sprinkler OUTLOOK

issue 2/2022

Fire Sprinkler EUROPE Rome 2022

Car parks

Galvanised pipes

Corrosion

Disruptive technologies

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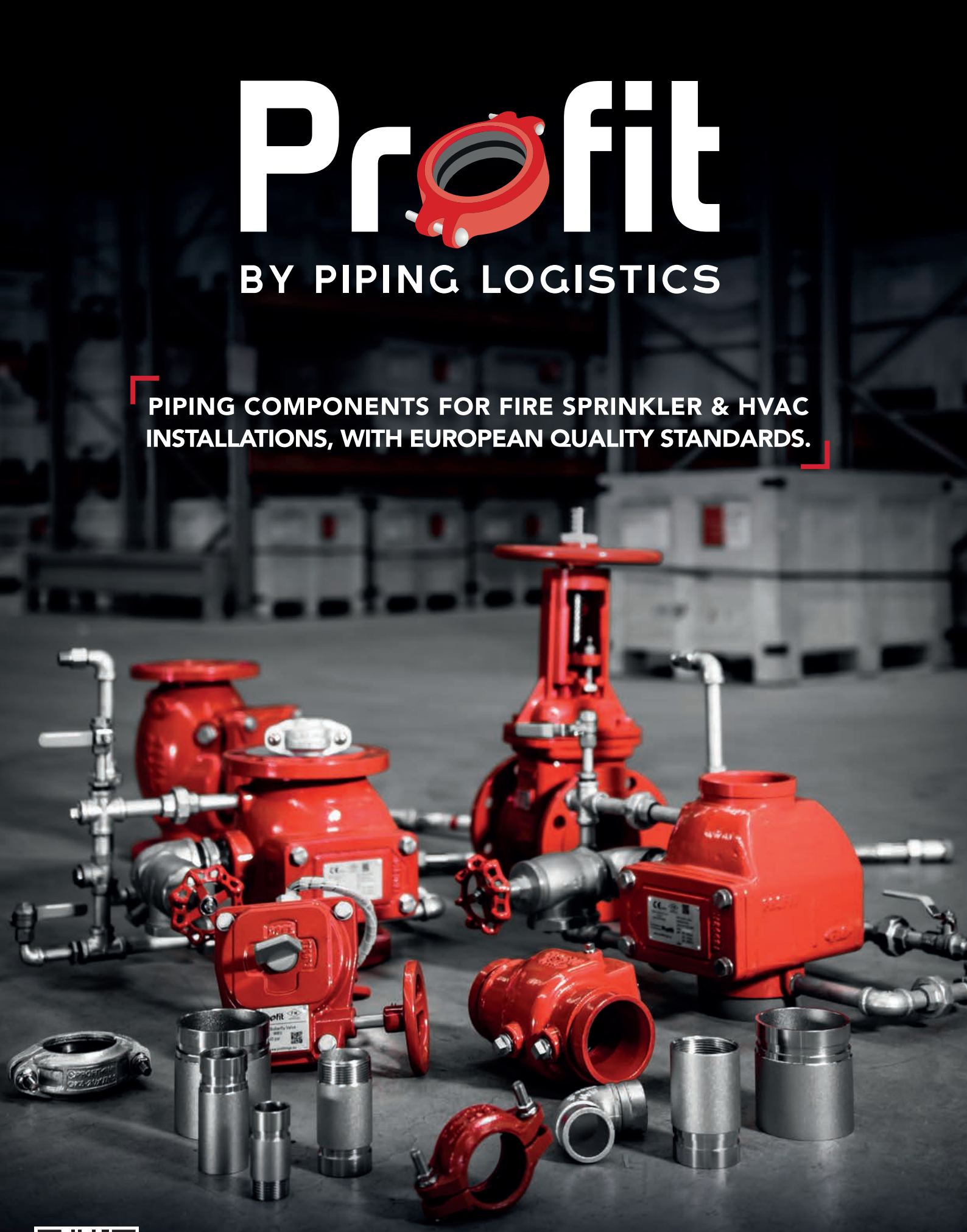

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Welcome to this conference edition of Sprinkler Outlook! Fire Sprinkler Europe - Rome is our first event in Italy. We hope it will help us launch a permanent presence to champion the sprinkler concept and develop wider sprinkler usage for the protection of all Italians. I am delighted that we are working with the Italian Chapter of the SFPE to host FSE Rome.

Our conference will open with welcomes from Luciano Nigro, President of SPFE Italy, Volker Bechtloff, Chairman of EFSN, and Stefano Marsella, representing the Italian Ministry of the Interior. Paul Sincaglia, Managing Director of the IFSA, will explain how his organisation can help us. He will be followed by Piergiacomo Cancelliere, Rimini Fire Chief, who will give an overview of existing Italian regulatory requirements and incentives for sprinklers. After coffee, Bo Hjorth of Albacon will give an update on future changes in NFPA sprinkler standards, while with my colleague Björn Schaumburg and I will do the same for European sprinkler standards. In between, Chris Gill of Viking will introduce polymer enhanced pipe, which corrodes significantly less than unprotected steel pipe.

After lunch Giovanni Cosma of Jensen Hughes will analyse how sprinklers can justify relaxations in structural fire resistance. Tom Roche of FM Global will follow with an overview of research on how sprinkler system performance can be affected by smoke ventilation. Stefano Grimaz of Udine University will end the session with an introduction to EN 12845-3, the future European standard for sprinkler system earthquake bracing, a subject particularly important in Italy.

In the final session Francisco Joglar of Jensen Hughes will discuss appropriate fire scenarios and how to account for sprinkler system reliability in fire engineered designs. Luciano Nigro will then return to the stage to give an overview of one of his specialised subjects, water mist in Italy.

To complement the conference programme this issue of Sprinkler Outlook contains reports from John van Lierop, Alfredo Álvarez, Keith MacGillivray and Paul Sincaglia on progress in The Netherlands, Spain, the UK and in other parts of the world respectively, illustrating the kinds of activities we hope to undertake in Italy in future. Changing building codes or customary fire safety design practice does not happen by itself but by strength of argument to convince others. Johan Hoogeweg of DGMR makes the case for fitting sprinklers in enclosed car parks, while Ruud van Herpen of Eindhoven University shows that sprinklers can make automatic smoke detection in car parks unnecessary – the saving would offset the cost of the sprinkler system.

In recent years our industry has begun to talk more openly about corrosion. Jan Nikola of VdS presents his research on the potential for galvanised pipes to produce hydrogen in sprinkler systems, with a risk of explosion, while Mascha van Hofweegen of KWA gives an overview of her recent experience with corrosion in sprinkler systems, advising how to prevent it.

We sometimes forget that sprinkler systems compete with alternative approaches to fire safety. Graeme Leonard writes about innovative products and ways of working that can reduce sprinkler system cost and improve installation quality to make sprinklers more competitive, while I discuss whether other technologies could disrupt the sprinkler market. And for those who may be confused about CE marking, I have included a brief update.

I hope you enjoy this edition of Sprinkler Outlook and look forward to seeing many of you in Rome!

Alan Brinson

EUROPEAN FIRE SPRINKLER NETWORK

OUTLOOK

ISSUE 2

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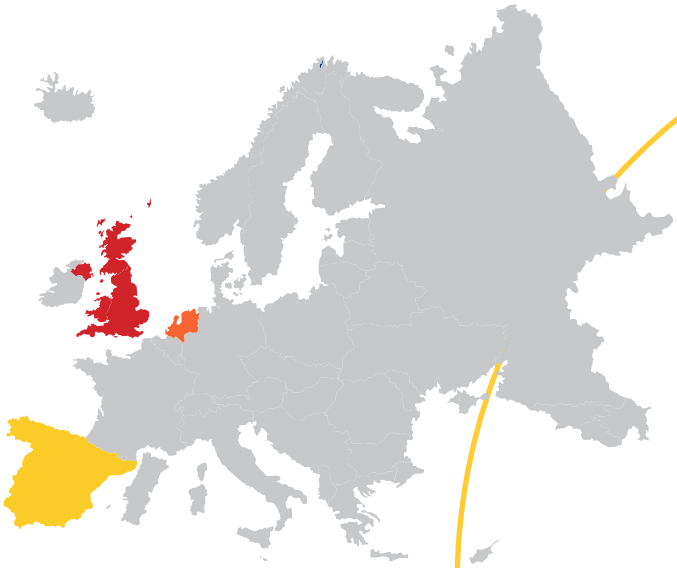
SFPE Engineering A Fire Safe World

REGIONAL REPORTS



Sprinkler protection for fire detection in car parks

When a fire compartment is equipped with sprinkler protection, automatic, monitored fire detection is required to activate the fire alarm system (according to regulations in the Netherlands). The sprinkler system is seen as a fire control system and for the fire alarm system a faster automatic detection of smoke is required. Yet a sprinkler system does detect a fire.

A relevant question, posed by Ruud van Herpen, Eindhoven University of Technology and Peutz BV, is how much faster optical smoke detection is compared to thermal detection by the sprinkler heads?

If the time gain is limited, while in addition the conditions for escape improve after the sprinkler system has been activated, consideration could be given to omitting smoke detection and using the sprinkler system to activate the fire alarm system.

This consideration is especially topical for car parks, for the following reasons:

- Smoke detection is not desirable because of a high probability of false alarms. This is often the case in car parks.
- Smoke detection has little or no effect on fire safety in a sprinklered car park, which means that this measure can be regarded as disproportionate.

The second point was examined on behalf of EFSN/VSI to answer the question of whether sprinkler protection in car parks can be used to activate the fire alarm system [1].

Car fire scenario and activation time

If no sprinkler system is present, a burning car will ignite the cars parked next to it and then the other cars in the parking row. This creates a 'travelling car fire' in two directions in that row of parked cars, which can eventually also result in a compartment fire by flashover.

Figure 1: Travelling fire in a row of parked cars

The CaPaFi scenario has been used for the heat release rate (HRR) per car [2]. The time interval for fire spread from one car to the next car is 12 minutes (see figure 1). After 60 minutes, nine cars will burn and the first car will have already burned out.

The following fire characteristics were used for the car fire scenario:

- Combustion value (gross): 25 MJ/kg (57% m/m hydrocarbon)
- Combustion efficiency: 80%
- Stoichiometric constant: 1.89 kg/kg
- Smoke potential: 400 m^2/kg
- Soot yield: 10.5%
- CO yield: 4%
- Max. fire area after 60 minutes: 9 parking places (9 x 12.5 = 112.5 m^2)

When sprinkler protection is present, the fire scenario is limited to one car and the HRR will remain constant after sprinkler activation. The production of contaminants and smoke is also assumed to be constant from that moment on. It is conceivable that soot yield (smoke potential) and CO yield increase after sprinkler activation, but in that case there will also be a reduction of the HRR. Because the HRR is kept constant in the simulation after sprinkler activation, so are the soot yield and CO yield.

