

Case story | SEM-SAFE® high-pressure water mist system in heritage building

# Museo Paolino library, one of the most precious libraries in the world, is **protected with SEM-SAFE®** high-pressure water mist system

Danfoss Fire Safety A/S



## Preserving heritage, protecting life & extinguishing fires with SEM-SAFE®

The **Vatican Museums** are public art and sculpture museums. They contain the world's largest collection of art and are some of the most visited museums in the world. Covering an area of 43,000 m<sup>2</sup>, the Vatican Museums are the 5<sup>th</sup> largest museums in the world, including 1,400 rooms, chapels and galleries.

The library nearby the Gregoriano Profano Museum and Pio Christiano Museum has undergone extensive renovation in order to meet the modern requirements of fire safety and security.

Two essential aspects were considered when choosing the fire safety technology for the building. First, the people working or studying in the library must be protected by a reliable fire fighting technology that offers the best possible protection, while being harmless to people. Second, the library contains books mainly from the 19<sup>th</sup> and 20<sup>th</sup> centuries. Thus, the technology should keep water damage to a minimum in addition to rapid system activation and excellent fire control. With these two key parameters in mind and a good collaboration between Danfoss Fire Safety and the project's decision-makers, SEM-SAFE® high-pressure water mist system was chosen for the fire safety of the entire library.

## Improved fire safety

A compact **SEM-SAFE® high-pressure water mist pump unit** with 2 pumps is installed. It has a small footprint.

A single interlock pre-action system was chosen according to EU Standard CEN TS 14972:2011. The pipe system is dry, and nozzles are closed (with bulb). When a fire is detected by the early-warning automatic fire detection system, a signal is set to open the pre-action section valve. Water flows into the pipe system and only nozzles with broken bulbs will be activated. Bulbs break when the temperature rises to a certain level in the room. This means that only areas affected by fire will be actively sprayed with water mist.

The **SEM-SAFE® high-pressure water mist nozzles** installed in the library are small, have a beautiful aesthetic design and blend with the room's style.



The SEM-SAFE® high-pressure water mist system provides reliable fire safety for the historical and valuable pieces in the Vatican library. Picture shows interior of the library.

## Customer first

Our priority is the customers' needs and ensuring that the project and installation are as smooth as possible.

**Danfoss Fire Safety provided a full engineering package,** including layout drawing, section drawings to understand positioning for piping and assembly details, nozzle layout arrangement, hydraulic pressure drop calculation, detailed mechanical design of the pump room, water tank size specifications and arrangements, BMS low voltage electrical cabling, P & ID drawings, technical description for the system, bill of material and a design, installation, operation and maintenance manual.

## Challenges & smart solutions

There are always challenges when planning a new system in a heritage building, where any renovation must be in line with the preservation of the architectural features. In addition, the entire area is "packed" with historic buildings that must not be affected by the work on the library.

The stainless-steel pipes used in the SEM-SAFE® system provide a great advantage. The pipes have small diameters. Thus, there is no need to drill big holes in the walls, and they can easily be bent to access any difficult and tight places.

The built-in shelves in the library were placed too high, therefore they prevented the original installation plan. The minimum distance between the ceiling and the shelves is 500 mm. To solve this, piping was re-arranged to fit the height of the shelves, while complying with the safety regulations.

### Small pump unit footprint - great solution for tight spaces

Due to limited space in the Vatican Museums, the pump room was built underground in the garden, where careful consideration and care was given to the trees above. With a small footprint and compact design, the SEM-SAFE® pump unit fit easily in the room. Installing the pipe network from the pump room to the protected areas was significantly aided by the flexibility of the small-diameter stainless-steel pipes.



SEM-SAFE® high-pressure water mist nozzle with stainless steel Ø12 mm pipe.



## Key benefits

- ✓ **Lowest possible water damage.** Clean water is forced through the small-diameter stainless-steel piping network to the SEM-SAFE® nozzles. In contrast to traditional sprinklers, the SEM-SAFE® high-pressure water mist system uses less water and produces a high level of atomization.
- ✓ **100% harmless to people.** The technology is safe for people and climate-friendly.
- ✓ The small diameter pipes make the system **easy to retrofit**, without damaging the building's structure.
- ✓ **Fast system activation** in the area where fire is detected, for effective control of the fire.
- ✓ **Reliable fire fighting** due to excellent cooling properties, including capture of soot particles and reduction of heat.