

Translated from German by AQUASYS

INNOVATIVE HIGH-PRESSURE WATER MIST TECHNOLOGY FROM AUSTRIA

Both local and international companies have been relying on the high-pressure water mist technology of AQUASYS for many years, which differs significantly from conventional sprinkler and gas extinguishing systems due to its excellent effect. A reason to bring the local company, which is also at home in Linz, to the curtain for once.

*An introduction to this technology by Josef Hainzl,
managing director of AQUASYS in Linz*

High-pressure water mist systems (HPWM systems) offer unique possibilities for active fire fighting even under critical conditions through the use of innovative spray technology and high quality materials. They are used especially where different fire loads can occur at the same time,

special values must be protected, productivity in industry must be maintained or critical infrastructure must be secured. A great advantage is that even liquid fires without the addition of chemicals, e.g. fuels can be effectively controlled with pure water.

Reliable fire fighting from Austria

AQUASYS was founded in 1993 as part of a family owned compa-

ny group and is a pioneer in the development and manufacture of high pressure water mist fire fighting systems. According with our motto "Fire Fighting is Responsibility", we play our part as a reliable Austrian manufacturer, system integrator and contact person for safe and efficient fire protection. AQUASYS combines product development, active research, implementation of 1: 1 real fire tests, simulations, project management,

The nozzles produce a water droplet size between only 0.050-0.300 mm! The system works with a pressure between 35 and 140 bar.



design, installation of the systems, commissioning, customer training as well as service and maintenance under one roof. Made by AQUASYS guarantees high quality and efficient fire protection solutions „Made in Austria“. Both, local and international companies have been relying on AQUASYS high-pressure water protection technology for years, which differs significantly from conventional sprinkler and gas extinguishing systems due to its excellent effectiveness

The operating principle explained simply:

The function of the system is based on the use of water, which flows at high pressure through stainless steel pipes and specially developed and manufactured nozzles and thereby generates extremely fine water mist with a droplet size between 0.050-0.300 mm. The high-pressure water mist spreads three-dimensionally in the room within a few seconds and completely fills it with a full mist. High-pressure water mist systems

work with a pressure between 35 and 140 bar, depending on the application, whereby the droplets receive the kinetic energy they need to reach even remote points in the protected area and withstand both thermal forces and existing ventilation currents. Especially when fighting hidden fires (for example due to enclosures or various interfering contours), the high-pressure water mist can unfold its full effect through this 3-dimensional spread, similar to a gas extinguishing system.

Due to the complete filling of the fire area with water mist and the natural thermals of the fire, which almost „draws in“ oxygen from the environment, the high pressure water mist is optimally supplied to the fire. With sprinkler systems, the very large drops (1 to 5 mm) compared to HPWM falls to the ground, comparable to rain. Only those water droplets that can directly hit the fire or the immediate surroundings from above achieve an effect. Depending on the size of the fire at the time it was triggered, for example 1m² a large part of the water of a typical



Fire tests are carried out for the further development of the system again and again.

effective area of 16-20 m² is lost, or causes damage or problems elsewhere.

Physical effects:

Due to the high temperatures above or in the immediate surroundings of the fire, the water mist floating in the room begins to evaporate. The phase transition from liquid



to vapour makes use of 2 physical effects:1. Each of these very small droplets requires only a small amount of heat from the fire for evaporation, but the simultaneous evaporation of a very large amount of these tiny droplets removes massive amounts of energy from the fire. Expressed in numbers, this means that when one litre of water evaporates per second, energy of 2.26 MJ is

extracted from the fire! Due to the space-filling effect and the permanent feeding of new droplets, in addition to the massive cooling effect, this also results in very good shielding from heat radiation and thus insulation of the fire. 2. The second effect uses the resulting vapour. When water is evaporated, the volume is multiplied by a factor of 1,675! That means: one liter of water pro-

duces 1,675 liters of water mist after evaporation. This increase in volume leads to a partial displacement of the oxygen and thus to a reduction in the proportion of oxygen near the fire. Even reducing the oxygen content by a few percent, which is completely harmless to humans, has a significant effect on the combustion process!

Innovative spray technology with a proven system design

The functional system structure and the interfaces for activation and feedback to the fire alarm system correspond to the current standards and are therefore comparable to sprinkler systems. In addition to the features mentioned at the beginning, there is another advantage in the quality of the materials used: All AQUASYS components that come into contact with water are made of high-quality stainless steel, which makes them corrosion-resistant and thus significantly extends the service life of the system compared to conventional systems. The piping system used has its origins in highly demanding industrial applications and is therefore extremely reliable in terms of ease of installation and leak tightness. Even pipelines that are not filled with water can withstand ambient conditions according to the standard curve for a temperature rise of up to 800 degrees and even briefly up to over 1000 degrees.

Rescue teams and fire brigades are supported by the high-pressure water mist that suppresses and washes out dangerous, sometimes toxic smoke particles, the



The „AQUASYS Water Mist Gun“ for mobile fire protection solutions or for use in wall hydrants).



rapid cooling of the source of the fire and the surrounding area and also the reduction of the oxygen content near the source of the fire through the highly effective water mist.