Optical detectors activate faster than thermal detectors and sprinkler heads and are therefore the most suitable automatic detection technology for the fire alarm system. Optical detectors activate faster because:

1. The optical density of the smoke at the ceiling quickly exceeds the alarm threshold of an optical detector. It takes more time to exceed the alarm threshold of a thermal detector (sprinkler head), even at a low activation temperature.
2. An optical detector reaches the optical density alarm threshold without any delay. To reach the activation temperature of a thermal detector (sprinkler head), the mass of the thermal detector must also be heated to the activation temperature. As a result, the thermal detector has a delay before it activates. The larger the mass, the longer the delay. This is expressed in the Response Time Index (RTI).

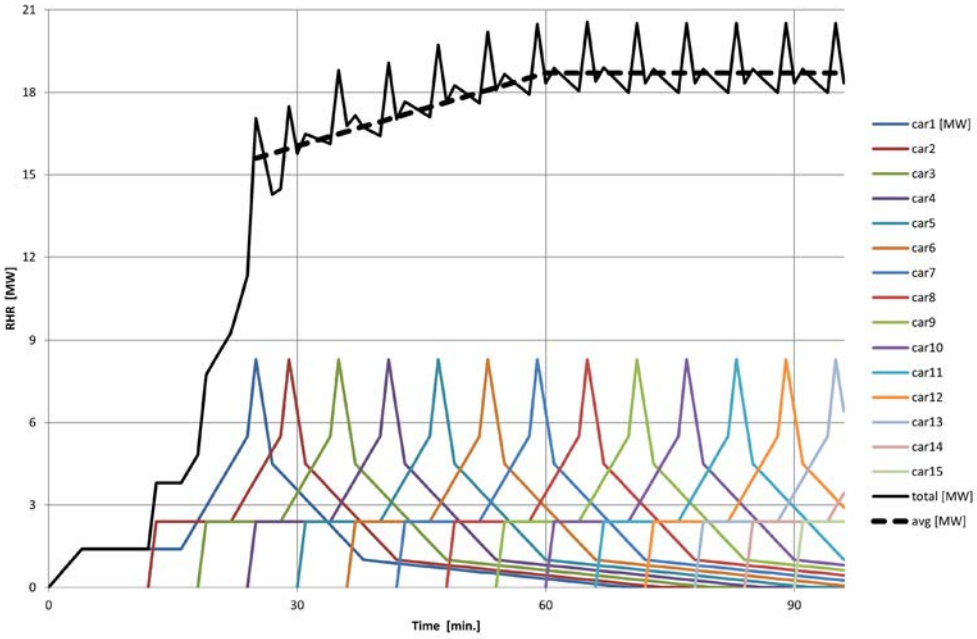


Figure 2: HRR scenario of a travelling car fire, per car and cumulatively, according to CaPaFi

Classification of thermal detectors and sprinkler heads	RTI range $(m.s)^{0.5}$
Quick response	≤ 50
Special response	> 50 … ≤ 80
Standard response A	> 80 … ≤ 200
Standard response B	> 80 … ≤ 200 > 200 … ≤ 350

Table 1: Response time index for thermal detectors and sprinkler heads

Table 2 shows the activation times of some types of thermal and optical detectors in a large fire compartment of 2.6 meters high, based on the car fire scenario. The monitoring surface of a thermal detector (sprinkler head) in a car park is 12 m² and for an optical detector 80 m². The algorithm of Evans and Stroup [3] was used for the calculation of the activation time.

A sprinkler head reduces the heat release rate and smoke production. This can increase the available evacuation time. The sprinkler protection is assumed to be successful when it limits the HRR to a constant level from the moment of activation. The fire does not grow anymore, as shown in figure 3.

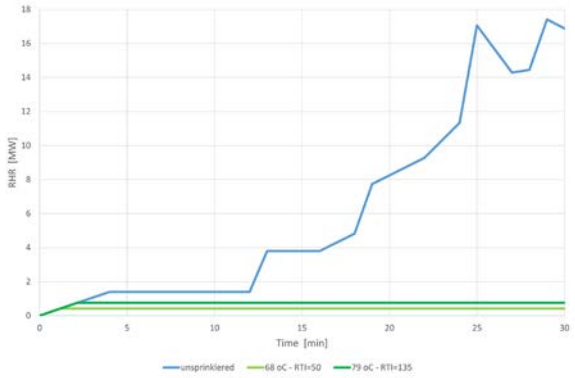


Figure 3: The HRR over time for an uncontrolled fire vs. a fire controlled by a sprinkler system

Standard fire: CaPaFi	Standard response (avg) RTI = 135 $(m.s)^{0.5}$	Quick response (max) RTI = 50 $(m.s)^{0.5}$	Optical response (max) RTIeq. = 0.5 $(m.s)^{0.5}$
Thermal 68 °C	112 s	70 s	-
Thermal 79 °C	129 s	82 s	-
Optical	-	-	10 s

Table 2

Safety of car park users: ASET and RSET

Table 2 shows that sprinkler heads and thermal detectors are activated later than optical detectors. Whether this has consequences for safe evacuation depends on project-specific building and fuel characteristics, and also on the number of people inside the car park who have to evacuate when there is a fire. After all, the purpose of fire detection is to be able to alert building users as quickly as possible via the fire alarm system.

The potential for safe evacuation is determined by the margin between the available safe egress time (ASET) and the required safe egress time (RSET). The larger the margin, the higher the safety level. The margin between ASET and RSET is a good measure to compare safe evacuation under sprinkler protection with evacuation safety under optical detection.

The ASET is the time for which room conditions are acceptable for evacuating occupants. The limiting criterion for ASET is visibility, determined by the optical density in the compartment. The optical density at the RSET, when modelling optical detection without sprinkler activation, is the reference value.

The RSET is determined by summing the pre-movement time and the movement time. The detection time plays a major role in the pre-movement time.

ASET for a car fire scenario

Consider a parking level of 50 x 65 m (3,250 m^2). A total of 120 parking places are available at this parking level. The internal height is 2.6 m. The compartment consists of a concrete floor, concrete walls and an opening (void) in the upper floor for the ramps.

The car park is equipped with mechanical exhaust ventilation with a capacity of 4 h-1, corresponding to a volume flow of 33,800 m^3/h (9,390 dm^3/s). The air supply comes naturally through the void.

The fire scenarios were simulated using the multizone mode of CFAST version 7.6.0 (NIST, 2021). The parking level had to be divided into several zones because the height compared to the width and depth is too small to assume a homogeneous situation in the entire car park. A total of nine zones have been modelled, zone 1A to zone 1I, in accordance with the floorplan in figure 4. The car fire starts in the middle zone (1E). A stratified situation is assumed in the middle zone (hot smoke layer above a cold lower layer), in the other zones a mixed situation is assumed.

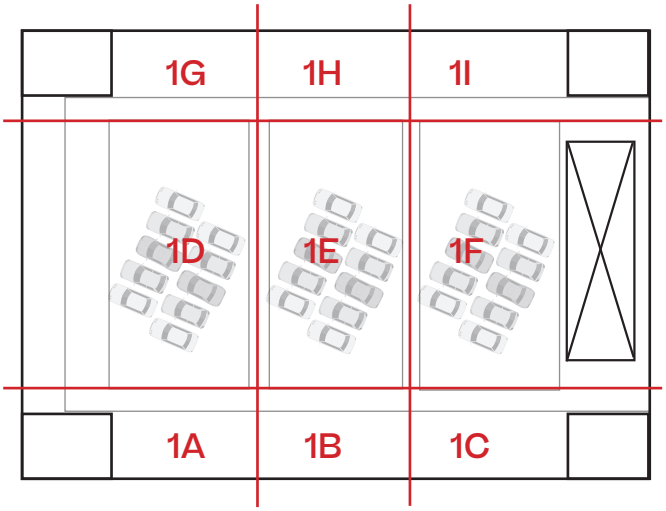


Figure 4: Floorplan of the parking level, divided in nine zones, fire in zone 1E.

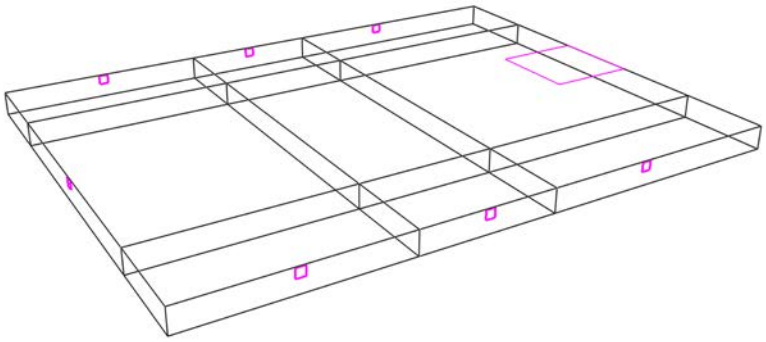


Figure 5: Isometry of the parking level showing zones, void for the ramps and extraction points for the mechanical ventilation

The optical density is the significant criterion for safe evacuation in all zones, the gas temperature is of minor importance. The results for the optical density in the fire zone and the other zones are shown in Figure 6.

