24th International Water Mist Conference 2025

High-rise Building Fire Protection with High-pressure Water Mist

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High-Rise Building Fire Protection

Content

- High-rise building fire protection
- Standards and fire test basis
- Case study project description
- Fire protection concept and system evaluation process
- System implementation
- Conclusion

High-Rise Building Fire Protection

Fire Protection in Urban Developments

- Cities grow taller and denser
- Fires in urban areas can rapidly spread causing loss of life and infrastructure
- Active firefighting systems have an important role to secure resilient communities
- Fire codes and standards provide the foundation for effective and reliable system
- Many countries have strengthened their regulations to address safety challenges

High-Rise Building Fire Protection

Motivation for Water Mist in High-Rise Buildings

- High cooling effect / Safe evacuation
- Minimal water usage, thus water run-off
- Hydraulic flexibility for great heights
- Small pipe sizes / Small water storage tanks
- Compensation of structural fire protection
- Architectural freedom for open space designs

Building Fire Protection with Water Mist

Water Mist Sprinkler Systems and Extinguishing Systems *VdS 3188en : 2019-10 (02)*

The water mist sprinkler systems described here are to be regarded as equivalent to sprinkler systems in accordance with VdS CEA 4001 in terms of reliability and effectiveness for the respective field of application.


Anerkennung
von Bauteilen und Systemen
Approval
of Components and Systems
VdS


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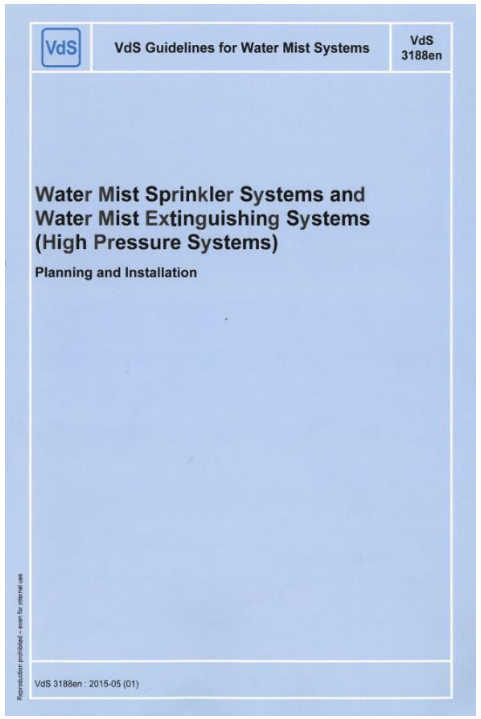
Comparison Fire Tests to Sprinklers

- VdS 3883-1/3/5 fire test protocols (corresponding to EN 14972-2/3/6) for
  - Office and accommodation areas
  - False floors and ceilings
  - Storage and technical areas
- Water mist systems must demonstrate fire control and damage limitation as well as temperature control
- Water mist system must meet at least the performance of an approved sprinkler system
- Component tests are carried out in analogy to sprinkler systems

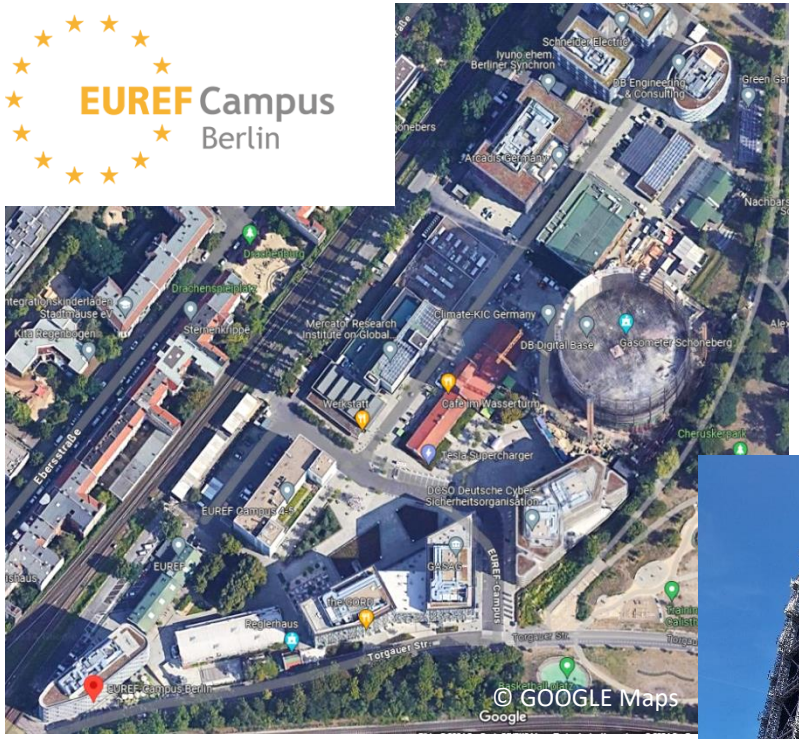
High-Rise Building Fire Protection with Water Mist



