



Smoke Extraction Systems

What is a smoke extraction system?

Smoke ventilation systems, designed to effectively remove smoke, heat, and combustion products from the areas affected by fire, and at the same time proportionally supplement the system's output with external compensating air, play a particularly important role in the maintenance of the fire safety of buildings, escape routes, staircases, etc.

Sections of fire ventilation ducts are additionally used to collect and discharge other harmful and toxic extinguishing gases escaping fire areas.

Ventilation ducts must be non-combustible and meet several requirements covered by the harmonised standard EN 12101-7 (*Smoke and heat control systems. Smoke duct sections*) in order to be used for smoke extraction systems. It is particularly important to refer to the test standards PN-EN 1366-8 and PN-EN 1366-9, which specify the method of carrying out fire resistance tests of smoke extraction ducts, and PN-EN 13501-4, which provides detailed information on their classification in terms of fire resistance.

Types of Fire-resistant Ductwork

There are four basic types of fire-resistant ductwork that could be required or have special use under fire conditions. The following terms are used in identifying varying performance criteria for such ducts.

1. **Ventilation fire ductwork:** This ductwork is either supply or extract and needs to be fire rated where it passes from a fire compartment through, for example, an escape corridor. It must be tested for type A fire outside and type B fire inside criteria. It is not necessary for the ductwork to maintain its cross-sectional area in a fire.
2. **Smoke extract fire ductwork:** This ductwork is for extracting smoke from the building and should be fire rated equal to the compartment walls or floors through which it passes for stability, integrity and insulation.

The duct must also be tested to prove its cross sectional area does not reduce by more than 25%, both inside and outside the furnace, and to ensure that it will achieve its primary function, of extracting smoke.

Stability and integrity ratings are only normally required within the area to be protected, i.e. car parks, if the duct is contained within a dedicated shaft or there is at least 500mm separation between the ductwork and combustible materials.

3. **Non-domestic kitchen extract fire ductwork:** This is sometimes called grease ducting and should be tested for both type A fire outside and type B fire inside.

Both tests are required as it is important to prevent flammable grease from either catching fire when it passes through an adjacent area, or if the grease itself is already alight, causing a fire to start within the adjacent area by radiant heat. Fire dampers should not be used in kitchen extract ductwork.

4. **Pressurisation ductwork:** Pressurisation is a method of restricting the penetration of smoke into certain critical areas of the building by ensuring the air within those areas is at a higher pressure than in adjacent areas.

This particularly applies to protected stairways, lobbies and corridors as smoke inhibits escape. This also affects fire-fighting shafts serving deep basements as there is greater difficulty in clearing smoke.

As the air supply creating the pressurisation must be maintained for the duration of the fire, fire dampers cannot be used within the ducting. The ducting should be tested to type A fire outside criteria.

What is a smoke Pressurisation system?

A smoke pressurisation system (SPS) is designed to stop smoke circulating by introducing clean air into the stairwells. This increases the air pressure in the stairwell and reduces air pressure in other areas to create safe & clear escape route for building occupants as well as a rescue route for firefighters.