

State of the Art Fire Protection for the Centre of Islamic Civilization in Tashkent

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Centre of Islamic Civilization in Tashkent



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- Project description
- Fire protection concept and challenges
- Evaluation process including fire test basis
- System implementation
- Conclusion

Museum and Heritage Building Protection



Fire Protection

- Active firefighting systems have an important role in securing safe evacuation conditions in public buildings
- Fire codes and standards provide the foundation for effective and reliable system
- Many countries have strengthened their regulations to address safety challenges
- Water mist technology is applied for fire protection of water sensitive structures and contents
- Heritage buildings, museums and exhibition areas are protected by water mist systems for 30 years in Europe and other parts of the world

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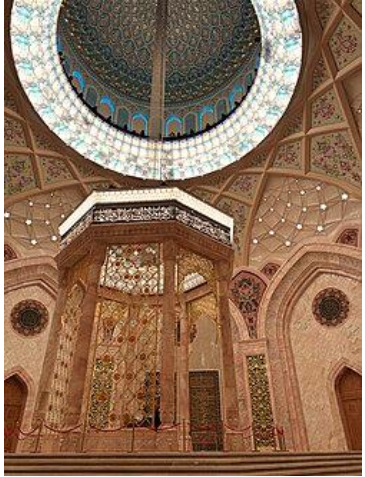


Source: Centre of Islamic Civilization

Project Description

- Large cultural, educational and research complex built in the historic Hazrati Imam district of Tashkent initiated by the president of Uzbekistan
- Financing of the project by donation of Alisher Usmanov
- Museum, libraries, research and educational departments housing rare artifacts and 200.000 archival documents with interactive exhibits tracing Central Asia's Islamic heritage in algebra, astronomy, medicine, and calligraphy
- 145 m by 115 m three story building with a 65 m central dome decorated with ancient architectural motifs
- Centrepiece is the Quran hall with one of the oldest manuscripts
- Daily 5.000 visitors
- Project start in 2017 with opening in March 2026

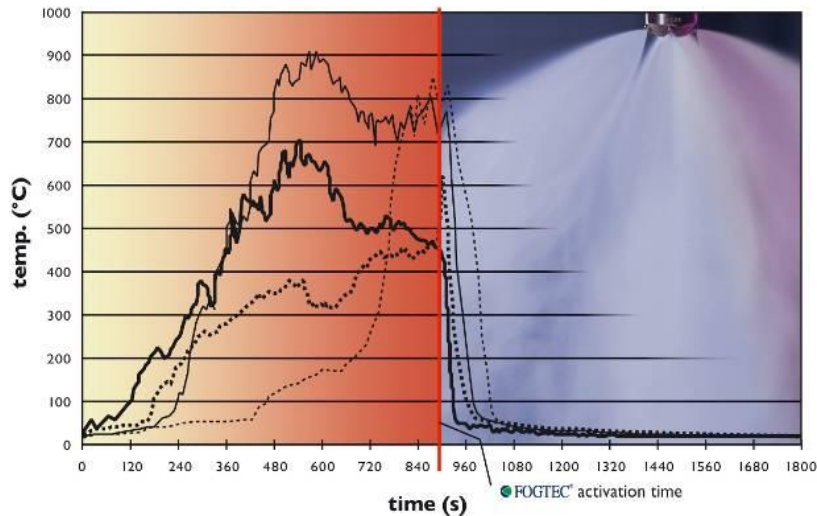
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Fire Protection

- Building with interior steel structure and outer cladding required an automatic fire fighting system
- Wide open spaces in the 15.000 m² exhibition area required compensation by an automatic fire fighting system to prevent fire propagation and to secure safe escape conditions
- Combination with hose reels for manual fire intervention, particularly for areas with great ceiling height (e.g. Quran hall with 55 m height)

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Motivation for Water Mist Technology

- Water mist technology offers high cooling ability and partly reduces smoke spread, thus creates tenable conditions for evacuation and access to fire services
- Water damages to valuable exhibits and museum operation interruptions are reduced to a minimum
- Technology 100% full scale fire tested for each application including public spaces, exhibition areas and libraries
- Eco-friendly and sustainable technology with long life cycle due to corrosion resistant stainless steel components