Extract from VdS 3188 water mist standards

- Annex E describes special requirements for high-rise buildings with more than 45 m height
- High-rise systems shall be designed for an area of operation of at least 216 m²
- System shall be zoned so that each zone is not larger than 5.000 m² and does not cover more than one floor, which may contain one mezzanine floor of not more than 100 m²
- Installation shall have at least a superior single water supply, thus water storage for the full operation time and the pump system shall contain at least one additional pump module
- Power supply shall be provided from two independent sources

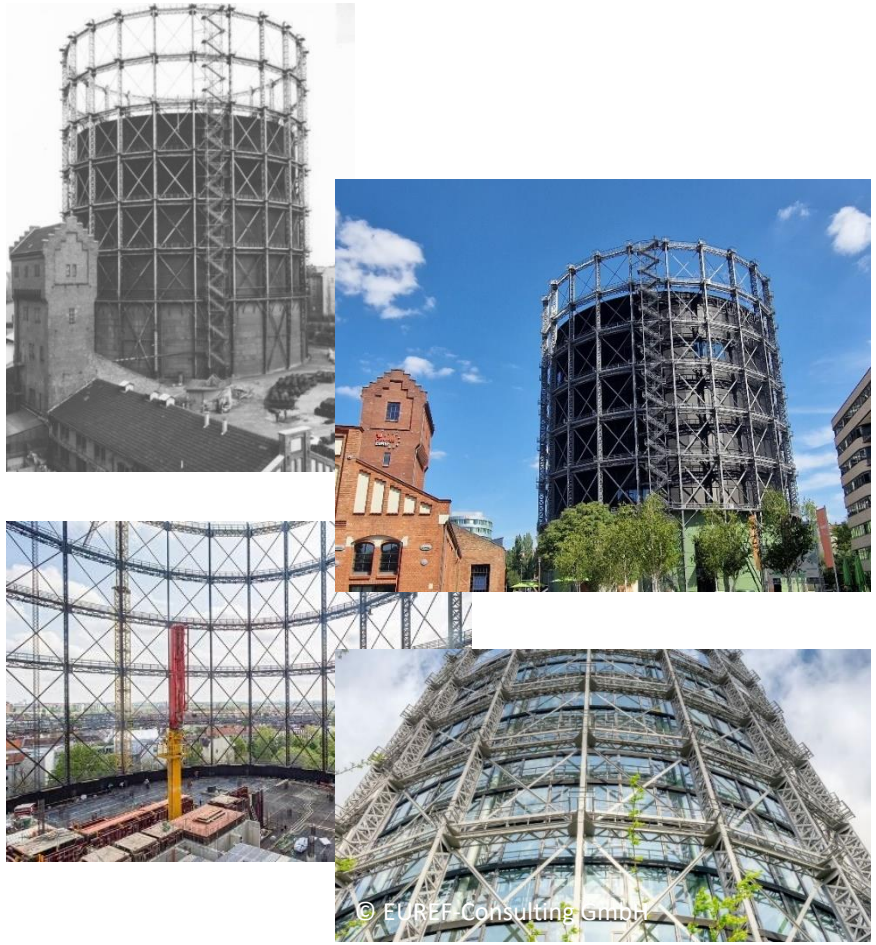
Gasometer High-Rise Building in Berlin



Project Description

- New landmark as part of the EUREF Campus in Berlin
- 50 km^2 city district with 150 enterprises and institutions
- 5.000 employees active at the EUREF Campus in the fields of energy, mobility and sustainability

