

# Sprinkler protection for car parks

High fire loads, numerous ignition sources, complex building constructions, inner city location with high density of surrounding buildings – the risks of fire in car parks are high. The consequences of a fire can be incalculable from economical as well as ecological standpoints, people located within are at extreme risk. Sprinkler systems are the first choice for effective fire protection in car parks. Dr. Wolfram Krause, Managing Director bvfa – Bundesverband Technischer Brandschutz e.V.

Car parks are primarily multiple storey buildings, in which parking spaces for passenger vehicles are located. They can be extended into multi-storey or underground car parks and are as a rule accessed by vehicle drivers themselves via ramps. Less common are automatic parking systems, whereby vehicles are parallel parked using conveyor technology: the driver is granted no access into the interior of the parking system, the vehicle is parked on a parking platform via automated hoist. This contribution relates to the fire protection in non-automated car parks.

## High fire loads – high risks

There are a high number of parked vehicles in car parks being utilised and the fire load is immense. Highly flammable materials, such as plastic, rubber, textiles, have been used in the vehicles' production – all of which have a high potential for fire development and smoke production. In addition, passenger vehicle tanks are filled with combustible fuel. Fire quickly develops through negligence (discarded lit cigarettes or carelessly placed highly flammable materials coming into contact with the hot motor components of the parked passenger vehicles) or through a technical defect (faulty power cable, leaky petrol lines or tanks, new electric power systems with increased dan-



In April 2008 there was a fire in the underground car park in Wehr/Baden with nine completely burnt out passenger vehicles.

Fotos: Justus Obermeyer

ger of short circuiting due to high capacity batteries). If a fire is generated under these conditions it will in certain circumstances quickly spread and ignite neighbouring vehicles. The hot, dense smoke rapidly blanketing the entire building complex makes fire fighting more difficult and the emergency exits less visible. It is not uncommon for a "flashover"

to occur in a fire in car parks. The fire then suddenly develops from its formation phase to the full-blown fire phase; it burns throughout the building, instantaneously covering a large area, room temperatures reach many hundreds of degrees Centigrade. It is only during the absolute initial phase of such a fire scenario that the attempt can be

## Benefits of a sprinkler system

Fire process	Ventilation system	Sprinkler system
Outbreak of fire	✓	✓
Fire localisation	✓	✓
Automatic fire fighting	–	✓
Preventing the fire from spreading	–	✓
Containing the fire	–	✓
Restricting the smoke development	–	✓
Limiting financial consequences to a minimum	–	✓

Position paper on the fire protection of car parks

The Eurofeu sprinkler department of the European umbrella association Eurofeu (manufacturer of preventative technical fire protection) have compiled a policy document for fire protection in car parks. The paper is available for free download on the home page [www.eurofeu.org](http://www.eurofeu.org).



Extensive damage to the building structure. Closed 8 months for certificate (statics) and renovation.



Total damage to passenger vehicles and building according to Wehr public administration: 442,000 euros. Cause of fire unexplained.

made to control and extinguish the fire. Deployment for those entrusted with the extinguishing work is difficult and extremely dangerous. Intense, highly toxic smoke enters the emergency exits, visibility is quite obscured. In a flashover even the most highly modern protective systems of fire brigades hold the extremely high temperatures throughout the building at bay for just a few seconds. The results of such fires are in every respect incalculable, both for the user as well as for the operator of the car parks, and not least of all for the environment. Many of these car parks are located in inner cities; a fire can have catastrophic consequences for the surrounding area.

### Sprinkler system or ventilation system?

For several years new ventilation systems have been used in combination with electronic fire detection and reporting systems. These new technologies can supplement an automatic sprinkler system well. They cannot however act as a replacement, as they alone do not offer the secure protection of a water extinguishing system. The effectiveness of sprinkler systems and ventilation systems are contrasted in the tables. Electronic alarm systems have advantages: they can recognise a fire, localise and trig-

ger an alarm in the very early phases of a fire. Now it is key to get a fire under control, which under certain circumstances may be spreading quickly in large-scale buildings with limited visibility, as are car parks. Quick action is of the essence. A reliable, automatic, quickly acting water mist system (the sprinkler system) is a matter of life and death.

In recent years quick responding sprinklers were developed, which immediately detect and fight rapidly escalating fires. In contrast ventilation systems do not actively intervene in the fire event. They neither limit nor control the size of the fire, nor hinder the fire from spreading. After a ventilation system with fire detection and reporting systems has recognised the fire, the fire brigade is notified and is perhaps ready to fight the fire on site 15 to 20 minutes later. During this time the ventilators blow the rapidly developing smoke through the car park into the ventilation flues, from there further large blowers drive it from the car park. In addition the building must be equipped with flues, which bring in fresh air, in order to offset losses of air. This increased volume of air impacts the development of the fire, they can even additionally kindle the fire. Ventilation systems, which produce high air speeds, can lead to a sig-

nificantly delayed sprinkler response and impair the effectiveness of the sprinkler system in catastrophic ways. These systems should hence always be manually activated by the fire brigade.

### Conclusion

The size of the fire in a car park is limited through the rapid response of an automatic sprinkler system and its spread and smoke development reduced. The commercial damage of a fire in a building equipped with a sprinkler system is thus limited to an absolute minimum. Ventilation systems can represent a sensible supplement to sprinkler systems, however only when the ventilation system is laid out and installed such that it supports the sprinkler system function.



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