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Protection Concept

- Protection of exhibition and library areas applying a VdS approved system based on VdS 3883 fire test protocols

Project Challenges

- Exhibition areas with greater heights
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- Fire risk assessment and evaluation of the protection concept based on specific full scale fire tests
 - Adoption of manual water mist firefighting technology to wall hydrant system within the building

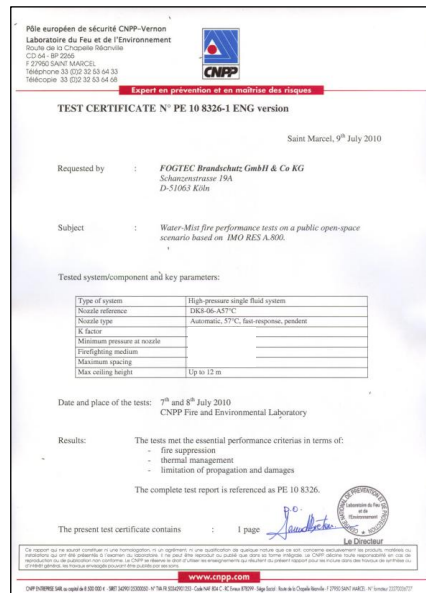
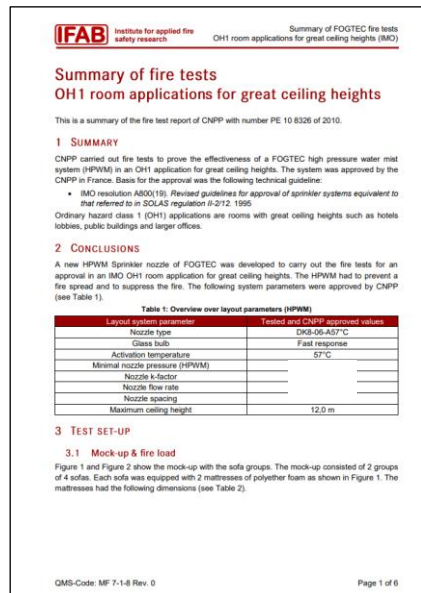


Evaluation Process

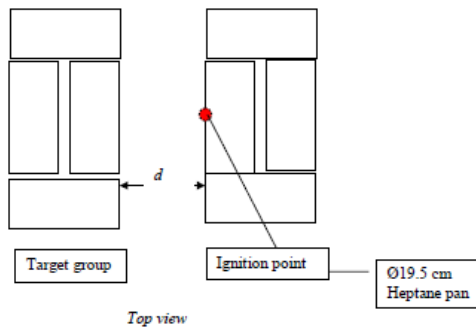
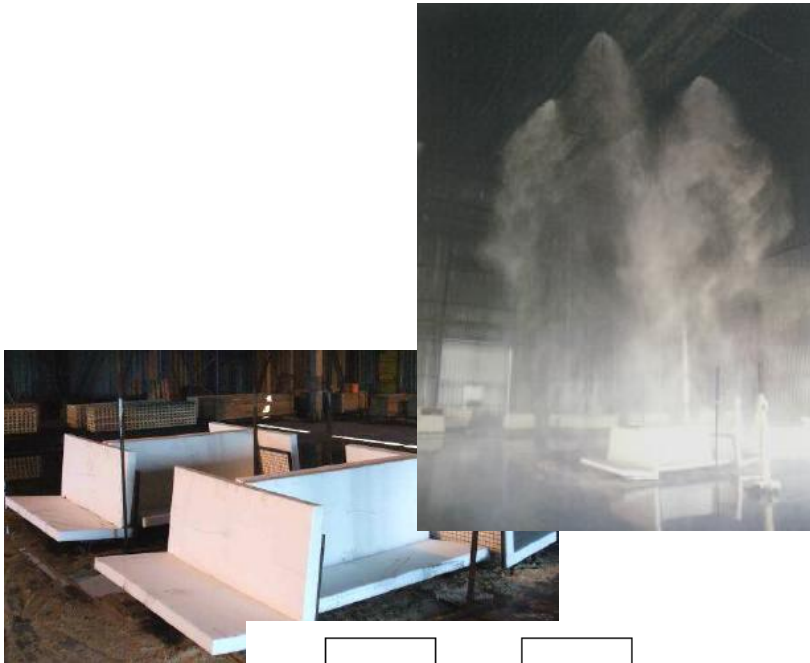


