

Full-scale tunnel fire tests

The Applus+ TST facilities enable the performance testing and verification of both passive and active fire-protection systems in real tunnel-fire scenarios. To be able to provide this service, our facilities were custom-built in order to test fire in tunnels under controlled conditions, thereby guaranteeing the safety of test personnel as well as of the infrastructure itself.



The Applus+ TST technological centre in Asturias (Spain) is equipped with a specialist test tunnel designed to reproduce the conditions of a full-scale fire in a confined space such as a tunnel, shaft, mine, ship or other underground structure.

These full-scale tests, which go beyond mandatory conformity testing, aim to validate the adequacy of the fire-protection measures that are about to be installed at a particular site, be this a new construction or a project to upgrade the safety equipment in an operational tunnel.

This testing infrastructure enables us to assess the behaviour, in a real fire scenario, of:

- Ventilation and smoke-extraction systems
- Fire-detection systems
- Fire-extinction and fire-control systems (sprinklers, water mist, etc.)
- Building-material components used in tunnels
- Safety equipment
- Mobile equipment and materials
- Rolling stock

We can also corroborate theoretical CFD simulation models and ventilation calculations.

Key projects

Owing to the unique nature of our testing facilities, we set a global benchmark in tunnel fire tests. The many projects we have undertaken include the testing of the following fire-protection systems:

- Eurotunnel (France – UK)
- Mont Blanc Tunnel (France – Italy)
- Madrid's M30 tunnel (Spain)
- Road tunnel managed by the Land Transport Authority (Singapore)

Our test tunnel for full-scale fire testing

Applus+ TST has the only facility of its kind in Europe for reproducing tunnel-fire conditions. This facility includes a mock, 600-metre-long, concrete tunnel – the equivalent of a two-lane road tunnel or a railway tunnel – as well as two ventilation stations, an emergency and service shaft, four emergency exits and a second, 150-metre-long fire tunnel.

Ventilation systems

The test tunnel boasts four different ventilation systems so as to be able to test all of the most common ventilation systems on the market:

- Longitudinal systems
- Semi-transverse systems
- Mixed longitudinal and transverse systems
- Saccardo systems

Passive fire-protection systems

The tunnel is equipped with a passive fire-protection system featuring a 5cm-thick layer of fire-resistant concrete that is able to withstand powerful fires with a calorific value of over 200 MW.

Additional equipment

- A water-storage vessel with a total capacity of 600 m³
- A 150 mm-diameter pressure pipe on the outside of the tunnel at PK 300, powered by way of a pressure group running at a maximum pressure of 4 bars and with a capacity of 180 m³/h
- A 100 mm-diameter pressure pipe on the inside of the tunnel, with fire hydrants at 50-metre intervals. This system is supplied by a number of different tanks and powered by a 12-bar pressure group with a capacity of 72 m³/h

- A fibre-optic network: the data-acquisition and control system is a central component of the tunnel facility, used as much for the control and regulation of the various ventilation, fire-fighting and lighting systems as for the collection and storage of test data and images.

Training for firefighters and mine-rescue teams

As well as testing fire-protection products, the Applus+ testing tunnel is an ideal training environment for carrying out practical exercises and rescue maneuvers in tunnels. Our experts have conducted [training courses in tunnel and mine fires for firefighters and mine-rescue teams](#) from multiple countries.