Gasometer High-Rise Building in Berlin



Project Description

- Gasometer was erected in 1913 as gas dome for a power station
- One of the three largest gas domes in Europe with 60 m diameter and 78 m height
- Listed historical monument
- Since 2021 re-modelling to an office building with 18 floors and 34.000 m^2 as part of the EUREF Campus
- Steel frame and building appearance had to remain
- Building re-construction with full glass facade behind the steel frame
- Besides offices, the building contains event locations, technical floors and a parking garage

Gasometer High-Rise Building in Berlin

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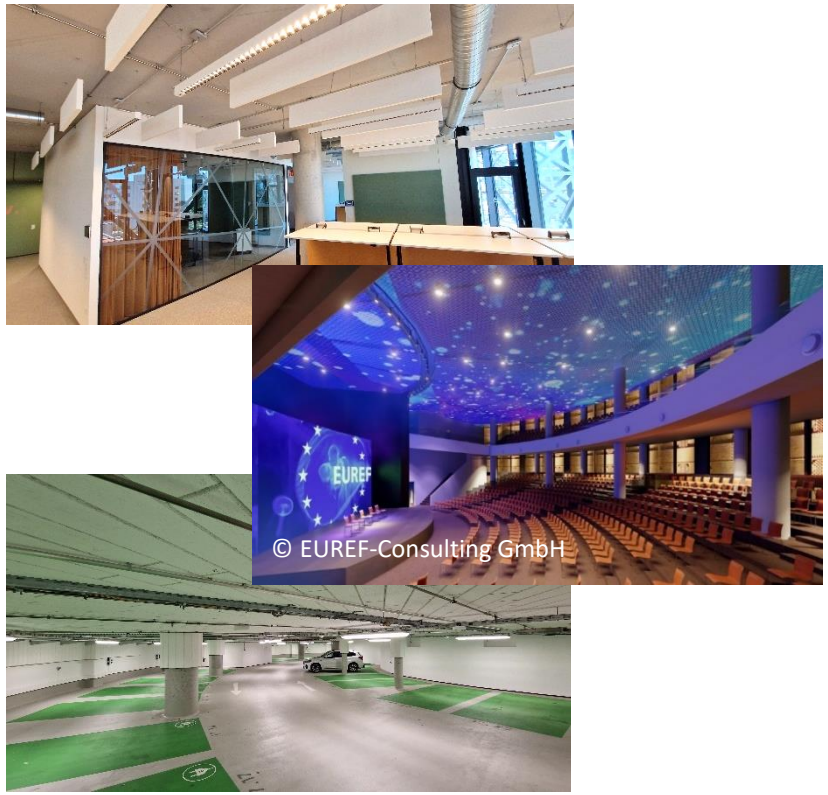
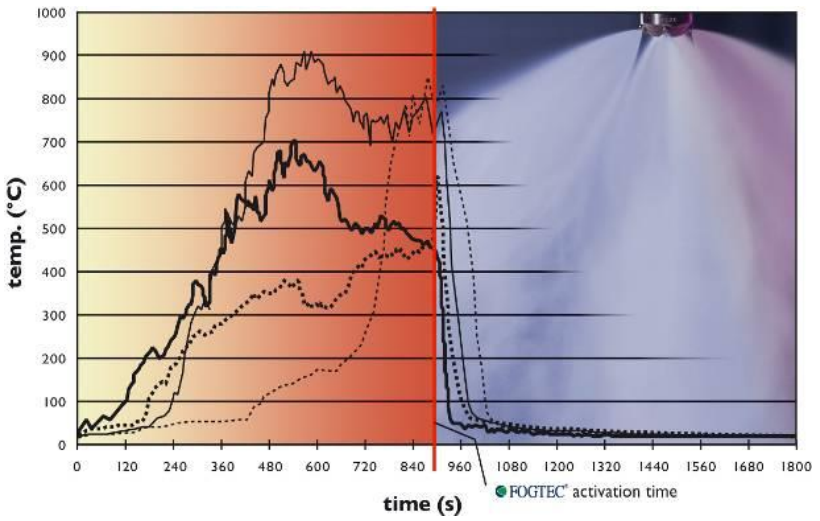