Fire Test Validation

- Evaluation process conducted by ISO 17025 accredited fire institutes and laboratories
- Full scale fire test scenarios developed in conjunction with independent fire test laboratories based on published fire test protocols
- Fire tests with standardized fire loads and ambient conditions reflecting the reality as close as possible



Fire Tests for Greater Heights



Fire Test Scenario

- Test hall of 30 m x 20 m floor area with open perimeter ceiling at 12 m height
- Natural ventilation conditions / No enclosure effect
- Fuel package adapted from IMO A800, respectively EN 14972-3, with 2 groups of 4 sofas each made of polyether foam
- 50 cl Heptane as igniter, being placed under the centre sofa
- Fire tests under one and between four nozzles
- Automatic glass bulb water mist nozzles
- Fire test duration 30 minutes

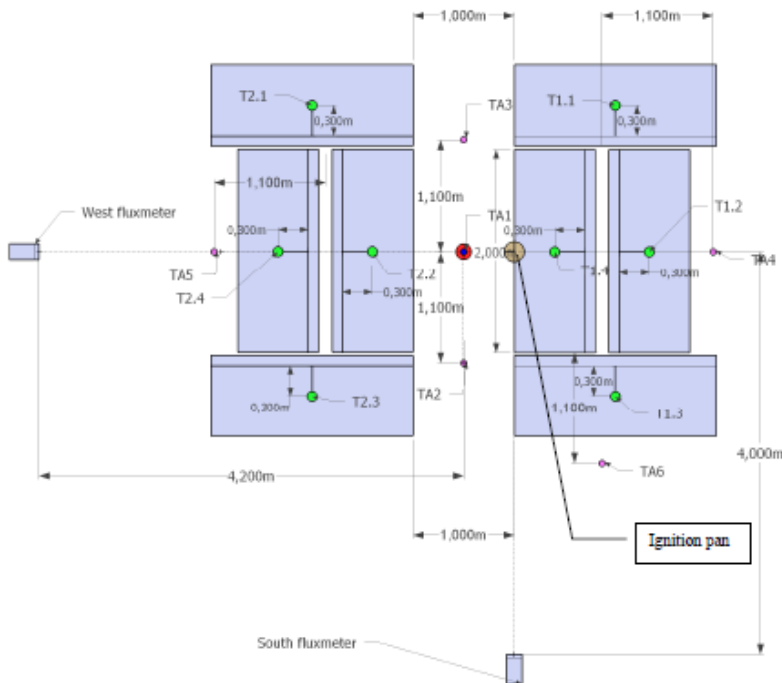
Fire Tests for Greater Heights

Measurements

- Temperature at sofas (T1.1 to T1.4 and T2.1 to T2.4)
- Ambient temperature at 1,5 m height above floor (TA1 to TA6)
- Ceiling temperatures
- Heat flux

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

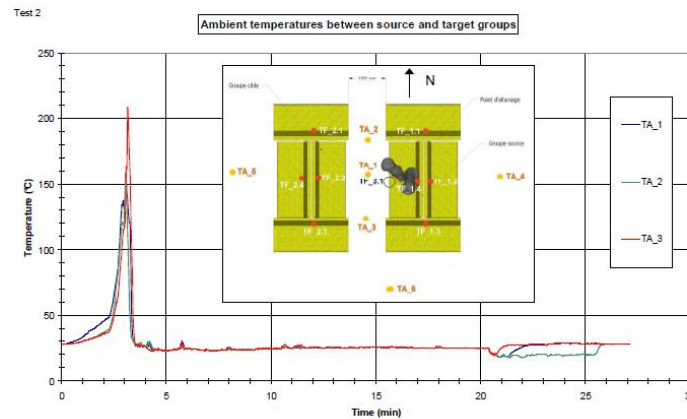
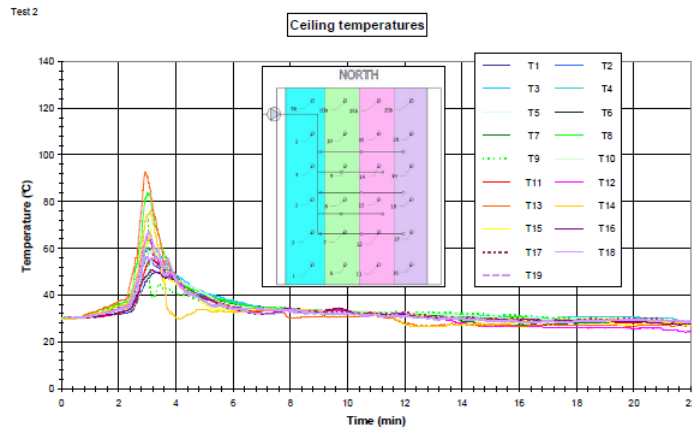


