oxygen available and the amount of air infiltration will mean that this would not be effective. The fire cannot be sealed off.

In the early stages, smoke from the fire will quickly rise into the roof space.

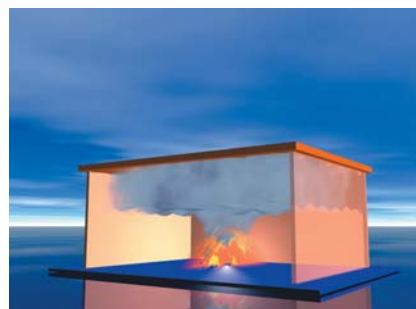


1. In the early stages, smoke from the fire will quickly rise into the roof space.

## 2. SMOKE CHARACTERISTICS

The smoke can spread laterally at a velocity of up to 5m/s. An average person will walk at 1-2m/s and run at 7.5m/s.

Once the building roof space is full, the smoke will start to build down. The rate at which this occurs varies significantly with the nature of the combustibles and building geometry.



2. Smoke travels laterally beneath the roof, remote from the fire source.

## 3. SMOKE LOGGING

In an unventilated situation, a building with a volume of 10,000m<sup>3</sup> can become smoke logged in just a few minutes.

This was proven at the Colt test facility in Ghent (with a volume of 13,000m<sup>3</sup>) where it was shown that the test building became completely smoke logged in under two minutes.

Although the smoke is made up mainly of entrained air, it can contain sufficient toxic substances and asphyxiates to disorientate and disable within seconds and kill within minutes.



3. Even large buildings can become totally smoke logged in minutes.

Snowflakes Factory, Ropley.

A fire involving a store measuring 20m x 40m plus two out-buildings and near-by equipment was destroyed by fire. Approximately 60 firefighters struggled for 2 days to bring the fire under control.



#### BASIC DESIGN PRINCIPLE

The basic principle of smoke control is therefore to limit the spread of smoke through the building and provide a means by which the smoke and heat can be extracted.

To achieve this requires three elements.

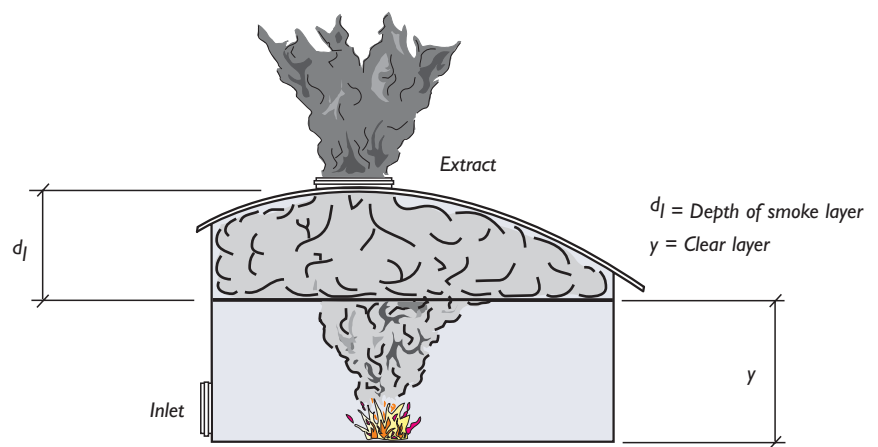
1. Openings or fans at high level to exhaust the smoke from the building.
2. Barriers to restrict the spread of smoke through the building.
3. Inlet ventilators to provide a replacement air supply to balance the smoke being extracted.



*Building with smoke ventilators.*



# Design methodology to BS 7346-4 and BS 7346-5



## DESIGN PARAMETERS

All the factors listed below need to be taken into consideration when designing a smoke control system for single storey buildings.

- Design fire size
- Steady state, or growing fires
- Ceiling jet
- Heat output of fire
- Clear layer required
- Smoke zones
- The effects of sprinklers
- Wind effects
- Air inlets / replacement air
- Depth of smoke layer
- Ambient temperature
- Plugholing

## DESIGN FIRE SIZE

The base dimensions of the largest fire which a smoke ventilation system should be expected to cope with. Calculations are based on either a steady state or a growing fire.

### Steady state fires

The scheme design is based on the anticipated largest fire size within the building, and therefore the smoke control scheme will be capable of accommodating any fire up to that size.

### Growing fires

The scheme design is based on a fire changing size over a period of time depending on the contents of the building.

## CEILING JET

A horizontal flowing of hot gases driven in part by the kinetic energy of the rising fire plume. It typically has a depth of approximately one tenth of the building height.