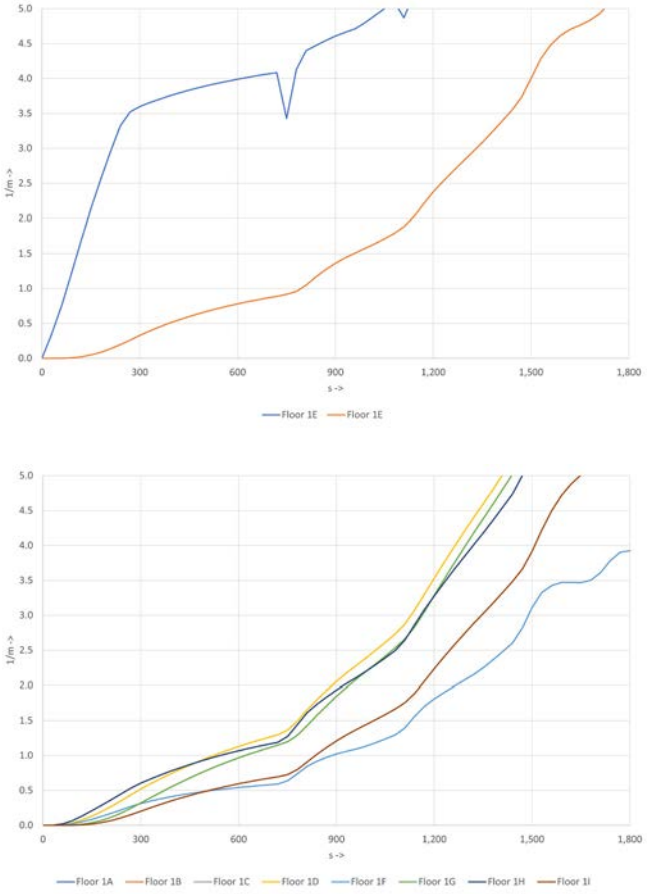


Figure 6: Optical density in smoke layer and the lower layer in the fire zone 1E (upper) and in the other zones 1A t/m 1I (lower)

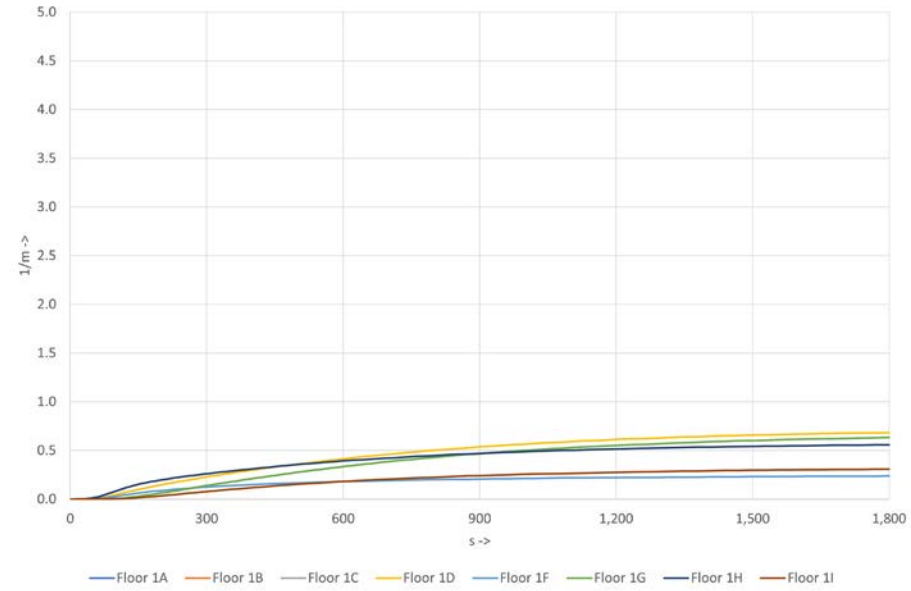


Figure 7: Optical density in smoke layer and the lower layer in the fire zone 1E (upper) and in the other zones 1A t/m 1I (lower) with quick-response sprinkler protection (68 °C, RTI=50)

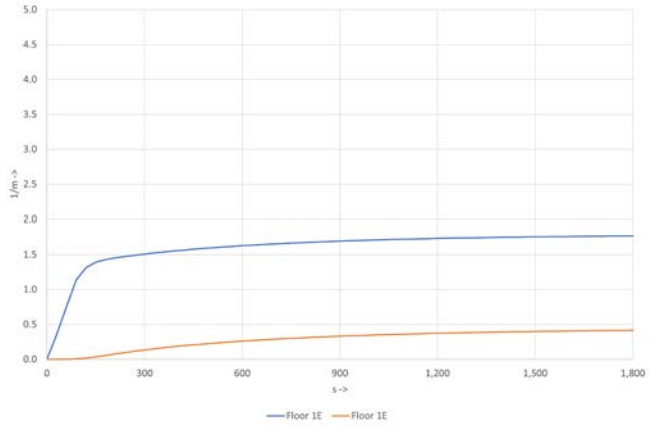


Figure 7 shows the calculated optical densities in the different zones when the parking level has a sprinkler system fitted with quick-response sprinkler heads (68 °C, RTI=50)

ASET-RSET analysis

When optical detection activates the fire alarm in the car park 10 s after the fire starts, the required escape time RSET is 190 s (3:30 min.), taking into account the detection time (10 s), pre movement time (2 min) and movement time (1 min). The optical density in the normative zone at that time is 0.32 m-1, corresponding to a visibility of 4.1 meters for light-reflecting objects (figure 7).

Sprinkler: Yes / No	Detection	ASET [min]	RSET [min]
N	Optical	3:10	3:10
Y	68°C - Quick Response	7:00	4:10
Y	79°C - Standard Response	3:40	5:09

Table 3: Available safe egress time (ASET) with visibility > 4.1 m, in an unsprinklered and a sprinklered fire scenario, and required safe egress time (RSET), taking into account the corresponding detection times.

With quick-response sprinkler protection (68 °C, RTI=50) in the car park, it takes 420 s (7:00 min.) before the above reference optical density of 0.32 m-1 is exceeded (figure 8). The RSET in this case is 250 s (4:10 min), because the detection time is 70 s. With standard response sprinklers (79 °C, RTI=135), the optical density of 0.32 m-1 is exceeded after only 220 s (3:40 min.). The RSET is now 309 s (5:09 min), due to the detection time being 129 s.

Comparing optical detection with quick-response sprinkler protection, the quick-response sprinkler protection appears to guarantee a higher level of evacuation safety. This does not apply to standard response sprinkler protection.

Conclusion

In car parks a sprinkler system can also serve as the automatic detection for the fire alarm system when quick-response sprinkler heads are used. A separate automatic detection system is unnecessary. Compared to optical detection without sprinkler protection the level of evacuation safety (ASET/RSET) increases.

The safety factor ASET/RSET depends on the floor area of the car park. An increasing floor area results in a higher safety factor, a decreasing floor area in a lower safety factor. In car parks smaller than 1,000 m² a quick-response sprinkler system no longer provides the same level of evacuation safety as optical detection.

It should also be noted that optical detection in car parks is hardly used in practice, because of the probability of false alarms. Fast thermal line detection (LIST) is often used instead because it is more reliable. LIST detection is slightly slower than optical detection, which makes the comparison in table 3 even more favourable for sprinkler protection.

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Could a disruptive technology affect the sprinkler market?

Alan Brinson, Executive Director, EFSN

Since I set up the European Fire Sprinkler Network in 2003 sprinklers have become much more widely recognised in building codes, with buildings of certain types and uses now routinely being protected with sprinklers. I estimate that more than twice as many sprinklers are now sold each year. I also believe the market can grow a lot further, perhaps doubling again. There is no guarantee that this will happen, and there are powerful vested interests who see sprinklers either as a competitor or as an extra cost which will reduce their profits. We are familiar with that, but could there also be a disruptive technology out there which could replace sprinklers?

Disruptive technologies and concepts seem to be changing every industry, so perhaps we should consider what might disrupt the sprinkler industry. 30 years ago water mist emerged as a more efficient way of using water, challenging sprinkler designs. In marine applications, where weight is a crucial factor, water mist took the market. Yet on land it did not, largely because water mist is usually more expensive than sprinklers and weight is less critical. There are even some applications, such as high bay warehouse protection, where water mist struggles to offer a solution. Against that there are others, such as heritage protection, where the consequences of any accidental water discharge often lead to a preference for water mist because it would release less water. 30 years later, water mist has become part of the continuum of water-based fire protection systems, with many sprinkler installers and manufacturers also offering a water mist option.

In more recent years the rapid evolution of new risks has challenged sprinklers. This is particularly true for warehouses, which are becoming taller and more compact with less space for sprinklers. While a sprinkler system may control a warehouse fire, in most cases the fire brigade will still need to complete extinguishment. There are warehouses being proposed that are over 100 m tall, without any thought to how firefighters would reach an internal fire at that height to complete extinguishment. Insurers can refuse to cover such risks but clearly if some other technology could adequately protect this scenario sprinklers would lose the market. Some are advocating oxygen reduction for warehouse protection, yet to maintain the correct oxygen concentration the warehouse operator has to limit movements in and out of the building, restricting capacity. Moreover these systems can be expensive to operate and at greater height static pressure differentials may make it difficult to ensure a uniform concentration. There are also disagreements between laboratories over the appropriate design concentration. Yet oxygen reduction systems are being used, particularly in refrigerated warehouses. Meanwhile in automated warehouses sprinklers are being installed alongside facilities for firefighters to attack the fire from above, while the storage system can be quickly dismantled

so that firefighters on the ground can access any remaining burning material. In a building protected by an oxygen reduction system firefighters would still need to enter the building to find and deal with the source of a fire.

Sprinklers have protected car parks for decades but the advent of electric vehicles has raised questions about their effectiveness. We know that sprinklers will probably not extinguish a battery fire inside an electric vehicle, in fact some fire brigades have found the only solution is to drop the car in a pool of water! Yet extinguishment need not be the goal. As long as a sprinkler system can prevent spread from one vehicle to another, the heat release rate will remain moderate and firefighters will be able to approach the vehicle to complete their work in relative safety. Some research has been conducted and more is in progress to understand what performance sprinklers bring. No credible competing technology has emerged.

Could other technologies be faster or do a better job? Systems that are operated by electronic detection could apply water a minute or two before the first sprinkler would normally open, further reducing the risk of injury and death, and the amount of damage. But injuries, deaths and damage are already reduced by over 80% by sprinklers, so this is about diminishing returns. Systems that offer this performance are more complex, comprising separate detection and extinguishing systems, making them more expensive and inherently less reliable. Yet there are some applications where glass bulbs or solder fuses are too slow – the fire spreads so quickly that an even faster response is needed from the suppression system. Deluge systems operated by electronic detection have been used for decades to protect buildings from rapidly spreading fires. While such systems are effective there is a delay to fill the pipes with water. One application where electronic detection has been tested in combination with a wet pipe sprinkler system is the protection of rolled paper. This is not a challenger technology to sprinklers so much as an enhancement of sprinkler technology, only commercially viable where nothing else works.

During the last review of British regulatory guidance, almost 20 years ago, fire tests were run using pig carcasses to represent sleeping people. The researchers concluded that sprinklers would not normally operate fast enough to save someone who was immobile if the fire began in their bed, particularly if the person was frail. Anecdotal incidents of fires in care homes have confirmed this. Some tests run in Germany a few years ago, not on pig carcasses but just on bedding, showed a huge reduction in fire damage when the sprinkler was operated earlier using electronic detection. If this concept could be proven to offer a reasonable chance of survival even to those intimate with an incipient fire it would sometimes be specified, as long as false activations were prevented. Again, this is not a replacement for sprinklers but an enhancement of their performance that will probably not be commercially viable in most applications.