Fire Tests for Greater Heights



Fire Test Under 4 Nozzles

- Activation of 4 nozzles within 3 min (repeated fire tests)
- Rapid temperature and heat radiation reduction
- Fire is controlled / No propagation to target sofas

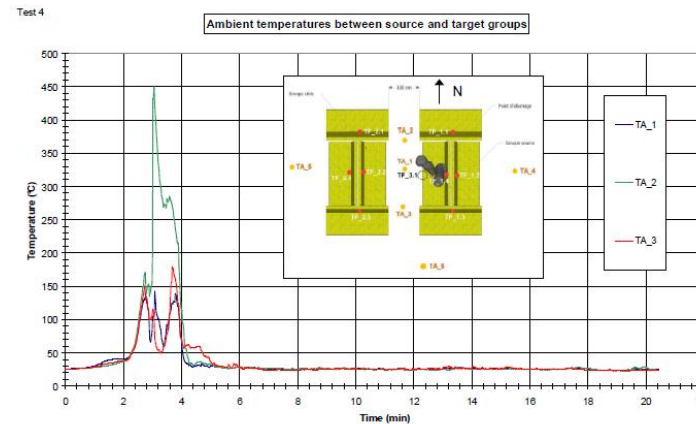
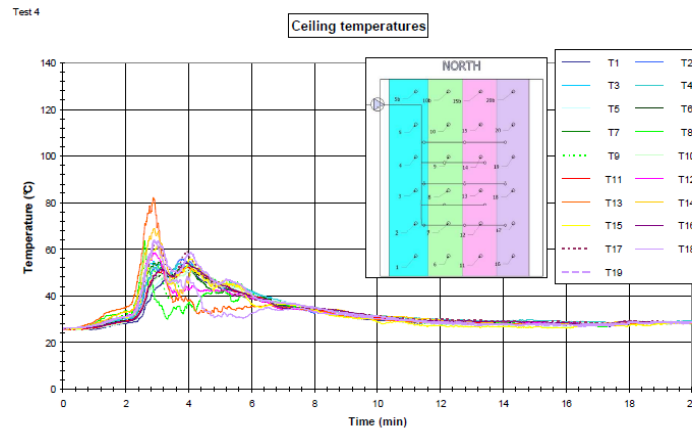


Fire Tests for Greater Heights

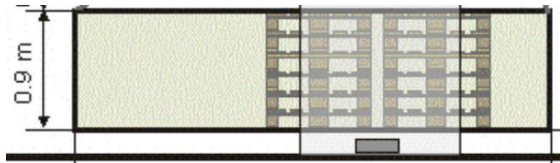
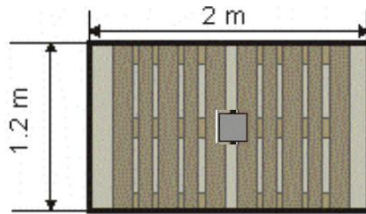


Fire Test Under 1 Nozzle

- Activation of 3 nozzles within 3 min (repeated fire tests)
- Rapid temperature and heat radiation reduction
- Fire is controlled / No propagation to target sofas