## HEAT OUTPUT

Total heat generated by the fire source. The convective element of this heat output drives the smoke flow.

## CLEAR LAYER ( $y$ )

The minimum clear layer for industrial buildings should be 3 m.

The clear layer depth is very important as it permits the escape of personnel and the entry of firefighters.

## SMOKE ZONES

Where the building is considered too large it must be divided into separate zones by use of smoke barriers.

Smoke zones should not exceed 2000 m<sup>2</sup> if naturally ventilated and 2600 m<sup>2</sup> if mechanically ventilated in plan area.



Sainsbury's, Chichester.

The fire started within the buffer store and travelled up over the fire-wall into the services section along the ceiling void. It didn't take long to spread across the whole building, making fire fighting from the inside impossible.

A smoke control system is now installed within the buffer stores to release smoke and heat in the event of a fire.



## THE EFFECTS OF SPRINKLERS

Sprinklers control the fire. They stop the fire from growing and spreading to other areas of the building. Colt would always recommend the combined use of sprinklers and smoke ventilators.

## WIND EFFECTS

Colt generally recommend the use of natural ventilators for Smoke Control Systems due to their intrinsically failsafe nature. If taller structures are situated close the position of the ventilators, these can divert the wind airflow and cause positive pressures over extensive areas, thus adversely affecting any natural ventilators in these positions. Instead of extraction from these ventilators they could inlet, and thus cause mixing and deepening of the smoke layer, resulting in smoke logging within the building. Thus wind effects have to be taken into account.

## AIR INLET / REPLACEMENT AIR

Sufficient replacement air is important for the efficient operation of a smoke control system to replace air entrained into the smoke plume.

For a natural smoke ventilation system opening ventilators, either in the walls or in the adjacent non-fire zones in a multi-zone system as illustrated below, can provide the system with the replacement air required. As more inlet air becomes available the extract ventilation becomes more efficient.

Care should be taken to ensure that all inlet air enters the fire zone below the smoke layer to prevent "inlet mixing" and a deepening of the smoke layer.

## DEPTH OF SMOKE LAYER ( $d_1$ )

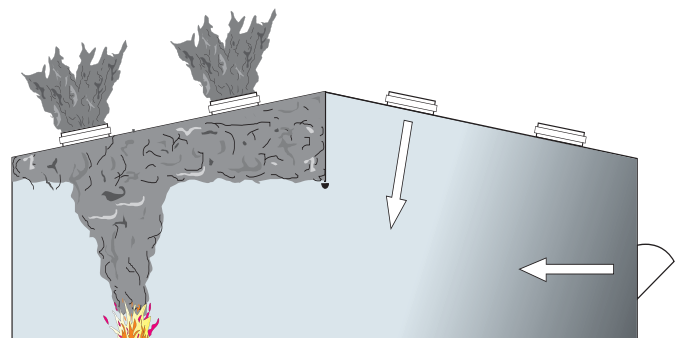
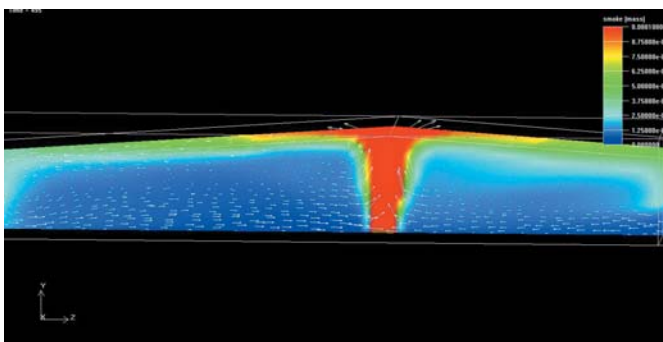
The smoke layer should not be designed to be less than one tenth of the floor-to-ceiling height.

## AMBIENT TEMPERATURE

The ambient temperature for the UK is conventionally set at 15°C.

## PLUGHOLING

If the smoke layer is too shallow for the size of the ventilator used, the ventilators efficiency may be reduced due to air being drawn through the middle of the ventilator instead of smoke.



CFD (computational fluid dynamics) is used by Colt for building analysis. CFD can predict the temperature within a building (shown above), or the smoke behaviour patterns.

# Smoke Reservoirs

## SMOKE CONTAINMENT

Smoke containment is critical to the effectiveness of smoke ventilation systems.

If the lateral flow of the smoke is not prevented, the ventilators in the fire zone will be less effective in releasing the hot smoke. This may cool and fall back to ground level, obscuring escape routes and endangering life.

Smoke curtains provide that necessary containment by creating smoke reservoirs.

