Pressurisation Systems

West India Quay, London.

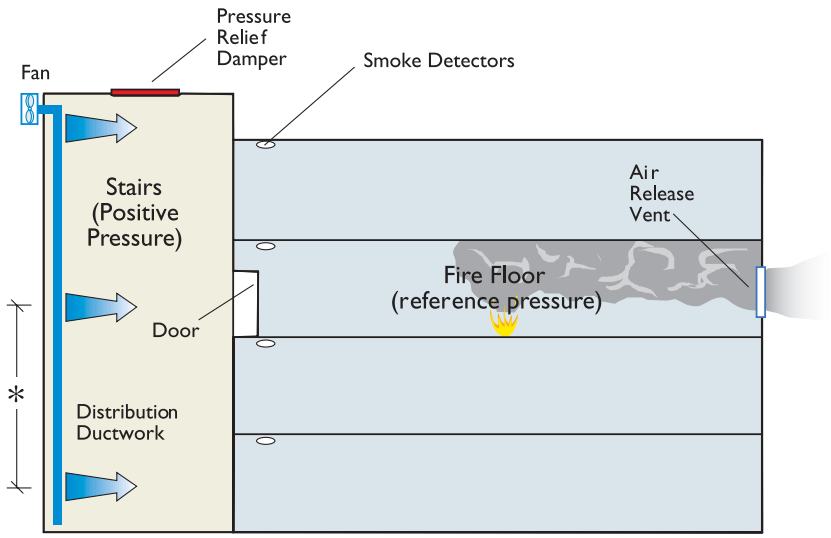
PRESSURISATION SYSTEMS

Pressurisation systems protect escape routes and fire-fighting shafts against the ingress of smoke by maintaining the pressure within the escape route higher than that in the adjacent spaces.

A pressurisation system consists of three main components: Supply Air (where air is injected into the area that is to be protected), Pressure Relief (to avoid overpressure when doors are closed) and Air Release (air and smoke is released from the adjoining fire area). Combining these elements creates a positive pressure difference which prevents lobbies and staircases from filling up with smoke.

Pressurisation systems should meet the recommendations of Approved Document B and BS EN 12101-6 “Specification for Pressure Differential Systems” or BS 5588-4 - “Code of practice for smoke control using pressure differentials”.

In commercial buildings pressurisation is normally carried through up to the final door to the accommodation, with air release provided from the accommodation. In apartment buildings it is usually impractical to carry pressurisation up to each apartment door due to the difficulty of providing air release from each apartment. Therefore stairs and lobbies are usually pressurised with air release from the corridor.



** One outlet at a maximum of every 3 storeys*

Beetham Tower
Birmingham

THE SYSTEM COMPRISES

- Inlet Fans for introducing air into the designated area. The run and standby fans and control equipment should be housed in a separate plant room or outdoors and the inlet should be protected from smoke. Dual inlets with automatic smoke dampers are required for high level inlet.
- Ductwork and Outlet Grilles, to provide distribution of air exactly where it is needed.
- Pressure Relief Dampers, to release excess air in the closed door condition from the stair area. This should be ducted to discharge directly to atmosphere independent of the wind direction. Damper blades are set to start opening at 50 Pa pressure differential.
- Automatic air release to prevent unwanted pressure build up in the adjacent spaces. This may be automatic vents, natural shafts or mechanical extract systems.

The control system should operate automatically from the smoke detection system with a manual on/off switch also provided within either the pressurisation plant room, near the building entrance (to suit fire service), or within the central building services control room.

SYSTEM REQUIREMENTS

There are two requirements to maintain within a pressurisation system. These are:

- Maintaining a pressure difference for a closed door condition. Here the pressure difference is required to overcome buoyancy pressure generated by the hot smoke layer, expansion of the gases in the compartment due to heating, stack pressure and wind pressure
- Maintaining a velocity for an open door condition. Here maintaining a velocity for an opened door is required to hold back the smoke on the fire floor when the door onto the fire floor is open.

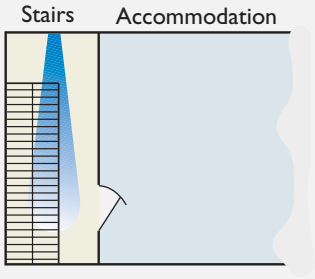
Getting the right balance for a pressurisation system needs careful design in order for the system to work effectively. Insufficient pressure difference across a closed door will allow the passage of smoke into the protected space. Excess pressure will impede door opening and hence escape.

DESIGN METHODOLOGY

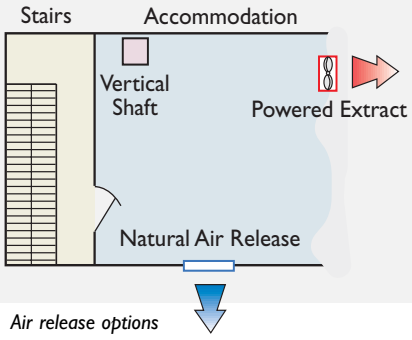
- Assess the usage and layout of the building, the area to be pressurised and the class of system required.
- Assess the leakage paths (through doors, lifts, vents).
- Calculate the required volume flow rates.
- Calculate the area of pressure relief dampers.
- Calculate the area of air release ventilation.

Colt can assist with the design of pressurisation schemes.

Colt offers a free technical design service on all projects undertaken. Please contact Colt for further information.



Supply air example



Air release options