

**SP Fire Technology has extensive experience of working for the automotive industry. With our expertise, we are involved in most aspects of fires relating to vehicles. SP has a well equipped and experienced fire lab. The following is a presentation of some of the areas in which we are active.**

## Testing

### Interior materials

Interior materials are mainly tested in accordance with ISO 3795/ FMVSS 302. Research carried out at SP has however showed that the requirements specified for interior materials in buses and coaches need improvement. As a consequence SP is now participating in a UNECE project with the aim of tightening requirements for interior materials. According to a proposal, interior materials will have to be tested against four existing, well-established European and international standards:

#### ISO 5658-2 (2006)

Lateral spread of flame on building and transport products in vertical configuration.

#### ISO 9239-1 (2002)

Determination of the spread of flame.

#### ISO 5659-2 (2006)

Testing of smoke generation and analysis of toxic gases.

#### prCEN/TS 45545-2 Annex B

Testing of heat evolution from burning seats.

### Absorbent materials

In Sweden, absorbent materials have hitherto been tested against the Nordic NT FIRE 002 ignition test method. However, some vehicle manufacturers impose stricter requirements, and are now increasingly tending to test absorbent materials against ISO 5660 (the cone calorimeter method), which also permits measurement of heat release rate and smoke evolution.

### Fire resistance

Barrier structures are fire-tested in order to ensure that they prevent the spread of fire from one compartment to another. The main properties that are evaluated are integrity, insulation performance and smoke resistance.

Fire resistance can be tested either on a small-scale or on a large furnace.

### Fuel tanks

Fuel tanks are tested in accordance with Directive 70/221/EC, with amendment 2000/8/ EC, or in accordance with UNECE



*Testing heat release rate from a fire in a seat.*

Regulation 34, Annex 5. The tests are performed with the tank 50 % full, fitted in the relevant vehicle, and exposed to petrol burning in a pan underneath the tank. The test requires the tank to be exposed to fire for two minutes, without any fuel leaking out.

### Fuel hoses and fuel filters

Fuel hoses and filters are tested in accordance with ISO 7840, Annex A, in order to verify that they retain their function and fuel-tightness.

### Airbags and seat belt tensioners

Airbags and seat belt tensioners are tested in accordance with ISO 12097-3, Section 7.4, in order to verify that gas generator, airbag's or belt tensioner do not fragment when activated.

## New fuel containers

New vehicle fuels present new challenges. It is important that fuel tanks containing new fuels should not increase fire risks, or make conditions worse in the event of the vehicle being involved in an accident.

## Gas cylinders

SP tests gas cylinders in accordance with the following methods:

E/ECE/324 – E/ECE/TRANS 505, Regulation 67, Annex 10, Paragraph 2.6

LPG fuels (Liquefied Petroleum Gases).

E/ECE/324 – E/ECE/TRANS 505, Regulation 110, Appendix A.15

CNG fuels (Compressed Natural Gases, such as natural gas or biogas). See also the article on Page 12 of this issue of Brand-Posten.

## Thermal and ageing resistance of exhaust gas cleaning system components

In connection with Regulation EC 715/2007, the European Parliament tightened the requirements relating to environmentally hazardous emissions, against which the Euro emission classes for engines were based. This has had the effect of specifying higher ambient temperatures for components in the engine compartment and in the exhaust gas cleaning system, which in turn imposes higher requirements in respect of gas tightness, thermal insulation performance and durability. SP has therefore developed an entirely new test method (SP Method 4358) for test testing these components under conditions which are normally encountered in exhaust gas treatment systems, in which components are exposed to high temperatures for longer periods of time.

## Full-scale tests

We can carry out full-scale tests of entire vehicles in our large fire test laboratory in order to arrive at the most reliable and easily interpreted results by full-scale tests we can evaluate:

- Fire detection equipment
- Propensity of spreading of smoke and toxic fire gases in passenger spaces
- Fire resistance of windows
- Fire resistance between engine compartments and passenger areas.

## Computer numerical fire simulation

SP can perform numerical fire simulations using computational fluid dynamics (CFD) employing input data from small-scale tests. Thus heat and fire gas evolution in a bus or coach can be predicted depending the source of ignition, and whether doors, windows or roof vents are open or closed. Fire simulation is an excellent tool for comparing different scenarios, e.g. in respect of ventilation conditions and the fire properties of materials.

## Risk assessments

SP performs risk assessments of complete vehicles in order to determine and identify potential risks associated with the vehicle that could cause fires.

Vehicles can catch fire for many reasons, such as heat, vibration, material fatigue/ function faults or poor maintenance. Risk assessment is performed by inspection of drawings, evaluation



*Material properties as well as design principles and features play an important part in determining the behaviour of vehicles in a fire. SP tests materials, sub-systems and entire vehicles.*

of material specifications and through visual inspection of the vehicle and its components and systems.

## Determination and analysis of thermal properties

The thermal properties of materials are of interest in many applications in the automotive industry, for such varied aspects as thermal expansion, heat transfer, mechanical strength, chemical or physical durability etc. SP can measure the thermal properties of isotropic/anisotropic, thin/thick materials at high/low temperatures and at high gas pressures.

We have assisted the automotive industry with components like:

### Brakes

Thermal properties of brake discs at high temperatures.

### Interior materials

Thermal properties of polymer materials at low and high temperatures.

### Seats

Thermal properties of textile materials, related to thermal comfort.

## Fibre-reinforced composites

Thermal properties of composites at high temperatures and high pressures, e. g. by our TPS (Transient Plane Source) test equipment, ISO 22007-2.

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