Fire Protection Concept

- Global reconstruction of the building required installation of an active firefighting system in the entire building
- Fire consultant and engineering office HHP specified a high-pressure water mist system to fulfil requirements for life safety in high-rise buildings and to compensate for exposed glass and steel structures
- Protection of offices, public spaces and technical floors by applying a VdS approved system based on VdS 3883 fire test protocols
- Fire risk assessment and evaluation of the protection concept based on full scale fire test results in accordance with EN 14972 for event areas and the car park with electric vehicles

FOGTEC® FIRE PROTECTION

Gasometer High-Rise Building in Berlin



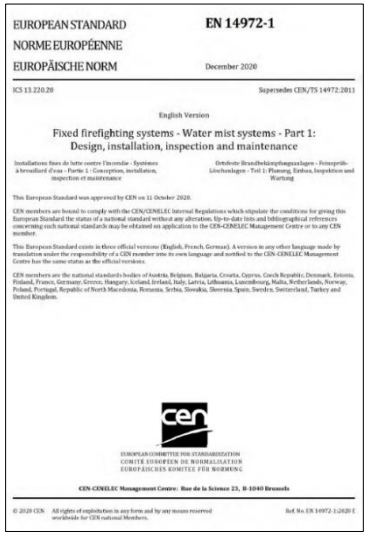
sustainable! eco-friendly! reliable & flexible!

Decision Making for Water Mist

- Water mist offers high cooling ability and partly reduces smoke spread, thus creates tenable conditions for evacuation and access to fire services
- Compensation of structural fire protection for glass facades and exposed steel structures
- Water damages and operation interruptions are reduced to a minimum in case of system activation
- Hydraulic flexibility for extended heights due to high pressure loss allowance
- Technology 100% full scale fire tested for each application
- Eco-friendly and sustainable technology with long life cycle due to corrosion resistant stainless-steel components

FOGTEC® FIRE PROTECTION

Evaluation Process Event Area


EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 14972-1

December 2020

ICS 13.220.20

Supersedes CEN/TS 14972:2011

English Version

Fixed firefighting systems - Water mist systems - Part 1: Design, installation, inspection and maintenance

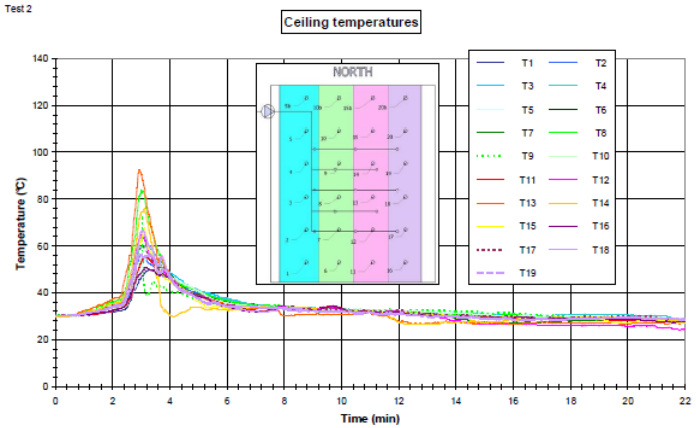
Fire Test Validation

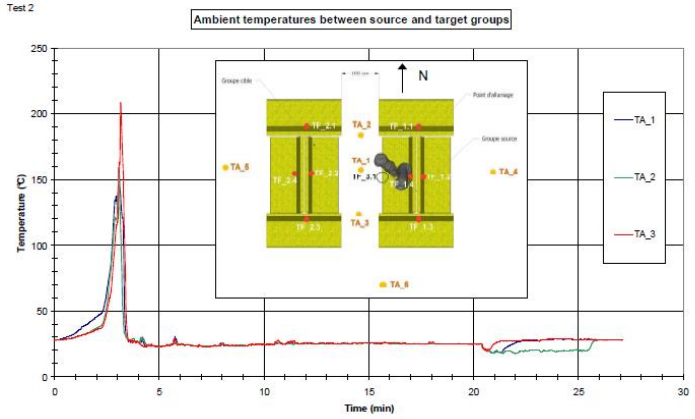
- Evaluation process conducted by ISO 17025 accredited fire laboratory CNPP based on EN 14972 A1 standard
- Fire tests defined with standardized fire loads and ambient conditions reflecting the reality as close as possible