Most fire fatalities are caused by smoke inhalation. This fact is used by some to claim that sprinklers are the wrong technology and that smoke control is the answer if life safety is the objective. They are partly correct. Smoke control is the answer but sprinklers are one of the most effective smoke control measures. By keeping the fire small or extinguishing it, sprinklers hugely reduce the amount of smoke released compared to a fire that is allowed to spread to involve all the combustible material in a room. Sprinklers also cool smoke and gases, so that they contract and the pressure drops, reducing the tendency of smoke to spread to other rooms. Fire testing conducted in Belgium and The Netherlands has shown how sprinklers contribute to smoke control in residential buildings. While some older national fire safety codes emphasise vents, fans and dampers, which play an important role, research is showing the benefits of sprinklers and that evidence is leading to sprinklers being recognised in building codes for their contribution to smoke control.

Environmental concerns affect every activity today and sprinkler systems are no exception. 20 years ago materials used in sprinkler system switches came under the spotlight as the European Union and other jurisdictions moved to ban the use of lead and other toxic materials. Manufacturers responded by changing the solders and alloys they use. Sprinklers themselves are mainly made of brass, an alloy of copper and zinc, with up to 2% lead added to improve its machinability. While there is no evidence that sprinklers can introduce lead to drinking water and they are separated from potable water by backflow prevention, California has insisted the brass be lead-free in domestic systems. Manufacturers have produced special lead-free sprinklers for domestic applications, with one manufacturer unexpectedly employing a plastic body. The industry has shown it can adapt.

Since the 1960s AFFF has protected airports from flammable liquid fires but the fluorosurfactants in AFFF are being phased out. Foam concentrate manufacturers and the foam systems industry have risen to the challenge and there are now fluorine-free foam systems to protect flammable liquid hazards. Polytetrafluoroethylene (PTFE), branded Teflon by one manufacturer, is to be phased out in Europe. Many sprinkler manufacturers use PTFE as part of the seal and no doubt they are now working on alternative materials.

Could technology render fire obsolete? Sensors and software could certainly help to identify potential fire risks before they become fires, shutting down equipment, and white goods can now have in-built fire protection. Yet such measures will not come close to eliminating fires, particularly when so many are caused by one-off human error.

Finally, there is reputational risk. What if a sprinkler system fails to operate correctly and people die or there is a polluting fire? Won't that discredit sprinkler systems? In practice I have found the opposite response. Authorities conclude that the sprinkler system could have saved the day had it been correctly designed and installed. They then tighten inspection regimes. Most recently this happened in France following a serious fire at a site in Rouen, where 9,800 tonnes of liquids burned and local farmers were forced to destroy their crops. Failures in other countries have also led to tightened supervision, something that helps ensure fair competition for installers.

Perhaps I have missed some threats but as far as I can tell, sprinklers are here to stay as the most effective, reliable and economical of fire safety measures. At the same time, to maintain that position they must continue to evolve.

Galvanised pipes in sprinkler systems

Internationally, the use of galvanised pipes in wet systems is banned or discontinued - for example in the USA, Sweden and Norway. FM Global also took a clear position against the use of such pipes back in 2017 [1] [2] [3] [4]. Jan Nikola of VdS asks how hydrogen forms and reviews learning from the field.

Incidents with galvanised pipes in wet pipe systems

In spring 2014, the first reports of severe pressure increases in sprinkler systems became known. An incident in Denmark resulted in a deflagration and a jet flame escaping from the pipe network. After several identical incidents, a Scandinavian pipe supplier commissioned the independent research organisation Sintef to investigate these incidents. The results confirmed that hydrogen forms under certain conditions in wet systems with galvanised pipes. In the following years, further incidents became known, among others in Helsinki and Kristiansand in 2020 [4] [5] [6] [7].

Corrosion of zinc in water

Zinc protects steel from corrosion through two mechanisms: the reactive zinc acts as a sacrificial anode and prevents a reaction between water and steel. In the presence of moisture, zinc reacts with oxygen and carbon dioxide. During drying, the zinc surface is additionally passivated by the formation of zinc carbonate. However, for galvanised surfaces that are constantly in contact with water, these mechanisms only apply to a limited extent.

If there is oxygen in the water-filled pipe network, the redox reaction mainly takes place between zinc and oxygen: the zinc is oxidised and willingly gives up electrons. During the oxidation reaction, the oxygen dissolved in the water is consumed and hydroxide ions are formed. These hydroxide ions react further with the zinc ions dissolved in the water, forming zinc hydroxide. As the amount of oxygen decreases, the amount of free electrons in the water increases since the oxidation of zinc continues. These free electrons now react with the water molecules. Hydrogen and further zinc hydroxide will form in the process.

As the proportion of dissolved oxygen decreases, more hydrogen is formed during the corrosion of zinc. This part of the corrosion reaction is therefore also called hydrogen corrosion reaction.

Hydrogen formation is possible in both black and galvanised pipes: electron release also occurs in the corrosion of black steel pipes as the iron is oxidised. However, this process is promoted at low pH values and proceeds more slowly under normal conditions than in galvanised pipes. The problem with zinc is its reactivity: the oxygen is used up faster and the hydrogen part of the corrosion reaction begins earlier. [8] [9] [10] [11]

Most important influencing factors

pH value: The relative corrosion rate at a pH value of approx. 10-11 is minimal, but even at neutral as well as slightly acidic pH values, an increase in the corrosion rate by a factor of 4-5 can be expected. However, setting a pH value of 10-11 is not recommended, as irritation of the skin is already noticeable in this range. In addition, it is not clear to what extent other components react to increased basic pH values. Typically, the pH value for drinking water, for example in Germany, is between 7 and 9 [12].

Water hardness: zinc corrodes slower in harder water than in softer water. This is due to the presence

of minerals that promote the formation of a protective layer with zinc. For example, an increased amount of calcium ions in the water forms a protective calcium carbonate layer on the zinc coating, which slows down the corrosion process. In softer water, as is the case in northern Europe, this protective film forms less and corrosion proceeds more quickly. The extreme case would be distilled water: the zinc has no chance to form a protective layer and dissolves quicker [13] [14] [15] [16].

Temperature: with increased temperature, the reaction speed usually increases. According to the reaction rate-temperature rule (RGT rule), the reaction rate doubles with a 10 K increase in temperature. In the case of corrosion reactions, the formation of a covering layer and a decreasing gas solubility also influence the corrosion rate. Increased temperatures are to be expected near skylights and windows or equipment such as ovens.

Agitation: in the case of stagnant water, it has been shown that damage due to corrosion often occurs in the form of pitting, as there is an increased proportion of oxygen locally. In the case of agitated water, corrosion is more likely to occur uniformly. In galvanised sprinkler distribution pipes or pipes of pressurised water tanks, a regular exchange of water takes place due to the weekly operator checks. The water is in motion more often and more uniform surface corrosion is therefore more likely [17].

Salts: various salts dissolved in the water, such as sodium chloride or calcium chloride, accelerate the corrosion of metals. In this case, the mobility of electrons in the solution is increased. An exchange of electrons is then easier. In addition, chloride ions initiate defects in oxide layers where corrosion can progress locally. In general, a high conductivity of water accelerates the corrosion of zinc. The limit values of the Drinking Water Ordinance should therefore be taken into account to minimise the occurrence of corrosion damage.

Surface area: the surface area or the size of the extinguishing system and thus the area of galvanised pipes increases the amount of hydrogen that can form during hydrogen corrosion.

Practical relevance

The use of galvanised steel pipes in areas with particularly aggressive environmental conditions makes sense in order to protect the outside of the pipes. It is different for the inside of the pipes though: in recent years, there have been an increasing number of findings internationally that the supposedly increased corrosion resistance of internally galvanised pipes for sprinkler systems is not realised or only to a limited extent compared to other corrosion protection measures. In unfavourable conditions, damage due to corrosion can become apparent earlier than in conventional black pipe.

To eliminate corrosion in the inside of the pipes in dry systems as far as possible, only the use of a nitrogen generator can bring success, as it can never be possible to get the pipe network completely “dry”. Pressure tests, filling time measurements or other introduction of water, as well as deficiencies in the installation, such as lack of drainage facilities or insufficient gradient, will never allow the pipe network to be completely drained. Nitrogen brings another advantage: due to the low dew point, no water condensate is introduced into the pipe system [18] [19].

The draft of EN 12845-1 - “Fixed firefighting systems - Automatic sprinkler systems - Design, installation and maintenance” explicitly provides for filling the pipe network with nitrogen as a possible measure against corrosion.

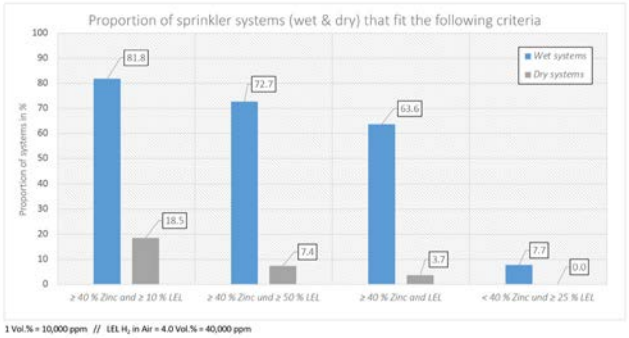


Figure 1

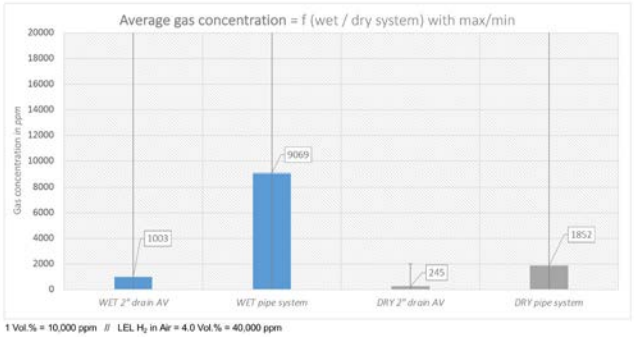


Figure 2

The corrosion resistance of zinc in water depends on the initial formation of the protective layer (patina) under atmospheric conditions. The time from installation to commissioning is usually not long enough. Certain impurities in the water, such as a high CO_2 content and an associated lower pH value, attack a previously formed patina. Even weakly acidic solutions accelerate corrosion to a level that can significantly compromise the benefits of galvanising.