## BENEFITS OF SMOKE RESERVOIRS

Smoke reservoirs:

- Increase the time available for occupants to escape the building since they reduce the travel distances.
- Are a cost effective solution to zoning a building.
- Assist the emergency services by containing or channelling the smoke into predetermined areas.
- Limit travel and overcooling of smoke, reducing the risk of cold smoke dropping to low level and obscuring vision.

## COLT SMOKEMASTER CURTAINS

Colt manufacture the Smokemaster range of smoke curtains. They are either fixed curtains, which are tailored to suit the particular building structure, or automatic drop curtains which are hidden and automatically lowered in an emergency.

### SMOKEMASTER - FIXED CURTAIN

A single fixed smoke curtain can be stitched together to provide one large continuous length, ideal for warehouses and large commercial units.



*Carpet Right and Focus Do It All, Rugby.*

*The Focus Do It All store in Rugby, was forced to close due to smoke damage yet the store didn't even have a fire! Carpet Right, adjoining Focus Do It All, was deliberately set alight to such a large extent, that Focus Do It All was forced to close due to smoke damage.*



## “Smoke curtains help to keep the smoke buoyant so it remains high”

### SMOKEMASTER - MOVABLE CURTAIN

The Colt Smokemaster is a high temperature roller blind incorporating heat resistant fabric, similar to fixed smoke curtains.

The curtains are normally held retracted at ceiling level and in the event of a fire, a signal allows the curtain to unroll at a controlled rate and drop to a preset height.

Smokemaster is electrically controlled and can be linked to a Colt EN OPV control system or building management system.

### MEZZANINE FLOORS

If a solid mezzanine floor is to be installed within a building, it can alter the fire characteristic, as any fire underneath a mezzanine floor changes from a free burning (bonfire type) to a compartment fire.

The introduction of mezzanine floors or other structures within the building can have a major impact on the smoke ventilation requirement for the building.

A fire occurring under a mezzanine floor or within a compartment which is open to the building will form a long plume of smoke as it spills out round the edge of the structure and rises up in to the roof level reservoirs. This smoke will not only be greater in volume but will be cooler, and therefore less buoyant.

Where a mezzanine floor is part of the building, it therefore becomes necessary to provide additional elements to the smoke control system. Due to the nature of the rising smoke plume compared with that of a simple fire on the floor, the amount of smoke ventilation required will be increased.

There are various options when dealing with the design of a smoke control system in a building with a mezzanine floor. One option is to contain all the smoke underneath the mezzanine and mechanically extract from source, another is to allow the smoke to spill out from a limited width and flow into a smoke zone in the roof of the building.



*Smoke curtains are used to channel smoke away from particular areas. In this case, under a mezzanine floor.*

**For further information on the Colt Smokemaster, please see the Smokemaster Smoke Curtain datasheet.**

# Extract Ventilation

## INTRODUCTION

Natural and mechanical ventilation each have their own advantages and disadvantages:

### Natural smoke ventilation

#### Advantages

- Fail safe operation
- Self regulating
- Silent operation
- No time or temperature limits
- Lightweight

#### Disadvantages

- Sensitive to wind effects

### Mechanical smoke ventilation

#### Advantages

- Not wind pressure sensitive
- Suitable for ducting
- Fixed extract volume

#### Disadvantages

- Noise and weight
- Maintained electrical supply
- Dedicated air inlet supply

## NATURAL SMOKE VENTILATORS

Natural smoke ventilators can offer the additional benefit of day-to-day ventilation.

They are normally positioned on the roof for smoke and heat extract, and at low level for fresh air inlet, although roof mounted ventilators in zones not affected by smoke can also be used for air inlet.

A natural ventilator can be designed to operate in a fail safe manner, meaning that the ventilators always open when all control/power sources are removed.

For a natural ventilation system, if the fire grows larger than designed, the smoke will be hotter and therefore more buoyant making the ventilators more efficient.

However, a natural system may be affected by adverse wind pressures, in which case mechanical ventilation should be considered.

#### Associated products:

- Seefire
- Meteor
- Kameleon
- Firelight

## MECHANICAL SMOKE VENTILATORS

Mechanical ventilation requires reliable power supplies.

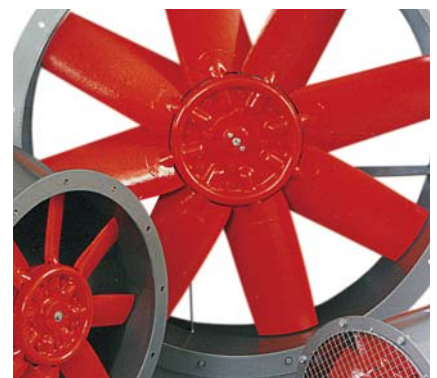
Mechanical systems are designed to extract a fixed volume of smoke regardless of fire size, unlike natural smoke ventilators.

