

Ventilation ducts

In the event of a fire, ventilation ducts ensure that fresh air is brought in and the neighbouring rooms are overpressurized. These ducts sometimes pass through areas where the fire is active before reaching protected areas. It is therefore essential to ensure that the ventilation ducts have the following properties, whether the fire is outside (normal functioning) or inside the duct (if the duct has been damaged):

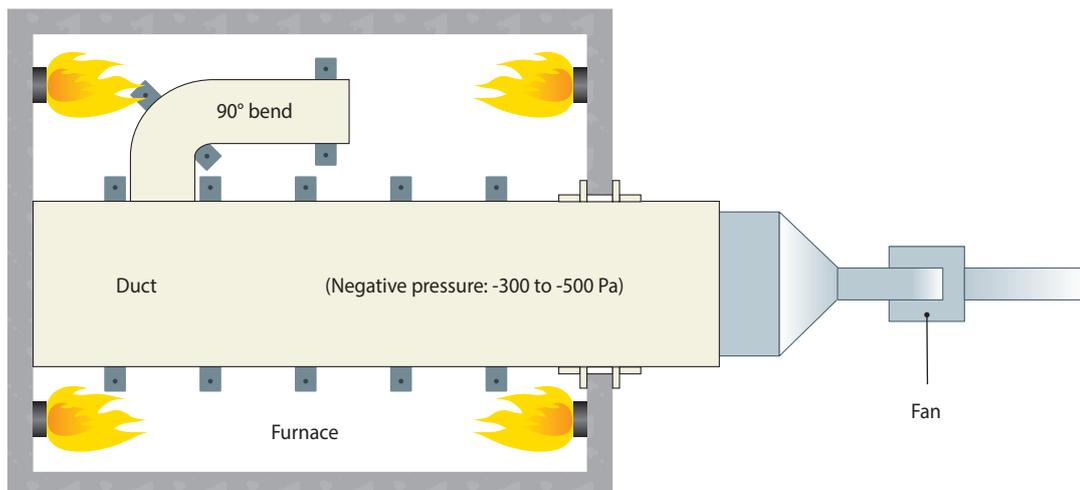
- Fireproofed, so as to not spread the fire from one room to another
- Thermal insulation to limit temperature increases
- Limited warping and mechanical resistance of the duct and its system so it can fulfil its function for the intended timespan
- Smoke tightness (optional) to limit the spread of asphyxiant gases.

To ensure this, standard EN 1366-1 offers two types of tests:

- «Duct A» test: the fire is outside the duct, which is kept at negative pressure. This test primarily serves to measure the fire and smoke resistance of the duct, but also its thermal insulation and its mechanical resistance in the event of an external fire.
- «Duct B» test: the fire is outside and inside the duct, where airflow is provided by a fan; temperature measurements are taken outside the furnace. This test primarily serves to measure the thermal insulation of the duct walls when the fire is inside, but also its behaviour when damaged; the fan at the end of the duct is also regularly stopped to simulate a breakdown.

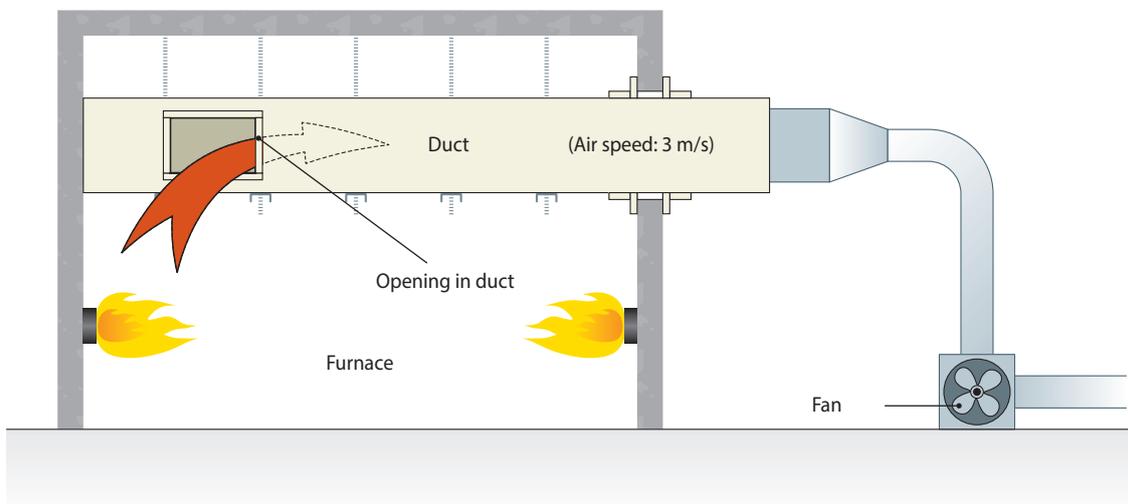
Duct A - View from above

Main purpose: Measure resistance to flame, smoke and hot and flammable gases in the event of an exterior fire.



