The Gasometer Berlin with its characteristic steel structure

FIRE PROTECTION IN HIGH-RISE BUILDINGS

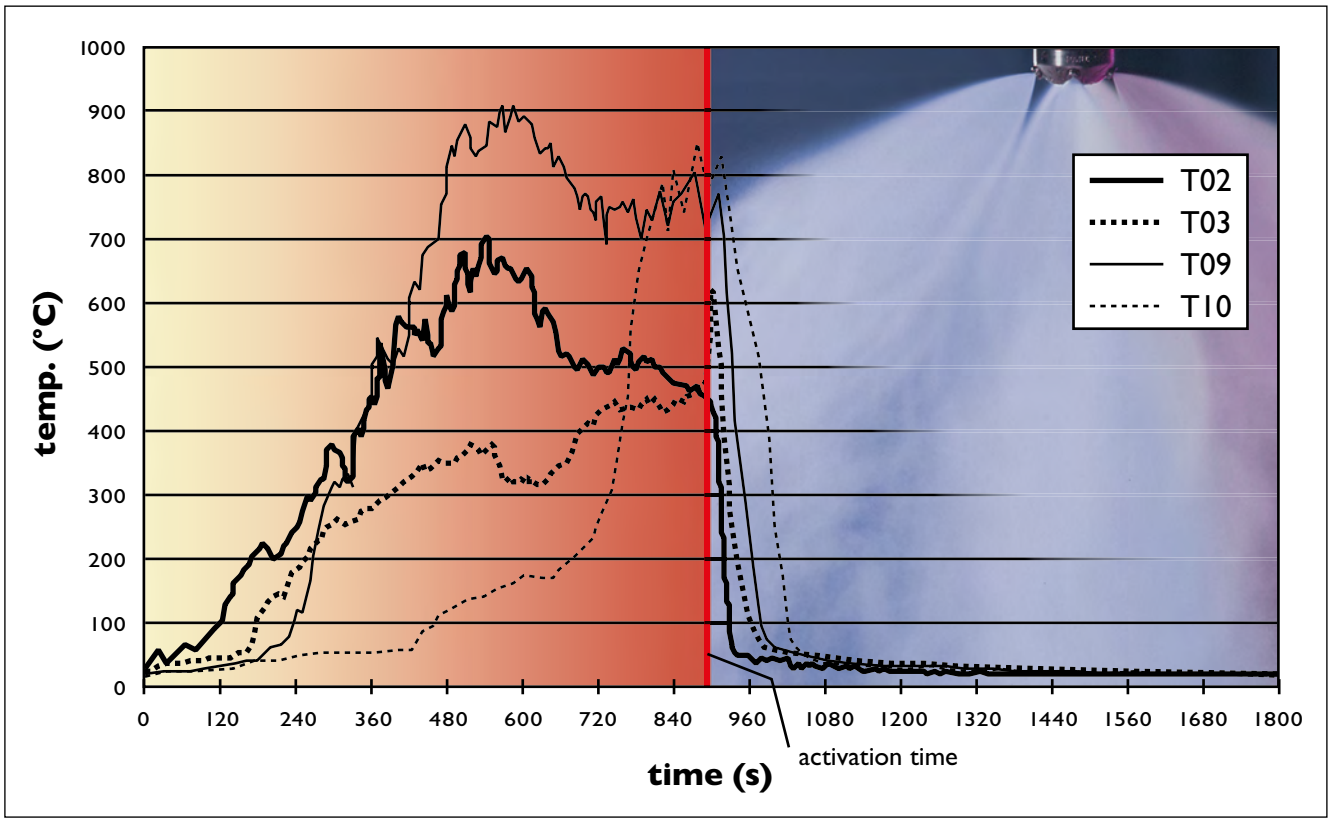
HIGH-PRESSURE WATER MIST AS A KEY TECHNOLOGY FOR MODERN FIREFIGHTING SYSTEMS

Our cities are growing upwards. Densification, multifunctional use and increasingly complex building geometries present architects, engineers and operators with new challenges. Fire protection is particularly important in densely built-up and populated areas. Today's fire protection systems must not only reliably protect people, property and infrastructure, but also combine sustainability, architectural quality and economic efficiency.