Consideration should be given to the weight of the fans, as this may lead to structural support issues. A mechanical extract system will require a dedicated air inlet system.

Noise can be a major issue, especially if voice alarm systems are used since the noise of the fans can reduce intelligibility.

#### Associated products:

- Liberator
- Mechanical Extract Fans



*Mechanical Extract Fans*

National Motorcycle Museum, Birmingham.

Over 500 vintage machines were destroyed by a carelessly discarded cigarette. Most motorcycles were said to be priceless and irreplaceable. The estimated damage is said to be around £8m.

The fire started outside the building within a rubbish collection area and spread quickly to the main building. Firefighters found it difficult and unsafe to enter the building to tackle the fire at its source.



#### COLT MECHANICAL EXTRACT SYSTEMS

A wide range of fan sizes and specifications are available from Colt.

As with natural ventilators, mechanical extract units can be linked into the sophisticated Colt EN OPV control system.

#### METEOR NATURAL VENTILATOR

The Colt Meteor is a flap ventilator which can be manufactured with aluminium, translucent polycarbonate or glass flaps.

Colt Meteors have large unobstructed openings producing high performance levels and improved 'U' values.

The Colt Meteor can be attenuated to provide sound insulation.

The ventilator can be fixed either in the horizontal or at an angle.

#### SEEFIRE NATURAL VENTILATOR

The Colt Seefire is a louvred ventilator with a low profile. The louvres can be aluminium or translucent polycarbonate to allow daylight to enter the building.

The Colt Seefire has a flexible size range with over 200 size variations.

The ventilator can be fixed either in the horizontal, vertically or at an angle.

For further information on these products, please refer to the relevant datasheets.



Colt extract system



Colt Meteor Ventilator



Colt Seefire Ventilator

# Inlet Ventilation

## INLET

In order for a smoke ventilation system to work effectively and efficiently, a supply of inlet air is required.

An inlet air supply will basically create a 'chimney effect' within the building allowing a steady stream of air flow. Air and gases that are removed by the extract ventilators are replaced by the inlet ventilators. This is sometimes referred to as 'make up air'.

Ventilators are an ideal solution in large single storey buildings when doors and windows are at a minimum.

## NATURAL INLET VENTILATORS

Inlet air should be designed as low as possible within the building, generally at least 1.5 m below the designed smoke layer. If this is unachievable due to the height of the smoke layer, then smoke curtains should be considered.

There are two main solutions for providing inlet air:

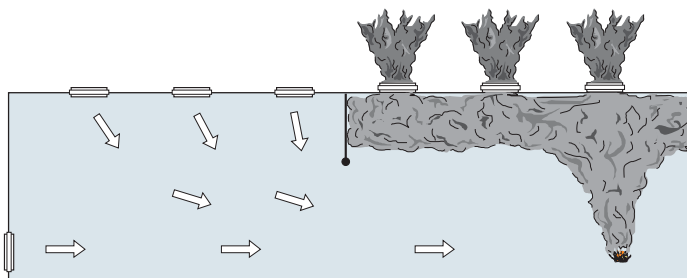
Utilising adjacent non fire zones to provide inlet (roof level) and/or by automatically opening ventilators, windows and doors to provide inlet ventilation.

Inlet velocities must be below 5m/s as greater velocities can hinder escape.

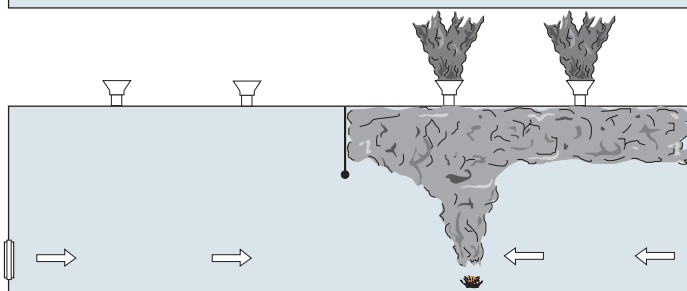


Seefire natural louvred ventilators installed at low level.

Replacement air via roof mounted ventilators and ventilators installed at low level.



Replacement air installed at low level with mechanical extract at high level.



Sainsbury's, Cheshire.