The installation of maintenance gates above alarm valve stations has been mandatory since the 2014 edition of VdS CEA 4001. Installations of valves for maintenance purposes also followed in older systems, so that the draining of wet groups for annual maintenance and inspections is no longer necessary. The water now remains in the pipe network for a long time with low oxygen content, which can favour the formation of hydrogen in galvanised pipes. The only reasons to drain the group are then modification work or repairs to the system.

As hydrogen forms, the system pressure increases. In exceptional cases, pressures were reported that were well above the permissible 12 bar (174 psi) in sprinkler systems. The high system pressure also exceeds the permissible pressures for installed components. Pipes could burst and press connections could fail. Due to these circumstances, overpressure valves could be installed in accordance with VdS CEA 4001, section 13.8. However, if the pressure increase is due to the formation of hydrogen, it cannot be counteracted with this measure.

Leakage currents that form in the pipelines due to a lack of equipotential bonding also have an influence on the reaction rate. Ultimately, the pipe filled with water can be regarded as a short-circuited galvanic element: applying an external voltage increases the mobility of the electrons. Certainly, equipotential bonding will not completely prevent the corrosion of zinc, but it would be a possible factor that could at least inhibit corrosion. Leakage currents bring another problem:

if work is carried out on the pipe network and an electrical discharge of the leakage currents occurs, this can be the ignition source in an explosive atmosphere generated by hydrogen formation.

Ongoing investigations & outlook

In cooperation with the Bundesverband Technischer Brandschutz e. V. (bvfa), field tests and measurements using gas detectors have been carried out on existing sprinkler systems since the beginning of 2021. At the present time, measurements are available for approximately 130 systems. The data collected allow estimates of the extent of this phenomenon in Germany:

- The higher the proportion of galvanised pipes, the higher the measured gas concentrations. In various cases, the lower explosion limit (LEL = 4 vol.-% hydrogen in air) was exceeded.
- Wet pipe systems with galvanised pipes show significantly higher gas concentrations than dry systems with galvanised pipes. If one considers systems with a proportion of galvanised pipes of 40% or more (cf. Fig. 1):
  - approx. 3/4 of the wet systems showed gas concentrations ≥ 50 % of the LEL
  - and approx. 2/3 of the wet systems showed gas concentrations ≥ LEL.
- The highest gas concentrations were measured at the high points of the pipe networks. An exception is the special case when the alarm valve station is located above the pipe network.
- On average, gas concentrations measured at the pipe network in wet systems were about five times higher than in dry groups (cf. Fig. 2).
- In all dry groups with elevated gas concentrations, due to inadequate draining water was standing in the pipes at the time of measurement.
- Measurements on galvanised pipes generally yielded higher concentrations than measurements on black pipes.
- Wet systems with maintenance valves show higher gas concentrations on average by a factor of three than wet systems without maintenance valves.
- Evidence that hydrogen formed in the pipes was provided by technical gas analysis. It is planned to carry out further gas analyses on different types of systems.

With the revision of the new VdS CEA guidelines for sprinkler systems - planning and installation: VdS CEA 4001: 2021-01 (07), the use of internally galvanised piping behind wet alarm valve stations is explicitly discouraged.

VdS is not aware of any incidents of damage during the normal operation of sprinkler systems. All known incidents occurred during maintenance and conversion work. For these cases, there are organisational measures that can be taken for personal protection. Based on the known cases, it can also be deduced that this is not a mass phenomenon. However, due to the high degree of danger to persons, this phenomenon should not be underestimated. The practical investigations will be continued so that the extent of this phenomenon can be further illuminated.

VdS will provide information on new findings, e.g. on the website www.vds.de. In case of doubt, consult the responsible authority.

Possible remedies and measures for personal protection

The formation of hydrogen is always accompanied by an increase in system pressure. It is possible to install a pressure relief valve in accordance with VdS CEA 4001, section 13.8, whereby excessively high pressures in the pipe networks can be relieved. However, if the pressure increase is due to the formation of hydrogen and not solely to e.g. temperature increases of the pipe network, this measure does not counteract the cause.

In existing systems, the following measures, among others, can be taken for detection and hazard minimisation:

- Weekly monitoring of the system pressure across the alarm valves of wet groups with galvanised pipes: an increase in pressure can be an indication of hydrogen formation. This is not a major additional expense to the weekly operator checks according to VdS CEA 4001.
- Fitters performing work on the sprinkler systems must be informed of the possible danger. In general, ignition sources must be kept away when working on potentially dangerous pipe networks (e.g. general ban on smoking).
- When working on galvanised pipe networks of wet pipe systems, tools suitable for working in an explosive atmosphere can be used. Likewise, the use of impact wrenches can be dispensed with for smaller jobs. Special care must be taken when drilling for tapping sleeves.
- Measuring the pH value of the extinguishing water used: acidic ambient conditions promote the corrosion of zinc. Neutral to slightly basic pH values in accordance with the Drinking Water Ordinance should be maintained.
- By using gas detectors with a sensor for early indication of reaching the lower explosion limit (LEL) for hydrogen, it is possible to measure before starting work. A suitable measurement strategy must be drawn up for this purpose.
- When emptying the group, care should be taken to ensure adequate ventilation of the environment. Work on the piping system should only be carried out after the piping system has been sufficiently emptied and any hydrogen present has been able to dissipate. A safe working environment can only be confirmed by measurement.
- If hydrogen formation has been detected in the pipe network, regular emptying and filling of the affected groups can ensure that the oxygen-enriched water causes oxygen corrosion to take place in the pipe network rather than hydrogen corrosion. This work should only be carried out by trained personnel (approved installation companies). Regular draining is related to monitoring the pressure, for example. The pressure increase does not happen suddenly, but over a longer period of time. As soon as it is recognised that the pressure is increasing, the group should be emptied. Accordingly, there are then emptying intervals according to which planning can be done.

VdS 3891

The information sheet “VdS 3891 - Galvanised pipes in sprinkler systems” contains information for operators, planners and installers. The leaflet describes the problem and shows possible options. The document also contains a variety of literature sources with further information.

The leaflet can be obtained free of charge from the VdS webshop. You can find it at vds-shop.de or directly via our QR code.

For further information regarding the references and sources in this article please go to https://bit.ly/3AbrNEK.

Low Pressure Water Mist Systems

David Bell, Business Development Manager Water Mist, Viking EMEA explores an alternative to high pressure water mist systems and traditional sprinkler protection!

The demand to use less and less water in our daily lives increases. This is feeding through to an increase in the specification of water mist systems for building protection. High pressure water mist is often thought of as the only water mist solution, overlooking the new kid on the block – low pressure water mist. Why is that?

Water mist sells itself on the more efficient use of water compared to traditional sprinkler systems. The physics, briefly, is that water mist has more water droplets per litre of water, with droplet diameters usually under 1000µ. Subsequently, the larger volume of droplets has a greater overall surface area and is thus able to absorb more heat than a system that produces fewer droplets per litre. In addition, the smaller water droplets turn to steam more quickly taking more energy from the fire. There is also a limited effect of displacing oxygen from the area around the fire by the steam which is generated.

"High pressure water mist systems use far less water than low pressure systems"
This statement is a common misconception, as can be seen in the examples shown in Table 1. The difference in flow rate is not significant.

"High pressure systems use smaller pipework"
This argument is credible, but is this really cost effective? For high pressure systems there is usually a requirement for stainless steel pipework and fittings. Specialist installation requirements to suit a system that will operate at 130 bar are also required. With the advent of Fendium polymer-enhanced steel pipe with a C Factor of 140, along with traditional grooved fittings rated at 16 bar, low pressure water mist systems can be as cost effective from a material and installation perspective.

"Water supply and pump requirements are a concern"
Generally, the duration of stored water has to be the same for both high pressure and low pressure water mist systems.

Pumping the water through the system is another consideration. Expensive pumps that drive pressure up to 130 bar may have a small footprint but they require quite high kW ratings. Low pressure pumps, whilst slightly larger in footprint, require a smaller motor in many cases. This could also have an important impact on the size of back up generation in areas of poor infrastructure.

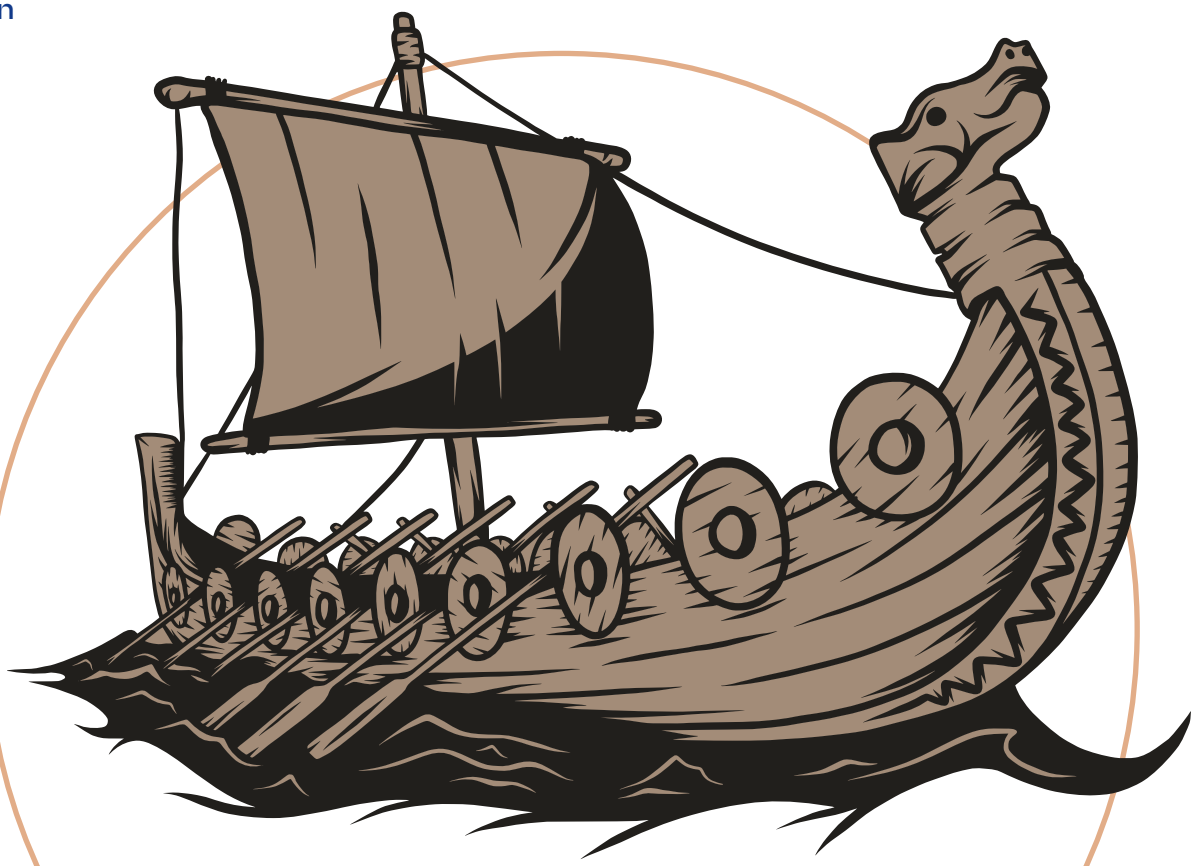
Finally, the selection of the approval can have a significant impact on the design criteria and be critical in the size of the water supply, with a reduced size often one of the key benefits of water mist. For example, an FM approved high pressure water mist system protecting an office building generally requires an operating area of 144 m^2, whereas for the same risk, a VdS approved low pressure water mist system requires an operating area of 80 m^2. This lower operating area requirement further reduces the size of the water storage tank.