Evaluation Criteria

- Temperature reduction at ceiling and in the vicinity of the fire
- Reduction of heat radiation
- Fire control and suppression to avoid fire propagation to the target sofas

Fire Tests for Event Area





Fire Test Under 1 and 4 Nozzles

- Ceiling mounted automatic glass bulb nozzles in 12 m height
- Fire test duration 30 minutes
- Nozzle activation within 3 minutes
- Rapid temperature and heat radiation reduction
- Fire controlled / No fire propagation to target sofas

Evaluation Process Car Park Area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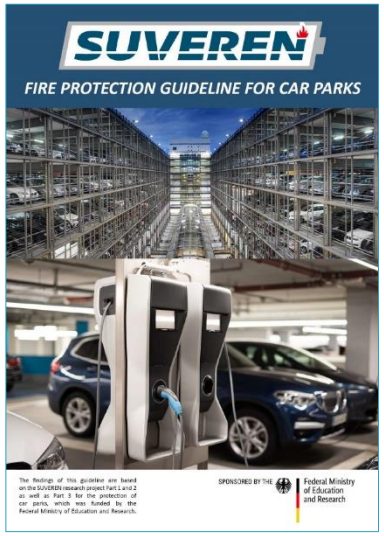
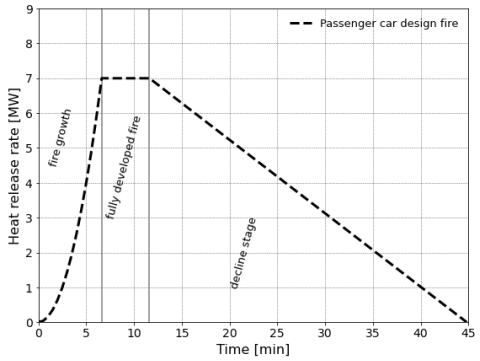




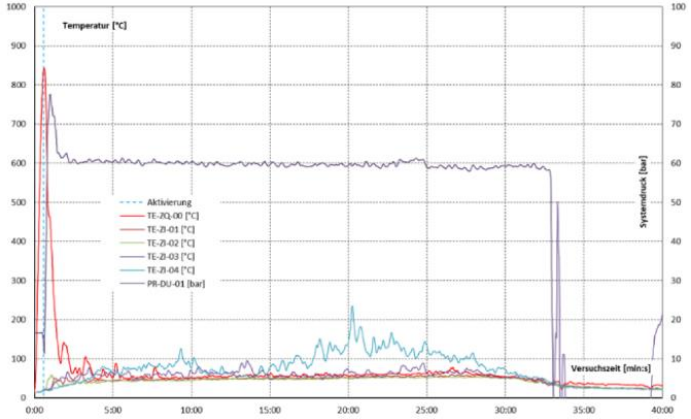
Fire Test Validation

- Evaluation process conducted by ISO 17025 accredited fire laboratory IFAB based on EN 14972 A1 standard
- Fire tests developed based on SUVEREN research project including electric vehicles with HRR of 7 MW

Evaluation Criteria

- Temperature reduction at ceiling and in the vicinity of the fire
- Fire control and suppression to avoid fire propagation to adjacent vehicles