*“We had to knock holes in the roof to allow the smoke and heat escape, it was the only way of making the building safe”*

*Quote from a senior firefighter speaking to Granada news.*



“Fire-fighters must be able to quickly identify and safely tackle the fire at source”



*Above - Seefire natural ventilators installed into a near vertical position.*

*Left - Seefire natural ventilators installed to blend in with the cladding.*

# High Bay Warehouses

## HIGH BAY STORAGE AREAS

The potential for fire growth within a high bay warehouse can be much greater than normal due to the rapid growth of the fire travelling up the vertical racking.

For any fire safety strategy to be effective it is essential that sprinklers are incorporated to control the fire.

A smoke control system will work in conjunction with the sprinklers to remove the smoke and hence limit damage and assist the fire service.



## IN RACK SPRINKLERS & SMOKE VENTS

Most modern day high bay warehouses will contain an 'in rack' sprinkler system to control the fire growth.

In sprinklered warehouses, the smoke control system objectives must be clearly understood for a design to work effectively.

## CONSIDERATIONS

Considerations for high racked storage buildings are:

The nature of the goods stored

The type of packaging used

The manner of storage

The surface area of any material that can support combustion

The type of sprinkler system installed

*This vast warehouse is split into separate smoke zones using fixed Colt Smokemaster smoke curtains.*







“Its reassuring to know that we are protected by a Colt smoke control system”

*Edwards High Vacuum International*



*Colt Seefire ventilators installed into glazing at high level.*

# Fire Compartmentation - Fire Curtains

## FIRE COMPARTMENTATION

As well as fixed or controllable smoke curtains which are purely used to contain or channel smoke to specific areas, Colt also manufacture and supply fire compartmentation curtains.



*Colt fire curtains will contain a fire for up to 2 hours at up to 1000 °C and help maintain the fire integrity of a compartmentation wall.*

## FIRE CURTAINS

The purpose of a fire curtain is to seal off an area to contain a fire and to prevent it from spreading to other areas.

An example of this could be an unsprinklered shop unit that needs to be separated from the mall during a fire condition.

Another example is access routes through compartment walls. The curtain must close to seal off the access route, keeping the integrity of the whole wall in a fire condition.

The curtain automatically descends upon receipt of a signal from the fire-alarm panel, and automatically retracts when the signal has stopped.

Fire curtains are ideal for entrances which need to retain fire integrity in an emergency but will allow daily operation to continue.



# “Colt Firepath curtains prevent the spread of fire to other areas”

## COLT FIREPATH FIRE CURTAIN

The fire curtain comprises a flexible, heat resistant fabric, which is impervious to smoke and hot gases, wound round a circular tube. The tube contains an electric motor which is normally held retracted at ceiling level, and which unrolls the fabric automatically upon a signal from a fire detection system or on loss of power. A bottom bar is fitted to the bottom edge of the fabric to keep it taut and provide a suitable finish when the curtain is retracted.

Metal side guides with a fabric retaining system provide a seal between the curtain fabric and the building. Due to the immense positive or negative pressures created by the fire, it is imperative that this seal remains in place at all times.

## CONTROLS

Each control panel can operate a series of curtains. It will generally include a battery back-up which will retain the curtains in their retracted position for a set period if there is a mains failure.

### Certification

Firepath fire curtains have been tested to and fully meet the requirements of BS EN 1634-1 and BS EN 1363-1 to provide an integrity rating of 120 minutes.

**For further information on the Colt Firepath, please see the Colt Firepath leaflet.**



*Colt Firepath fire curtains installed at Tate Gallery, London.*



*Colt Firepath fire curtains installed at Tesco's in Glasgow. These are designed to separate the main shopping area from the storage area.*

# EN OPV Control System

Colt EN OPV (One Per Vent) is an intelligent electronic control system, which enables all addressable equipment to be integrated within a total smoke control system.

## FEATURES & BENEFITS

### Proven performance

As life safety equipment, all EN OPV components meet the most stringent manufacturing and test procedures. Its communication network uses the proven and robust Apollo® protocols.

### Conforming to the latest standards

EN OPV has been designed to conform to the requirements of PrEN 12101-9 (Smoke and heat control systems - Control Panels), EN 12101-10 (Smoke and heat control systems - Power supplies) and EN 54 (Fire detection and alarm systems).

EN OPV is CE marked for compliance with the Low Voltage Directive and the Electro-magnetic Compatibility Directive.

### Flexible

Each EN OPV panel can control up to 1000 addressable units and 20 control zones. With additional remote fire override panels, the number of control zones can be increased to 80. The maximum number of these remote panels is 15.

### Addressable

Addressability provides accurate control. Each addressable unit can be controlled individually and as part of the specified automatic control system. The control software is configured to suit the automatic scheme requirements and

should these change, Colt can reprogram the software accordingly.