In this area of conflict, high-pressure water mist has established itself as one of the most forward-looking technologies: it is effective, resource-efficient and architecturally flexible. The full potential of this technology is particularly evident in high-rise buildings, where space, weight and integrability play a decisive role.

Compared to conventional sprinkler systems, a high-pressure water mist system requires up to 90 per cent less extinguishing water. The reduced water consumption minimises secondary damage and operational downtime after a fire. The effectiveness of the technology has been proven for every application through full scale fire tests under real conditions.

The German company FOGTEC Fire Protection, based in Germany, Cologne, is one of the pioneers and technology leaders in the field of fixed fire protection systems using high-pressure water mist. In its almost 30 years of existence, the company has equipped



The high cooling effect of water mist

numerous buildings with fire protection systems based on high-pressure water mist. Its references range internationally from iconic high-rise buildings in the Middle East, such as the Mecca Royal Clock Tower, to innovative renovation projects in Europe, such as the Gasometer in Berlin.

SMALL DROPLETS, BIG IMPACT

The principle of high-pressure water mist is as simple as it is effective: water is forced through special nozzles at a pressure of around 100 bar, atomising it into droplets, some of which are microscopically small. This increases the reaction surface of the water more than a hundredfold. Upon contact with the source of the fire or the hot fire gases, the droplets evaporate in a fraction of a second; the resulting water vapour extracts heat from the environment and simultaneously displaces the oxygen.

The high cooling capacity of the water mist and the binding of smoke quickly lower the ambient temperature and improve visibility. This creates optimal conditions for evacuation and access for the fire brigade. At the same time, the building and adjacent areas are protected.

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TECHNICAL AND PLANNING ADVANTAGES

High-pressure water mist combines technical efficiency with planning freedom. Due to the low water volume, only small pipe sizes with a diameter of 12 millimetres to a maximum of 60 millimetres are required for main risers. This saves space, simplifies installation and allows integration even in filigree or listed structures. The high pressure enables stable system performance even across large building heights—a crucial aspect in high-rise buildings over 100 metres.

Modern systems, such as those developed by FOGTEC, have redundant pump modules and separate power supplies. This means that protection remains fully intact even in the event of partial failures or maintenance.

In addition, the systems utilise very compact pumps and significantly smaller water tanks. This is particularly important in high-rise buildings, as it means less static load, less space requirements and thus more usable space.

Another important aspect that is becoming increasingly significant is sustainability. High-pressure water mist works without chemical additives and is therefore harmless to humans and nature. The low water consumption also means that only a small amount of contaminated extinguishing water is produced. In addition, almost exclusively stainless-steel components with a long service life are used. The technology thus meets today's ESG (environmental, social and governance) requirements and contributes to environmentally conscious building operation.

STANDARDS AND TEST PROCEDURES AS A GUARANTEE OF QUALITY

The reliability of FOGTEC water mist systems is based on extensive full scale fire tests that demonstrate fire suppression, temperature control and damage limitation. The basis for the consistently performance-oriented testing approach are fire test protocols for office and residential areas, raised floors and suspended ceilings, as well as storage and technical rooms (VdS 3883-1/3/5 and EN 14972-2/3/6). The requirements for high-rise buildings with a height of more than 45 metres are described in the VdS 3188 standard.

FOGTEC has developed its systems on this basis and has certified them by independent testing institutes such as CNPP, IFAB, FM Global and TÜV. These tests ensure that each system not only meets regulatory requirements but also demonstrates its real performance in demanding applications—from office high-rises to car parks with electric vehicles.