Fire Tests for Car Parks

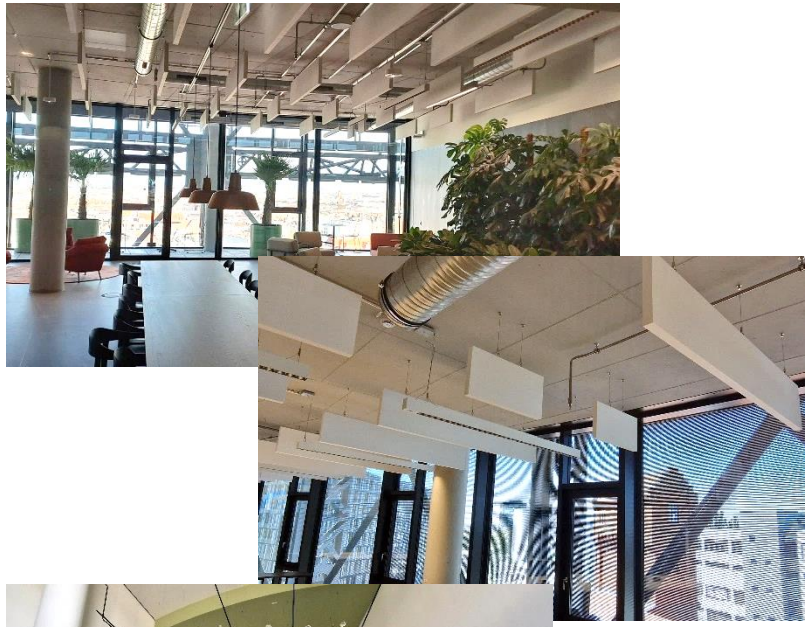


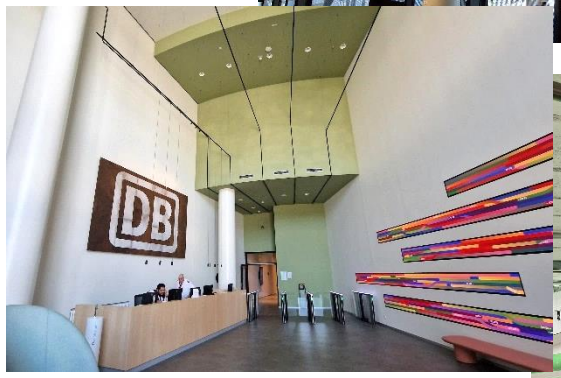
Fire Tests

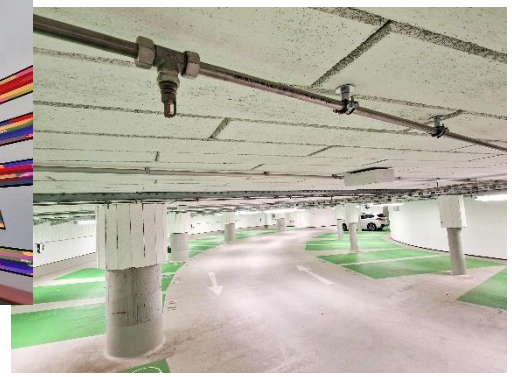
- Ceiling mounted automatic glass bulb nozzles
- Fire test duration 30 minutes
- Nozzle activation within 2 minutes
- Rapid temperature and heat radiation reduction
- Fire controlled / No fire propagation to targets