Ventilation equipment is generally configured into operational zones. However individual control can be provided to meet specific building requirements if needed.

### Complete control

Besides the ability to re-configure the system in response to alterations in the scheme, the user can operate the system manually at the control panel keypad and can amend the daily parameters such as the temperature settings and operating times.

### Monitoring and diagnostics

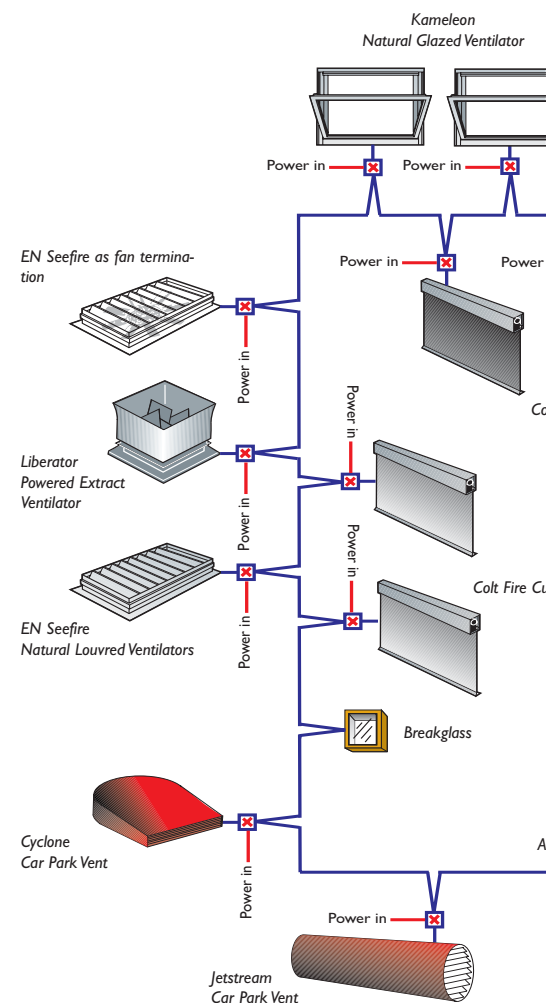
Software and hardware watchdogs detect faults in the system and then act upon these in a logical controlled fashion. These actions extend from merely flagging up an alarm to putting the system into failsafe mode, depending on their severity. Faults are recorded in an event log. This feature obviates the potential for “system freeze”.

### Low maintenance

OPV systems have very low maintenance requirements.

### Minimal power requirements

230v / 1 ph / 1A load for control panel.  
3A fuse recommended.