Conclusion

High pressure water mist systems as well as traditional sprinkler systems have their place in the world of fire protection, and so do low pressure water mist systems. Approved low pressure water mist systems offer a cost effective balance of water efficiency, material cost, power requirements and spatial requirements when considered against high pressure water mist systems and traditional water-based solutions.

	High pressure water mist system			Low pressure water mist system		
	K-factor	Flow range per nozzle	Operating pressure	K-factor	Flow range per nozzle	Operating pressure
Office space	3.5 to 6.5	30 to 73 LPM	60 to 120 bar	14	31 to 56 LPM	5 to 16 bar
Data centre	3.5 to 6.5	32 to 47 LPM	60 to 130 bar	14	37 to 53 LPM	5 to 16 bar

Table 1: Comparison of flow rates between approved high pressure and low pressure systems



A Valhalla for microbiology

That a sprinkler system is useful for protecting a building against fire needs no further explanation. By certifying sprinkler systems, it is ensured that this system also works when it is supposed to, when a calamity occurs. Unfortunately, in practice, a certified system does not mean that no corrosion can take place, perhaps even the opposite reports Mascha van Hofweegen, Senior Adviser, KWA

For a long time it was thought that corrosion would not occur in sprinkler systems, because it was thought that this was 'dead' stagnant water. The water is not circulated, as in other hot or chilled water systems, and replenishment is limited. For a long time, therefore, there were no checks for corrosion in sprinkler pipes.

Over time, the number of systems affected by leaks increased. In the Netherlands, this led to a working group in 2015 drafting a white paper, 'Corrosion Control in Sprinkler Systems' [1]. The white paper was then applied as a section in the Technical Bulletin on maintenance of sprinkler systems (TB80-2021) [7]. It states that certified sprinkler systems which are more than 15 years old are obliged to carry out an internal inspection of the condition of the pipes.

Sprinkler systems are water-bearing systems and corrosion is then not far away.

When steel is in contact with water and oxygen is present, the steel will, without additional measures, be corroded by oxygen pitting, see Figure 1.

Figure 1: Oxygen corrosion of steel in a closed cooled water system

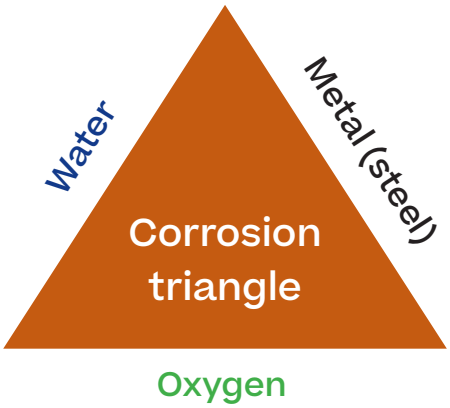


Figure 2: Conditions for oxygen corrosion of steel

Most sprinkler systems are wet systems [2]. When a wet sprinkler system is filled, the air present in the system remains 'locked up', so that all conditions (metal, water and oxygen) are present for oxygen corrosion to occur, see figure 2. If one of these three conditions is not present, oxygen corrosion of steel will not occur.

When replenishment is limited to an annual test through the inspector's test connection, the oxygen present is consumed quite quickly and the system becomes oxygen free, so oxygen corrosion cannot continue. In many sprinkler systems, this works well and the pipes still look good after 10 years or more. But unfortunately there are situations in which leaks can occur within 10 years.

Results of internal inspections

Until a few years ago, there was no understanding of the internal appearance of pipes in sprinkler systems. It was assumed that a closed system, with little water replenishment, would limit corrosion of the steel or galvanised pipes. We now know that sprinkler pipes can be subject to localised corrosion. Using an endoscope, various pipes in the sprinkler system can be viewed internally over many metres.

Meanwhile we have gained much experience with internal inspections, which shows that corrosion in sprinkler systems can manifest itself in very different ways. Corrosion can be very localised or spread over many metres, as shown in figure 3. Important here is the type of piping material used and whether the sprinkler system is a tree system or a grid system.

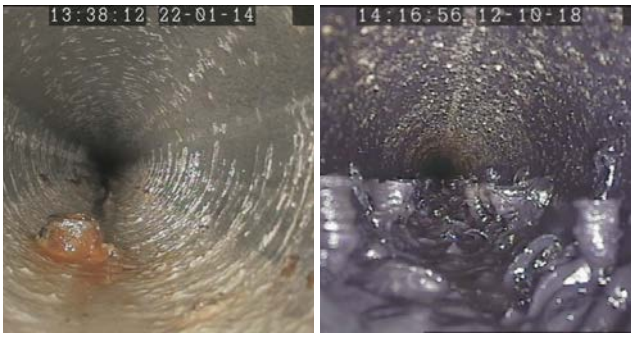


Figure 3: Corrosion can occur very locally (left) or over many metres (right)

As well as corrosion caused by oxygen, microbiological growth can also cause problems. Microbiologically induced corrosion (MIC) can not only cause leaks, it can also lead to a lot of sludge. The question is always: is this a problem when activating the system (see figure 4) or can it be flushed away by the sprinkler head?

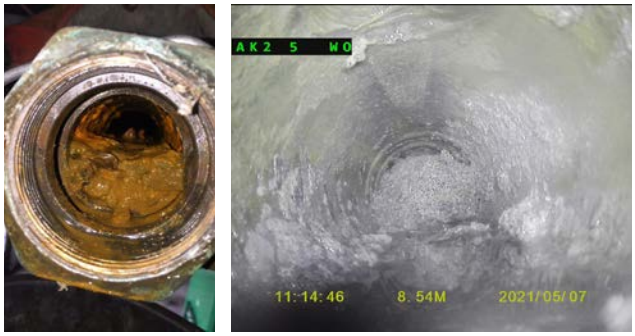


Figure 4: a lot of sludge or flakes in the pipes

What the inspections also show is that installers must work neater and cleaner. Too often, something appears in the sprinkler pipes that really doesn't belong there: stones, threaded rods, tools, cloths, plastic, welding scraps and a great many drill plates (see figure 5).

Figure 5: drill bit (left) plastic (centre) and stones (right) in the sprinkler pipes

The law of conservation of misery

Many sprinkler systems are fed from a sprinkler tank or sprinkler cellar. When these are filled with drinking water, microbiology can grow under certain conditions, despite the fact that no sunlight can shine into them.

In particular, sprinkler tanks with a bitumen liner are a Valhalla for microbiology. Carbon compounds are a nutrient for bacteria [3]. Drinking water is not sterile but contains types and low concentrations of bacteria that do not cause us to become ill. However, drinking water contains enough bacteria that, under ideal conditions, a biofilm can be formed in which microbiology can multiply. Bacteriological research shows that the water in sprinkler tanks, basements and ponds can contain many bacteria that can cause microbiological corrosion (MIC) after just one year. If a sprinkler system is fed with clean drinking water and no modifications are made, the sprinkler system often still looks very good internally after 10 to 15 years. But when many modifications take place, the sprinkler system is always fed with bacteriologically contaminated water from the sprinkler tank and this promotes the corrosion process. If leaks then start to occur, the entire section is often emptied, the relevant pipe section replaced and the section refilled with … water from the sprinkler tank. The result is that the next section of pipe has to be replaced within a short period of time. The 'law of conservation of misery' applies and the corrosion process continues at an accelerated pace.

Possible solutions

During the writing of the white paper 'Corrosion in Sprinkler Systems' [1] the main focus was on venting the sprinkler system to remove oxygen. In practice, this is not a practical solution because there are many high-low connections and therefore many places where air can collect. Also, due to contamination, vents can actually become aerators. Finally, the air cushion acts as an expansion vessel when the water heats up. By removing the air cushion, the desired expansion cushion also disappears. If it appears that corrosion is occurring in a sprinkler system, the following options are currently available to limit or prevent further corrosion (in order of investment costs):

A. Application of nitrogen
   By ensuring that the sprinkler system is filled with > 98% nitrogen instead of air, oxygen corrosion and the formation of a biofilm is limited. Especially in dry systems this is very favourable to apply, because these are never really dry, but also in wet systems you see in practice that corrosion is reduced.
B. Dosing corrosion-inhibitors
   By dosing with an inhibitor corrosion can be prevented. However, the substance in question must be present throughout the system to protect the steel against corrosion everywhere. Most types of corrosion inhibitors used in water circulating systems are not suitable in sprinkler systems, where the water stands still. Over- and under-dosing should be avoided. There are various products on the market for sprinkler systems, each with its own advantages and disadvantages; Pipe-Shield MC, Zitec IC and ACN Borboline.
C. Water treatment/conditioning
   By treating the water in the sprinkler tank or water cellar, corrosion in the entire system is prevented/limited. The water is treated such that corrosion is limited, the nutrients for microbiological growth are removed and bacteria are killed.
D. Corrosion-resistant piping
   By using pipes that are coated on the inside, corrosion of the steel is prevented. Examples of such pipes include Fendium, C-PIPES and CP MIC Shield. The pipes are prefabricated.

Each solution has its own advantages and disadvantages and each additional control measure adds costs. In addition to the above points, it remains important to empty and fill the system with contaminated water from the sprinkler tank as little as possible. Internal inspections therefore actually promote the corrosion process. It is therefore important to carry this out in a limited, methodical way.