Duct B - Side view

Main purpose: Measure thermal insulation.



Smoke extraction ducts

The role of the smoke extraction ducts is to extract hot exhaust air to limit temperature increases in the rooms and facilitate the intervention of emergency personnel. In addition to the properties of the ventilation ducts, the smoke extraction ducts must exhibit the following properties:

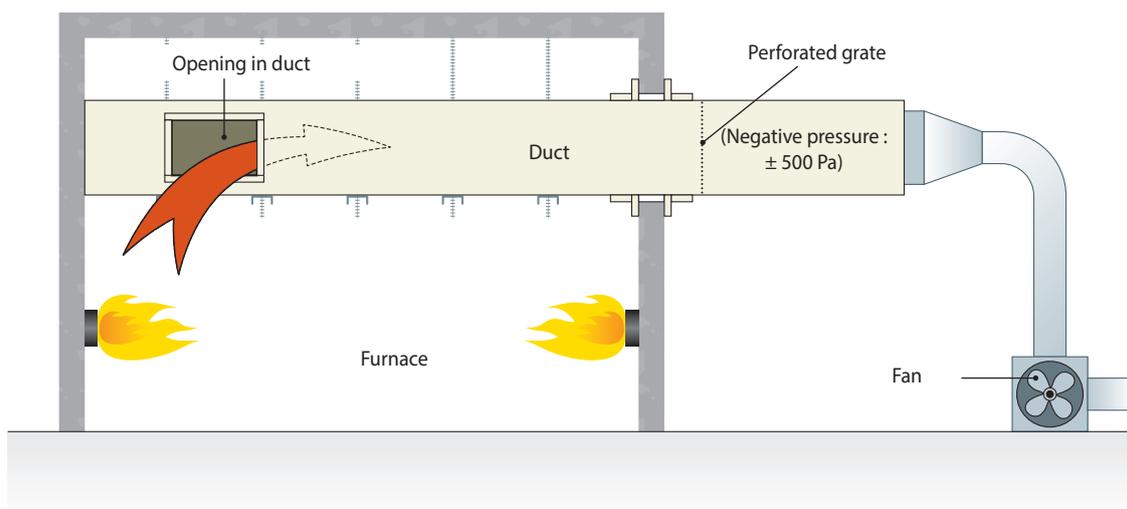
- Mechanical resistance when the fire is inside and outside the duct.
- Airtightness when the fire is only inside the duct and it is kept at negative pressure. This is necessary to ensure that the gases sucked in are the smoke and hot gases produced by the fire, and not the surrounding clean air filtering through leaks in the duct.

To demonstrate this performance, the ducts are tested according to standard EN 1366-8, which requires that ducts pass the tests of:

- Standard EN 1366-1 (ducts A and B)
- With additional «Duct C» test: the fire is inside and outside the duct. A fan extracts the hot air from the furnace and a perforated grate is placed between the section of the duct in the furnace and the exterior section; this creates negative pressure in the exterior section. This test checks the duct's mechanical resistance when it is subjected to fire inside and outside, and checks, using oxygen probes, that the air in the exterior section of the duct comes from the furnace area rather than from outside through duct leaks.

Duct C

Main purpose: Measure the airtightness and mechanical stability in the event of an interior fire.



Duct fire resistance classification

Following these tests, the performance of the ventilation or smoke extraction ducts is expressed using the following classifications:

- E: leak-tightness to flame and hot gases
- I: thermal insulation: temperature increase on the side not exposed to fire of less than 140°C on average and 180°C at any spot
- S: leak-tightness to smoke, optional
- ho and/or ve: depending on the configuration in which they were tested (horizontal or vertical)
- → i, o ← i or o ↔ i: only for ventilation ducts depending on whether they are tested with exterior fire (duct A, classification o → i) or interior fire (duct B, classification o ← i) or both (classification o ↔ i). Amended Decree of 22 March 2004 requires ventilation ducts installed in buildings to be checked with both exterior and interior fire tests. All FIBROGAIN® ventilation ducts have obtained both classifications and are therefore classified o ↔ i.
- Multi: for smoke extraction ducts only, indicates that they can be used to extract smoke in multi-compartment zones.
- Operating pressure: for smoke extraction ducts only, indicates the maximum admissible negative or positive pressure when cold.