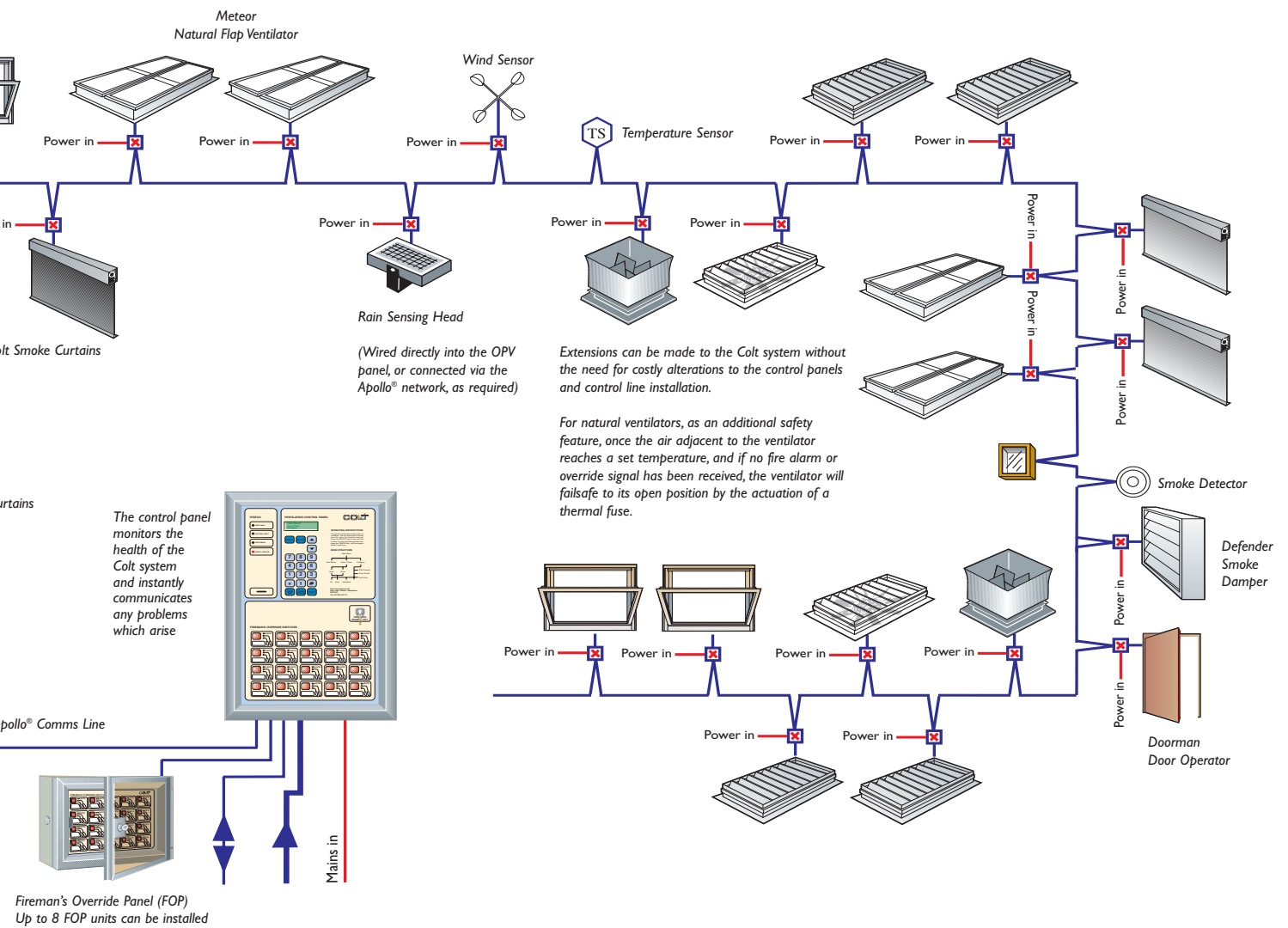


Churchill Files Ltd, Southampton.

This 100 x 80 m warehouse stored huge quantities of paper files.

“We have done everything we can, the fire is being left to burn itself out now. The total building has been lost”.

Fire & Rescue Spokesman  
Dave Askew



# Sprinklers

## SPRINKLER SYSTEMS

Most sprinkler systems are not designed to extinguish fires, they are intended purely to control them.

Sprinklers cannot prevent the building from becoming smoke logged, nor extract the huge amount of heat generated from fires. Indeed, it has been shown that due to the drag down of the smoke in un-ventilated buildings, sprinklers can accelerate the rate of smoke logging in the building.



*This photograph shows racking starting to bend even after a small fire which was extinguished very quickly.*

*Subjected to extreme heat, racking will collapse, increasing the risk of spreading the fire and blocking escape paths.*

## INTERACTION OF SPRINKLERS & VENTS

Unfortunately, there has been technical controversy for many years regarding the interaction of sprinklers and smoke ventilators.

The main arguments are that the removal of heat by the smoke vents could delay the operation of the sprinkler heads and that by maintaining the oxygen content of the building the fire could be allowed to burn more fiercely.

Now even some of the most sceptical about ventilation have agreed that its presence has virtually no impact upon the performance of standard sprinkler systems, a fact which has been demonstrated by research in the UK and USA.

Experiments have shown that venting did not significantly delay the operation of the first sprinklers, but did reduce the number of sprinklers operating unnecessarily away from the seat of the fire.

It is now accepted that when a fire breaks out, the operation of any fire fighting medium should not be delayed. The earlier the vents open, the greater is the chance of preventing the smoke from mixing into the layer of cool air near the floor.

## THEIR FUNCTIONS

### **Sprinklers**

Will limit fire spread and control growth

Will not reduce smoke damage

Will reduce temperature increase within the building.

### **Ventilation**

Will prevent smoke logging

Will reduce building temperature

Will assist escape

Will aid firefighting.