THE GASOMETER IN BERLIN – SUSTAINABLE FIRE PROTECTION IN A LISTED STEEL STRUCTURE

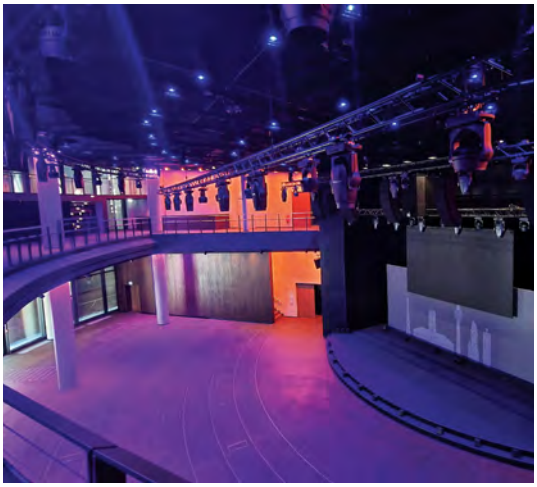
Few projects combine history and the future as impressively as the Gasometer in Berlin. Built in 1913 as a gas storage tank for a power plant, it has been converted in recent years into a modern 18-storey office tower. The characteristic steel structure and appearance of the building had to be preserved during the conversion, so the listed building was given a fully glazed façade behind the historic steel framework. In addition to offices, the Gasometer also houses event rooms, technical floors and a car park.

With a diameter of 60 metres and a height of 78 metres, the Gasometer is one of the three

The underground car park of the Gasometer for electrical vehicles

largest gas domes in Europe. The listed building placed the highest demands on fire protection. Exposed steel structures, a fully glazed façade and high ceilings called for a system that combined safety, aesthetics and technical feasibility. The engineering firm HHP therefore designed a VdS-approved high-pressure water mist system from FOGTEC.

The entire project was planned in Revit 3D so that spray obstacles could be taken into account. The building complex, consisting of offices, event areas, a technical floor and a car park, was equipped with an automatic wet system with glass bulb nozzles. Around 5,000 nozzles and 34 section valves are installed on the 18 floors. Redundant pump units and two water tanks in a pump room measuring just 25 square metres ensure an operating time of at least 60 minutes.



Event area of the Gasometer Berlin with a room height of 12 metres

Mecca Clock Tower

The effectiveness was validated in fire tests in accredited fire laboratories and witnessed by CNPP and IFAB. The scenarios in the event area with a room height of 12 metres and in the car park with electric vehicles were particularly challenging. In both cases, the high-pressure water mist reduced the temperature and heat radiation to a safe level within a few minutes. In the case of the electric vehicles, the propagation of fire to neighbouring vehicles was prevented.

Thanks to the small pipe diameters, the system could be seamlessly integrated into the historic steel structure. The gasometer thus exemplifies how modern fire protection, monument preservation and sustainability merge into a holistic solution with FOGTEC technology.

THE MECCA ROYAL CLOCK TOWER – FIRE PROTECTION AT A HEIGHT OF 600 METRES

Another exceptional example of the use of a high-pressure water mist system from FOGTEC is the Mecca Royal Clock Tower in Saudi Arabia. At 601 metres, the structure is one of the tallest buildings in the world and combines a hotel, museum, observatory and the world's largest clock.

The special fire protection requirements arose from the combination of steel construction in the upper part of the building, high fire loads and limited load-bearing reserves. A conventional sprinkler system is installed in the lower 400 metres of the hotel. However, for static and hydraulic reasons, a sprinkler system was not an option for the upper part of the Mecca Royal Clock Tower.

In close consultation with architects and fire protection consultants, a high-pressure water mist system from FOGTEC was therefore installed in the upper 200 metres — including the Royal Clock, the Islamic Museum and the observatory. The fixed system was supplemented by manual firefighting stations operated with the FOGTEC water mist lance.

Full scale fire tests proved the high efficiency of the technology even in exhibition rooms over 10 metres high. The result: reliable, resource-saving and space-saving fire protection in a building that is regarded worldwide as a symbol of technical and architectural excellence.

WATER MIST AS A FUTURE TECHNOLOGY IN HIGH-RISE CONSTRUCTION

With its combination of efficiency, sustainability and architectural flexibility, high-pressure water mist meets the key requirements of modern high-rise planning. The technology makes it possible to control fire risks without compromising on design or ecology.

In the wake of increasing ESG requirements, sustainable urban development and the digitalisation of buildings, water mist is becoming even more important. Systems such as those from FOGTEC can be integrated into smart building management systems, are low-maintenance and designed to last for decades.

Whether it's a historic conversion like the Gasometer in Berlin or a technical masterpiece like the Mecca Clock Tower, both projects show that high-pressure water mist isn't just a fire protection system, but an integral part of future-proof architecture.

FOGTEC stands for the combination of engineering, sustainability and safety — and for a technology that makes building at great heights safer, more efficient and more responsible.

www.fogtec.com

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