This and the use of the medium water, which is harmless to humans, animals and technology, creates a significantly better environmental condition in an emergency than with compara-

ble conventional extinguishing systems.

Complex fire loads with HPWM

The high pressure water mist acts primarily on the energy of the fire and only indirectly on the burning material. Therefore, water mist is ideally suited for complex fire scenarios with various flammable liquid and solid substances.

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The suitability for fire classes A, B, C and F, which is continuously shown and proven in fire tests and customer-specific demonstrations, enables the protection of complex production facilities, industrial plants and buildings with just one system.

The fires successfully fought in fire tests achieved a heat release rate (HRR) of up to 200 MW, both in solid-fuel fires and in liquid fires. Thanks to the successful verification of these extraordinary fire loads, the AQUASYS high-pressure water mist system is also suitable for use in tunnels, where such high fire loads can be reached, for example in the event of tanker accidents.

High pressure water mist in the building area

With up to 75% less water consumption compared to a conventional sprinkler system, the AQUASYS HPWM system is also ideally suited for historic and modern buildings as well as modern high-rise complexes. In addition to the low water consumption and the resulting significantly lower risk of water damage, the advantages in the building sector are the small pipelines and the lower water storage. In high-rise complexes, the water can be pumped to the top floors with a central pump station in the basement without additional pressure boosting stations. The use of HPWM wall hydrants also saves valuable space. Instead of the originally planned combination of sprinkler - wall hydrant system and gas extinguishing system to protect offices, apartments, kitchens and server rooms,



Thanks to up to 75% less water consumption compared to a sprinkler system, the system is also suitable for sensitive buildings such as the "Wiener Musikvereinshaus".



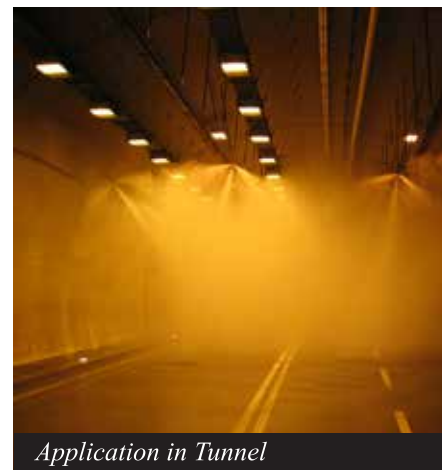
The AQUASYS system is also used in the 30-storey high-rise complex in the heart of Tallinn.

AQUASYS was able to protect the 30-story high-rise complex in the heart of Tallinn and a parking garage below with a highly efficient and space-saving fire protection solution.

In addition to various museums and archives, the Wiener Musikvereinshaus, for example, has also trusted high-pressure water mist technology for many years. Here, the resonance rooms made of wooden beam structures above and below the central and valuable concert hall and the roof structure are protected by means of AQUASYS water mist!

Typical industrial applications

The maintenance of production and the availability of the system in the event of a fire or in



Application in Tunnel

the event of false alarms due to false detection are essential criteria when selecting suitable fire protection and require the use of a reliable and robust fire fighting system. Operators in the industrial and power plant sector benefit from the specific protection of machines, systems and test fields as well as complete protection of production and laboratory areas by reducing the risk of downtime in the event of fire due to process contamination and consequential damage.

In the Austrian technology group Voest Alpine, for example, hydraulic areas, transformer stations and cable tunnels for the main energy supply are protected with water mist. The very rapid effect described above in connection with the low risk of consequential damage represent a significant added value for this company, which is always focused on innovation and also facilitate the safe advance of the company fire brigade to the source of the fire. Important infrastructure for maintaining the function of installations can thus be better protected.

Semi-stationary systems to support the company fire brigade

Semi-stationary systems are usually used in extensive industrial facilities and where a fire brigade is available at short notice (e.g. own company fire brigade). With these systems, only the nozzle lines are laid in the protected areas, but these are not connected to a "stationary" pump unit, but are laid to an easily accessible feed point. Due to the low water consumption, a mobile high-pressure unit integrated in a fire engine can be used to supply high-pressure

water in the event of a fire. In addition to high-quality fire protection, semi-stationary systems also offer an inexpensive alternative to fully stationary automatic systems, but require the aforementioned permanent short-term availability of the mobile high-pressure unit.



Fire vehicle with integrated high-pressure water mist unit to supply semi-stationary systems.

Future requirements for modern fire protection:

an outlook Parallel to the innovations in various areas of our daily life, the requirements and the need for innovative further development in fire protection are also increasing. Manufacture and operation of vehicles with Li-ion batteries or hybrid vehicles, huge server farms for the digitization of our lives or the required permanent availability of road tunnels or critical production facilities as well

as a fundamentally increasing focus on workplace safety are just a few of the main purposes! In all of these cases, reliable fire fighting technology is crucial in order to contain the fire as it develops, but also to maintain a viable atmosphere in the immediate vicinity. HPWM has proven itself to be a reliable technology in recent years and thus contributes significantly to increasing safety and achieving economic goals.

Further Information

A team of specialists and technicians with many years of experience is available at any time for more information on the use and function of AQUASYS high pressure water mist technology.