COLT SINGLE STOREY BUILDING AND WAREHOUSE INSTALLATIONS IN THE UK

<b>Aldi</b>	Holland	<b>Ikea</b>	13 Stores throughout UK
<b>Aldi</b>	3 stores in Germany	<b>Ikea</b>	Czech Republic
<b>Allied Carpets</b>	7 Stores throughout UK	<b>JCB</b>	Wrexham
<b>Allsports</b>	Manchester	<b>Kelloggs</b>	Manchester
<b>Argos Superstore</b>	Manchester	<b>Land Rover</b>	Solihull
<b>Asda</b>	64 Stores throughout UK	<b>Lidl</b>	Livingston
<b>B&amp;Q</b>	35 Stores throughout UK	<b>L'Oreal</b>	Nottingham
<b>BAE</b>	17 Buildings throughout UK	<b>Opel, Rochum, Germany</b>	2 sites in Germany
<b>BAT</b>	Nigeria	<b>Pfizer</b>	8 Buildings throughout the UK
<b>BAT</b>	Southampton	<b>Philips</b>	Holland
<b>Big W</b>	Glasgow	<b>Qatar General Petroleum Corp</b>	Qatar
<b>BMW</b>	Manufacturing Centre, Bavaria	<b>Quelle</b>	Germany
<b>BMW</b>	Hams Hall	<b>Safeway</b>	48 Stores throughout UK
<b>BOC</b>	13 Buildings throughout UK	<b>Sainsbury's</b>	53 Stores throughout UK
<b>Booker</b>	WarehouseDundee	<b>Schiphol Airport Buildings</b>	Holland
<b>Bookers</b>	Reading	<b>Singapore Expo</b>	Singapore
<b>Carlsberg Tetley</b>	Wigan	<b>Sony Warehouse</b>	Argentina
<b>Coca Cola</b>	Kuwait	<b>Tesco</b>	42 Stores throughout UK
<b>Co-op</b>	20 Stores throughout UK	<b>Tibbett and Britten</b>	Dublin
<b>Daimler Chrysler</b>	Cologne, Germany	<b>Toyota Parts Centre</b>	Belgium
<b>Daimler Chrysler</b>	3 sites in Germany	<b>Toyota</b>	Derby
<b>Deutsche Bahn</b>	Krefeld, Germany	<b>Toyota</b>	France
<b>Dinosaur Museum</b>	China	<b>Turbine Surface Technologies</b>	Nottingham
<b>Dong Guan Exhibition Centre</b>	China	<b>Vauxhall Motors</b>	Ellesmere Port
<b>ERF Trucks</b>	Middlewich	<b>Volvo</b>	Holland
<b>Homebase</b>	8 Stores throughout UK	<b>VW Autocity</b>	Germany
<b>Honda</b>	Swindon	<b>Zamil Steel</b>	Bahrain
<b>Hyundai</b>	Dunfermline		

## THE COLT PACKAGE

### Colt International offers the following services:

- Scheme design of all types of Smoke and Heat Exhaust Ventilation Systems (SHEVS)
- Scheme design of pressurisation systems
- Scheme design of smoke containment systems
- Provision of performance specifications
- Project management
- Supply, installation, commissioning and maintenance of systems, including all necessary controls, which will be designed to interface with others' control systems.

A free full system check will be carried out approximately 9 months after a Smoke Control System has been installed and commissioned by Colt. Besides the opportunity to check that the system is performing as designed, this will allow for any further training of local personnel that may be necessary. Assuming that this visit falls within the warranty period, any defective parts are replaced free of charge. A test certificate will be issued.

### Other reasons to choose Colt:

- Colt Smoke Control systems are suited to both commercial and industrial buildings, and may be adapted to suit most architectural requirements.
- Over the years Colt has funded a large proportion of the research into smoke control, and its representatives maintain an unparalleled level of technical expertise.
- Colt's in-house research and development capability ensures that Colt smoke control systems are designed, tested and updated by Colt to meet or exceed relevant legislation and standards.
- The majority of Colt's Smoke Control systems are manufactured in the UK under BS EN ISO 9001:2000 and BS EN ISO 14001:2004. Colt products are CE marked to the CPD, where relevant, in compliance with BS EN 12101.

## COLT SERVICE

Part of the Colt Group of companies, Colt Service offers a comprehensive range of maintenance packages incorporating the maintenance and repair of all building services equipment including non Colt products.

Colt Service provides a 24 hour, 365 day emergency cover as standard.

## MAINTENANCE

Maintenance of a smoke control system is essential. Regular maintenance is required by the Regulatory Reform (Fire Safety) Order both protects your investment and brings you peace of mind that the system will operate effectively in an emergency.

British Standard, BS 5588-12: 2004 recommends that smoke control systems should be serviced at least once a year and tested weekly.



“People feel better in Colt conditions”

**80<sup>th</sup>**  
ANNIVERSARY  
1931-2011

Architectural Solutions  
Climate Control  
Smoke Control  
Service and Maintenance

**Colt International Limited**  
New Lane Havant  
Hampshire PO9 2LY  
Tel +44(0)23 9245 1111  
Fax +44(0)23 9245 4220  
info@coltgroup.com  
www.coltinfo.co.uk