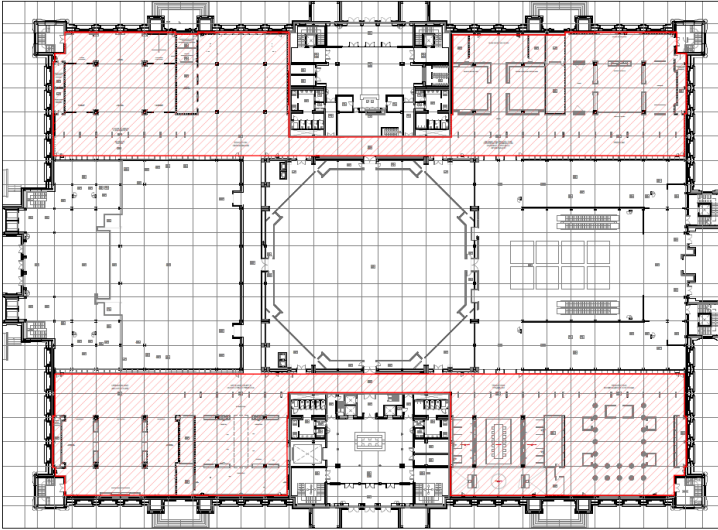
Fire Tests for Manual Intervention Units



Fire Tests

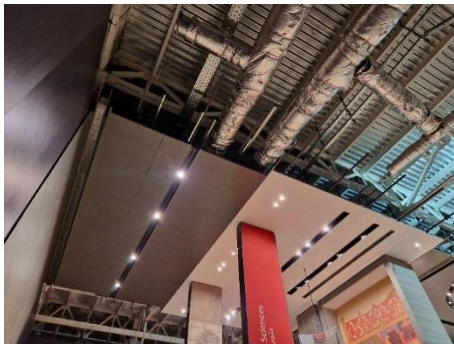
- Fire tests according to EN 3-7 scenario
- Two piles of each 6 wooden EUR pallets
- Natural ventilation conditions
- Ignition via a 0,9 m x 0,6 m x 0,1m fuel pool fire under the pallets
- 8 minutes free-burn before fire fighting
- Extinguishment achieved in less than 2 minutes (repeated fire tests)
- No re-ignition

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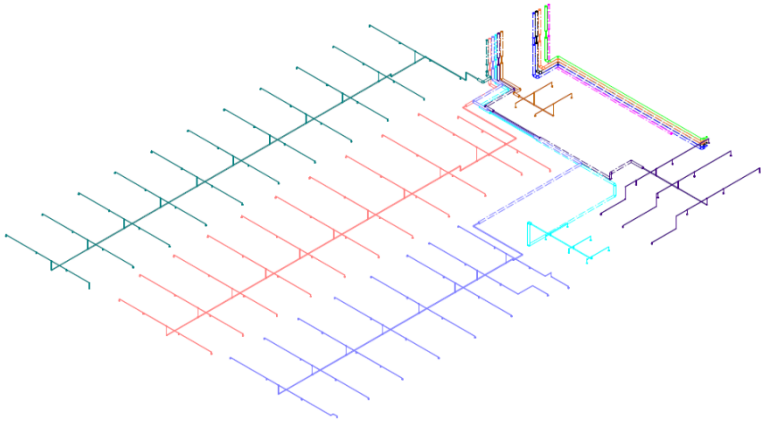
Transfer of Fire Test Results - Exhibition Areas

- Fire risk assessment determined the need of protection of all exhibition areas
- Building structure connects several halls without fire partitions
- Automatic wet system with 1380 glass bulb activated nozzles for room and false ceiling protection
- Exhibition area room height up to 8 m and false ceiling height up to 1,8 m
- 216 m² operation area
- System design based on DIOM manual
- Combination with 26 hose reels with 30 m hose and water mist gun at strategic positions

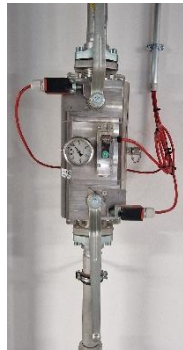


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Design and Installation



- Entire project planned in 3D
- Close co-ordination and supervision of nozzle positioning and hydraulic pipe dimensioning between manufacturer and local contractor
- Small bore pipework for installation
- Press fittings assure quick installation and highest reliability
- 16 section valves for system zoning