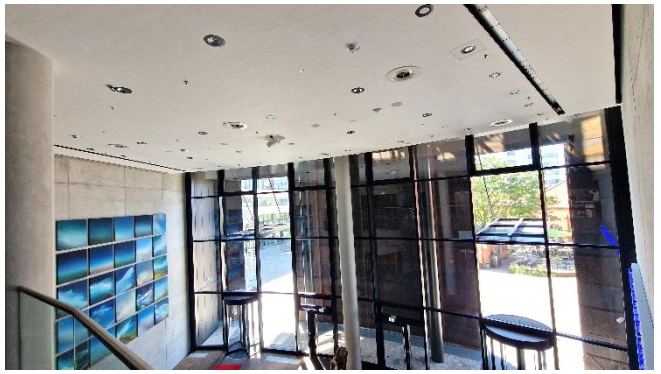
Comparison Fire Tests for Car Parks

Gasometer High-Rise Building in Berlin





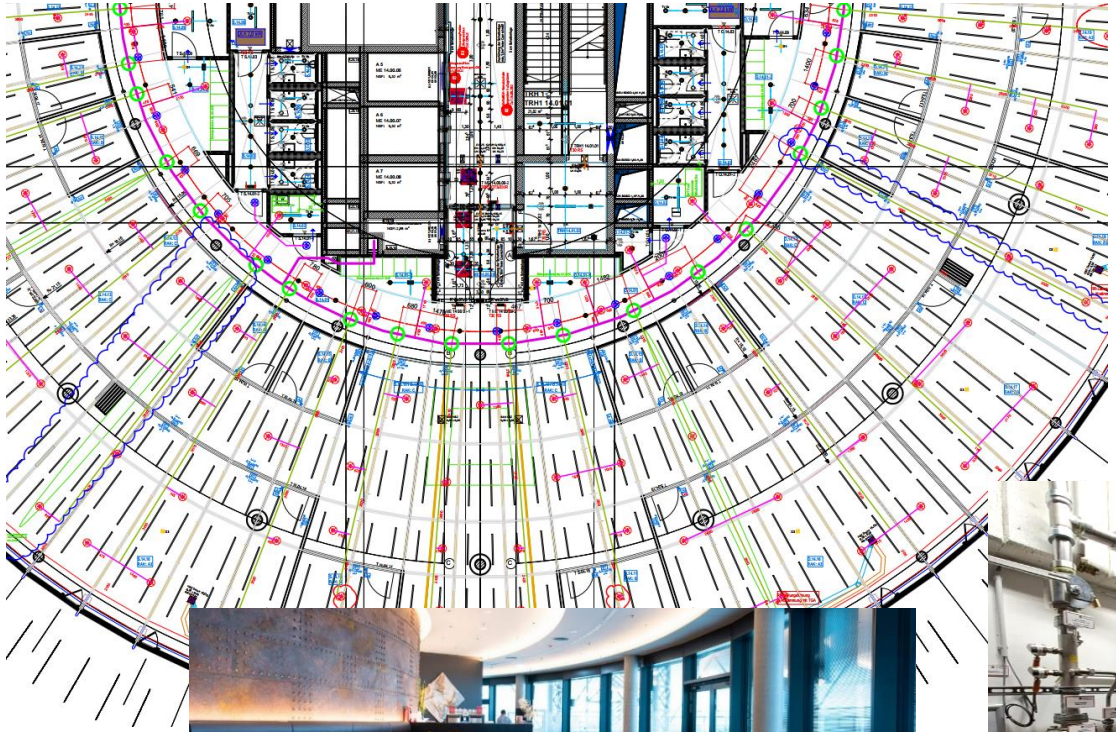




Water Mist System Implementation

- Protection of all offices, public areas and technical floors with an automatic wet system with glass bulb nozzles based on VdS system approval
- Tenant is Deutsche Bahn with 2.000 employees
- Special spray test to account for spray obstructions by ceiling panels / Adjustment of panels
- Transfer of fire test results for high areas to the entrance hall, the event area (Forum) and the car park

Gasometer High-Rise Building in Berlin



System Design and Installation

- Entire project planned in Revit 3D
- Coordination with spray obstructions
- Small bore pipework (12 to 35 mm) for installation with compression and press fittings
- 4.970 automatic glass bulb nozzles
- Operational area 216 m^2
- Two separate risers (60 mm) supply each floor
- 34 section valves (2 per floor)
- Final system inspection by TUV