Missing link

In the Netherlands, TB67B [7] indicates how maintenance in the water supply must be carried out. TB80 [8] discusses maintenance of the alarm valves and the sprinkler network after the alarm valves, including internal inspection of the pipework. However, the intermediate piping from the sprinkler tank to the alarm valves is not discussed anywhere and can therefore easily be overlooked, see figure 6.

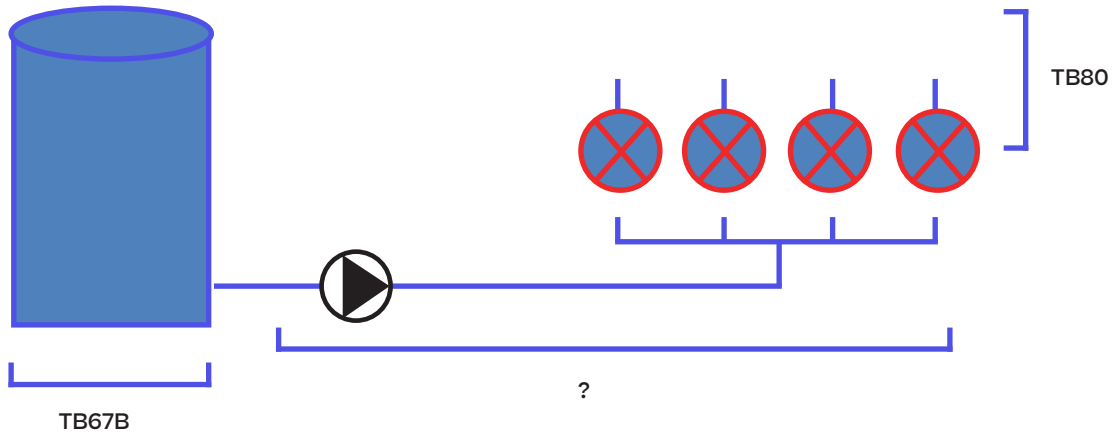
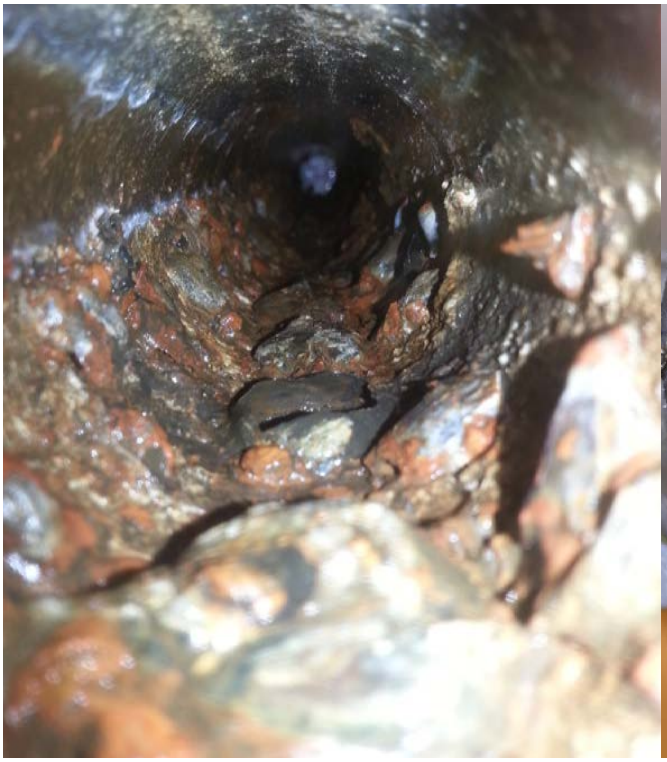
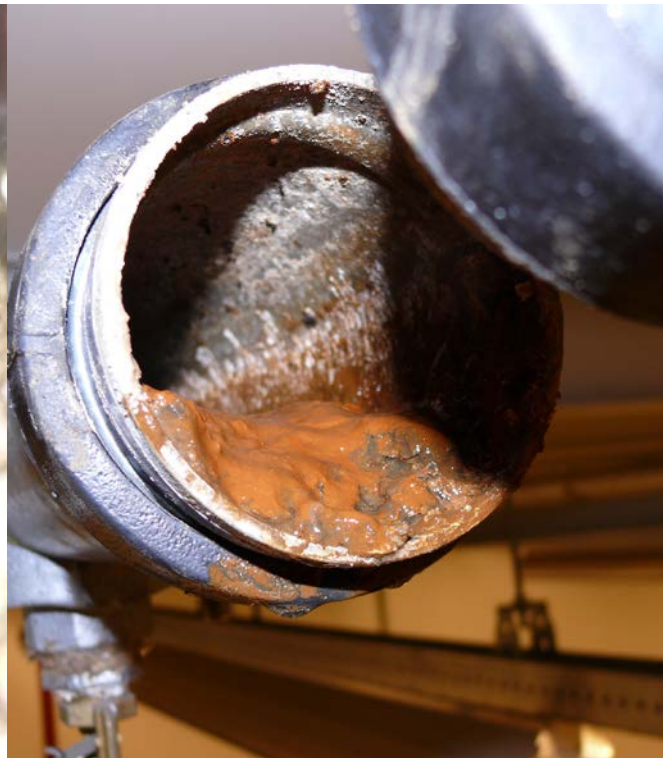


Figure 6: Assurance of maintenance of sprinkler systems in TB67B and TB80





In practice, it is difficult to inspect the internal pipe section between the water supply and the alarm valves. After all, if this is opened, there is no water available in the event of a calamity. The pipes are often thicker-walled than the sprinkler pipes, so that corrosion takes longer before leaks occur. It is good to realise that when the distance between the water supply and the alarm valves is large, there is a real risk of corrosion and a plan must be made to minimise this.

With the solutions mentioned in the previous paragraph, solutions A, B and D prevent corrosion in the sprinkler system after the alarm valve. With solution C, corrosion in the sprinkler tank, the pipes to the alarm valves and the sprinkler pipes can be reduced.

Preventing corrosion in sprinkler systems = tailor-made solutions

In order to operate sprinkler systems in a sustainable and affordable way, whereby they are guaranteed to function in the event of a fire, all stakeholders involved need to talk to each other. Whether a sprinkler system works or not is traditionally a matter of black and white thinking. Corrosion has created a whole new grey area. The owner of the installation in particular will have to be involved more than before. The owner will have to indicate the expected life span of the installation. Aspects such as consequential damage in the event of leakages play an important role in this respect. All stakeholders will have to discuss this with each other: owner, tenant, installer, building/maintenance company, inspector, insurer, consultant, architect, etc.

Different compositions – different approaches

In America and Germany [4] it was already recognised some years ago that blockages due to microbiological growth and leaks due to corrosion in sprinkler systems can cause a lot of inconvenience. VdS, NFPA and FM Global have regulations that address this issue of corrosion in sprinkler systems. MIC is specifically mentioned here [5 and 6].

The composition of drinking water in the Netherlands is different from that in surrounding countries such as Germany and Belgium. In the Netherlands, drinking water is not chlorinated. Furthermore, the maximum hardness of drinking water in the Netherlands is approximately 12°D, which means that hardness deposits in sprinkler systems are not a problem.

However, in addition to the difference in the composition of the water, in other countries the maintenance of sprinkler systems is also carried out differently. The impact of the inspections described in TB67B and TB80 on the maintenance costs and lifespan of sprinkler systems should be compared with the experiences in other countries. The aim is to achieve a sound sustainable maintenance system to keep fire prevention affordable in the future.

Source:

1 Publication van de CCV Corrosiewerkgroep (2015) Whitepaper ‘CORROSIEBEHEERSING IN SPRINKLERINSTALLATIES’
2 CIBV,(2021) ‘Sprinklerstatistiek 2017 t/m 2019’
3 D. van der Kooij, KIWA NV, (1982) “Interacties tussen materialen en micro-organismen en de invloed hiervan op de kwaliteit van het drinkwater bij distributie”
4 Schadenprisma 3/2002, Brandschutz, Überprüfung von Sprinkleranlagen nach 25 Betreibsjahren, Jörg Wilms-Vahrenhorst VdS Schadenverhütungen Köln
5 Data sheet 2-81, Fire Safety Inspections and Sprinkler System Maintenance
6 Data sheet 2.1 ‘corrosion in automatic sprinkler systems’ – FM Global – april 2018
7 Technisch Bulletin 67B, ‘Controle – en onderhoudsregiem voor waterreservoirs’, 2016 Het CCV
8 Technisch Bulletin 80 – 2021, ‘Beheer en onderhoud van watervoerende blussystemen’, Het CCV

What in the world?

Paul Sincaglia, Managing Director, IFSA considers the fire sprinkler market, its growth and current advocacy around the world.

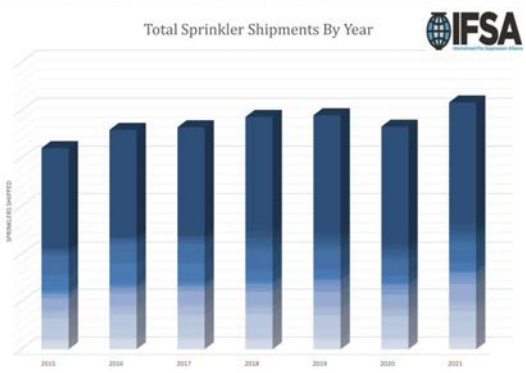
First, let's start with some very good news. The fire sprinkler industry continues to show significant growth and development all around the world. Evaluation of the data compiled by the International Fire Suppression Alliance (IFSA) indicates that 2021 was the best year on record for sprinkler shipments since the IFSA began collecting data from its members in 1980.

This success has not been limited to any one single region or country. Over the past several years, the IFSA data shows that there has been appreciable market growth around the globe with nominal increases of about 25% in Europe, 30% across Latin America, 40% in India, and 10% in Australia. And despite the lingering economic disruptions caused by COVID-19, seemingly high inflation, and ongoing global supply chain issues, data from the first two quarters of 2022 appear to have the sprinkler industry on track for what looks to be another record year in 2022.

But what is driving all this success?
On one end of the spectrum, the rapid global expansion of e-commerce and the related need for storage, distribution, and shipping infrastructure to support it have clearly been a driving force. The size, scale, and capital associated in these logistics facilities is significant. And while many nations have building regulations that mandate fire sprinklers in very large buildings such as these, the economic risk these facilities pose in terms of both contents and operational value places such buildings well above thresholds where corporate risk mitigation policies and/or insurance rates prompt owners to install fire sprinklers.