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Pump Room

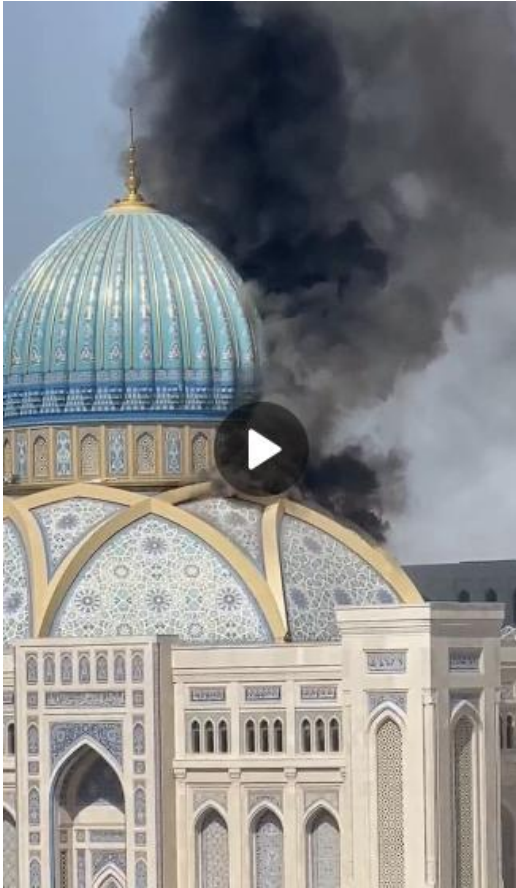
- Small pump room with less than 30 m²
- Pump unit with 5+1 x 120 l/min flow rate at 120 bar incl. redundant pump
- 60 minutes operating time requires 36 m³ water supply
- Water supply from the tank to the high-pressure pump unit via booster pumps and filtration units
- 4 alarm valves within the pump room



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Fire during Construction

- On 19 August 2025 a fire broke out during the installation of insulation materials on the roof of the cupola
- Firefighting and rescue teams could bring the fire under control
- Event led to extension of the automatic fire protection system to the inner roof structure

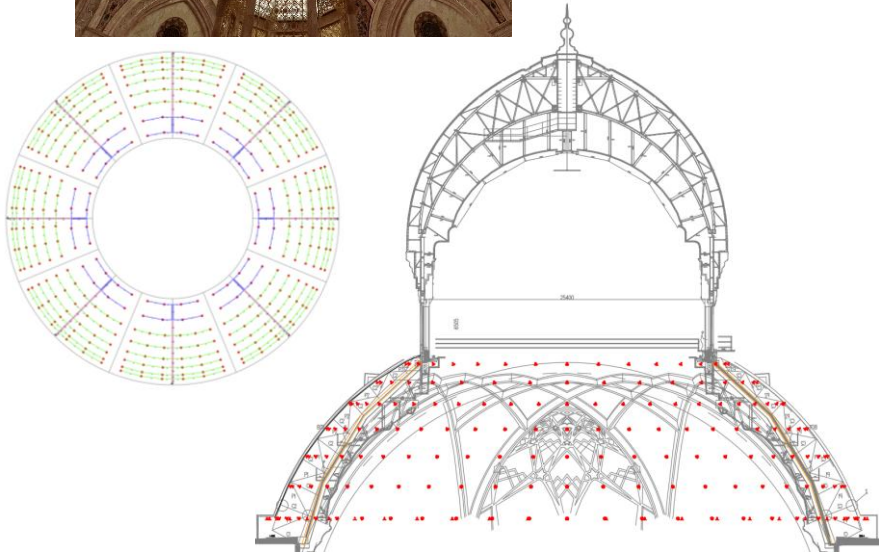


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Water Mist System Extension

- Deluge system with 420 open nozzles to protect the inner steel dome structure based on fire tests for greater heights
- System divided in 23 zones by deluge section valves activated by separate detection system
- Pump dimensioning for activation of 3 adjacent zones
- Combination with 13 hose reels with 30 m hose and water mist gun at strategic positions within the roof structure
- Additional separate pump unit with 8+1 x 120 l/min flow rate at 120 bar incl. redundant pump



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Conclusion

- Water mist has been identified as the best suited agent for fire protection of the building due to
 - Enhanced cooling eases evacuation by providing safe escape routes and creates safer conditions for fire services
 - Minimized water usage reduces consequential damages and exhibition operation interruptions in case of system activation
 - Small bore pipework, compact system components and small water storage requirements ease water mist system integration

Thank You for Your Attention



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