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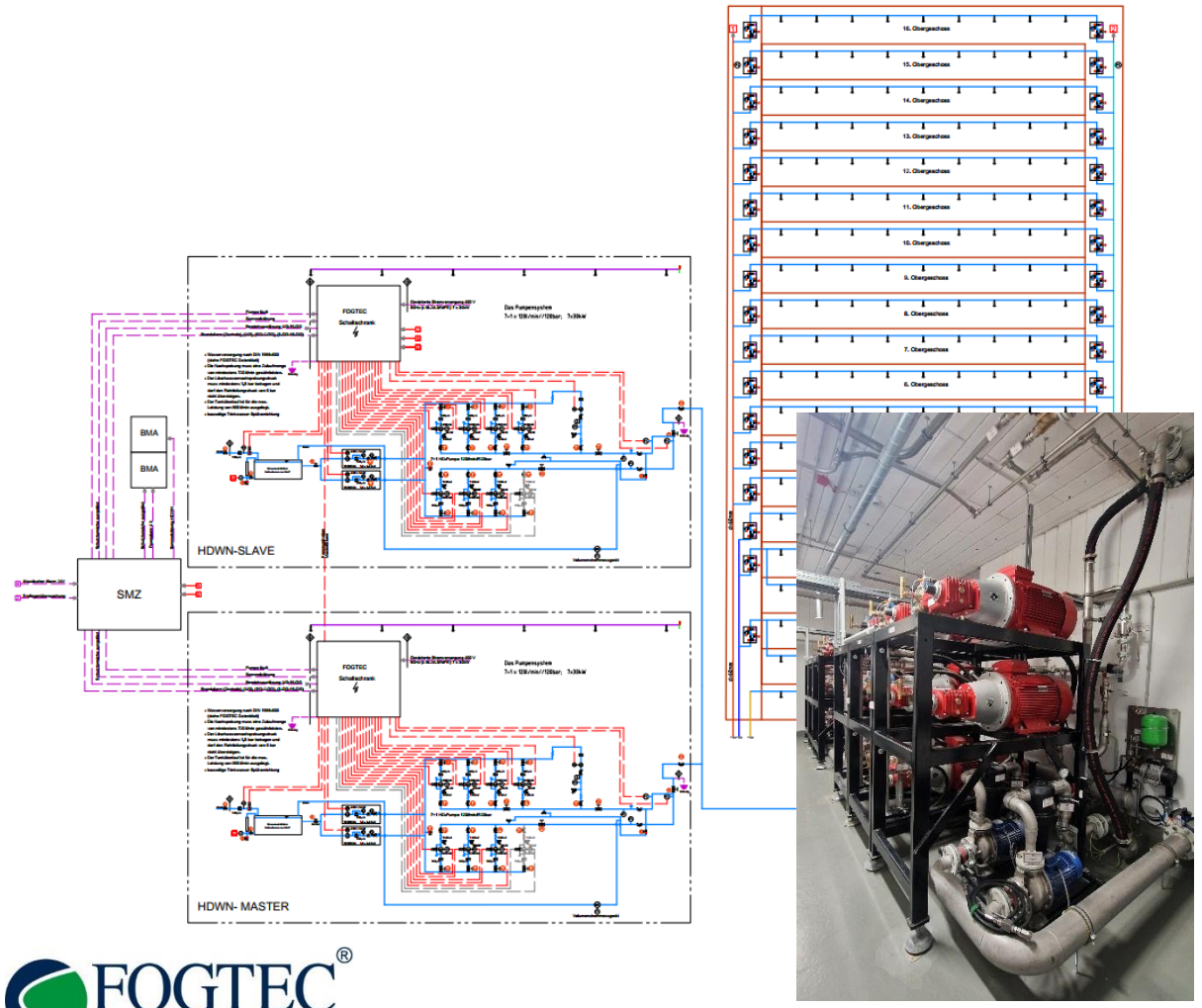

Water Mist System Pump Room

- Small pump room with only 25 m^2
- Two fully redundant pump units with each 7+1 x 120 l/min flow rate at 120 bar
- Two redundant water tanks with 50 m^3 securing minimum 60 minutes operating time of the water mist system
- Water supply from the tank to the high-pressure pump unit via redundant booster pumps and filtration units
- Power supply from two independent sources

High-Rise Building Fire Protection

Conclusion

- Water mist is identified as attractive agent for fire protection in high-rise buildings
    - Enhanced cooling eases evacuation by providing safe escape routes, creating safer conditions for fire services and compensating structural fire protection for glass facades and exposed steel structures
    - Minimized water usage reduces consequential damages and operation interruptions in case of system activation
    - Small bore pipework, compact system components and small water storage requirements ease water mist system integration
    - Water mist meets ESG requirements of modern buildings since the technology is eco-friendly and sustainable

Thank You for Your Attention

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