But on the other end of the spectrum, there is ever-increasing recognition that automatic water-based fire suppression systems are exceedingly successful in reducing deaths, injuries, property losses, and environmental damage. And in that regard, building regulatory changes are being made that encourage and/or require the installation of automatic fire sprinkler systems in an increasing range of building types based on other factors like occupancy, construction type or overall size.

A key set of examples that should be no surprise are the more recent building regulatory changes across the United Kingdom. Fire sprinklers are now mandatory in residential buildings taller than 11m in England, in all high-rise residential structures and social housing in Scotland, and in all residential occupancies, regardless



IFSA sprinkler shipment data is proprietary and is available to all Governing members who participate in the data collection programme

of size, in Wales. And while these new regulations are still in the early stages of implementation as they are applied to newer projects, IFSA survey data has shown market growth of greater than 20%, which is arguably below the true figure given that the UK, and Europe as a whole, are markets that are also served by a number of fire sprinkler manufacturers who are not currently members of the IFSA and not contributing to the data.

But this type of regulatory activity is also taking place outside Europe as well. Starting on the other side of the globe, in Australia, the federal government develops and maintains a National Construction Code (NCC) that is then adopted and administered by the individual states and territories. The Australian NCC is a performance-based code where building performance requirements are specified and designers are permitted to demonstrate compliance through analysis and/or the implementation of specific provisions within the code that are "Deemed to Satisfy" (DtS) the performance requirements.

Over the last decade, the Home Fire Sprinkler Coalition – Australia (HFSC-A) [homefiresprinklers.org.au], a group formed by the Australian Fire Services (AFAC) and Fire Safety Industry (FPA Australia), has been working with the Australian federal government to revise and expand the NCC DtS provisions to specifically address fire risks in residential buildings. Its efforts have been very successful. Under the current version of the NCC (2022), the DtS provisions have been expanded to specify fire sprinklers in all residential buildings more than 4 storeys in height. And over the next 4 years,

the HFSC-A is planning to build on these successes through an extensive programme that includes political advocacy, public education, fire service training, and related research, with an end goal of expanding the use of sprinklers into all multi-family residential buildings as part of the next revision of the NCC in 2025. For those who have additional interest in these efforts and the programmes in place to support it, I encourage you to review their planning in greater detail at homefiresprinklers.org.au/strategy-2021-2025/.

Heading east across the Pacific, there are several efforts underway in Latin America that are worth highlighting. ANRACI, the national fire protection association in Colombia has launched an ambitious effort in effect to transform their regulatory landscape. ANRACI recognises that successful implementation of public fire safety strategy requires a coordinated system that includes building codes, product, design, and maintenance standards, a well-trained workforce, and competent and consistent compliance enforcement.

Accordingly, ANRACI is launching a programme focused on these four key elements. The first is the building code, known locally as the NSR, which is in the process of being entirely rewritten with a draft nearing completion and expected to be made available for public comment later this year. While the full content of the draft NSR has yet to be publicly disclosed, preliminary discussions have suggested that the majority of the fire and life safety provisions within the fire and life safety portions of the draft draw heavily on the International Code Council's International Building Code. Adoption of such provisions, even if only in part, would be considered a significant improvement over Colombia's current code requirements.

Second, in conjunction with the changes to the building code ANRACI is working with ICONTEC, the Colombian Institute for Standardisation, to update Colombian standards referenced within the NSR and other regulations developed by other ministries. Ideally, ANRACI's goal is to maintain past practice where the majority of the fire and life safety standards are adopted by direct reference to existing standards prepared by outside standards bodies such as the NFPA. Because many of the NFPA standards are already available in Spanish with established training ecosystems available across Latin America, the adoption by reference model substantially reduces the burdens on the government to develop and maintain a similar set of documents.

Third, ANRACI is working with Servicio Nacional de Aprendizaje (SENA), the Colombian body responsible for employer/employee technical certifications to create standards and related regulations for fire sprinkler fitters and related fire protection system technicians. And finally, ANRACI has initiated efforts with the National Fire Service (Dirección Nacional de Bomberos de Colombia - DNBC), to promote increased and improved fire service oversight and inspection responsibilities in regard to both new building construction as well as increased regular safety inspections, with an additional future goal of creating a national fire code to be administered and enforced by the DNBC.

Somewhat similar efforts are also underway in Mexico. Outside of the oil & petrochemical industry, Mexico does not currently maintain a national model building code or a set of nationally recognised standards specifically pertaining to fire and life safety. Yet Mexico has initiated efforts to modernise, expand, and update its regulations. As part of that process the Mexican government has partnered with UL Standards and Engagement, the Consejo Nacional de Protección Contra Incendio (CONAPCI) and Asociación Mexicana de Rociadores Automáticos Contra Incendios (AMRACI), the Mexican fire protection council and fire sprinkler association respectively, to help facilitate the drafting of product-related standards. While still in the early stages, standards for fire pumps and motors are the first of what will be many such standards. Future items that are currently planned include piping, hangers, seismic supports, and other related equipment. However, the timeline for these efforts has yet to be established.

On a larger scale, one of the most exciting developments in Latin America is the formation of LATAM PCI, a network of fire protection associations from across Latin America whose missions include improving the regulatory environment for fire and life safety in Latin America, supporting fire suppression research, public fire safety education, and advising local governments regarding issues of fire suppression and safety, all intended to influence the development of fire safety regulations and the use of fire protection systems. To that end, the groundwork for the organisation has been the product of a significant effort by members from 15 organisations representing 11 countries:

Argentina (Argentine Association Povensis NGO); Brazil (Associacao Brasileira de Sprinklers - ABSpk) (Sprinkler Institute Brazil - ISB); Chile (National Fire Protection Association - ANAPCI); Colombia (National Fire Protection Association - ANRACI); Costa Rica (College of Electrical, Mechanical and Industrial Engineers – CIEMI) (University of Costa Rica – UCR); Ecuador (College of Mechanical Engineers of Pichincha - CIMEPI); Mexico (Mexican Association of Automatic Fire Sprinklers – AMRACI) (National Fire Protection Council - CONAPCI) (Universidad México Americana del Norte, A.C. - UMAN); Panama (Panamanian Fire Protection Association - APPCI); Paraguay (Volunteer Fire Department of Paraguay - CBVP); Peru (National Fire Protection Society - SNPCI); Dominican Republic (Dominican Association of Fire Protection - ADPCI).

One of the more exciting efforts that LATAM PCI members have already initiated is an audit of fire safety regulation across the region. The final report is due to be released in the next several months. But one of the key findings to date has been the substantial differences and deviations between the regulatory requirements, frameworks, and enforcement authority between the participating nations. And that in many respects these issues are similar to those faced by the nations in Europe, where each national government is uniquely sovereign and the manner in which laws are written, codes developed, and regulations enforced varies considerably. However, given that the EFSN successfully works and navigates in such a similar environment, the leaders of LATAM PCI are exceedingly optimistic that they can apply some of the lessons learned in Europe and achieve significant success.

Obviously, the efforts outlined above are not the only sprinkler related activities underway around the world. This past year saw both India and the International Standards Organisation issue new, improved product standards for automatic sprinklers; there are efforts in Brazil to add sprinkler requirements to the Sao Paulo Building code, and even efforts to create a single building code to serve across the majority of Caribbean Island nations. But one thing is certain. Fire sprinklers save lives, property and the environment and the more the industry can demonstrate their success, the likelihood of governments encouraging, if not requiring their use improves and the world will continue to see the resulting benefits.

A light sprinkler standard?

Fire safety in parking garages has been a hot topic within the world of fire safety for decades. Fire fighting in car parks by the fire brigade is not always easy and a number of major fires have made it into media. Developments in vehicle technology over the past few years, such as EV vehicles, have not reduced these discussions. The 'severity' of the technical and maintenance requirements is often an obstacle to the installation of a sprinkler (or water mist) system in garage facilities. Here Ronald Oldengarm and Johan Hoogeweg, both Fire Safety Consultants with DGMR, explore the problem areas and look at possible solutions.

An important question that concerns us as consultants is: Can we be satisfied with a simple design of the sprinkler protection? A general rule is that if something can be done more simply (read cheaper), the chance that an installation will be realised is greater. Would we rather have 10 simple installations that provide a basic level of safety or two installations that provide maximum protection? In this article, we explore the problem areas and look at possible solutions.

Challenges

In practice we see that especially for small car parks (<2.500 m^2) the following challenges that lead to them not being equipped with a sprinkler system:

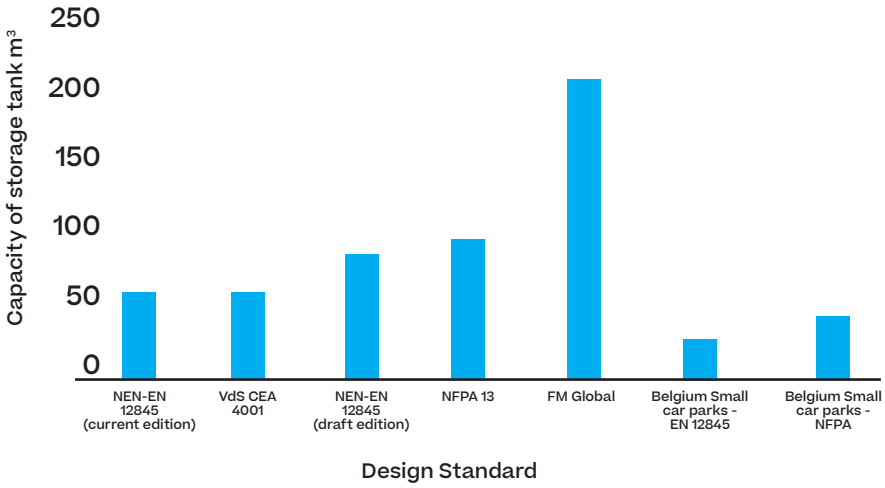
1. High costs for realising a water supply and pump room; often a supply from the water mains is not possible. A dedicated water storage in the building is required.
2. High costs for realising a monitoring system and fire brigade panel
3. High maintenance costs (e.g. every 1-2 weeks a check)
4. 3rd party inspection (annual)

For small installations, the general costs (1+2) have a large influence on the price per m^2 of an installation. If we can make these aspects more attractive, we will have a much better chance of realising more installations, protecting more buildings and increasing the overall safety level of where we live and work.

Sprinkler standards

One of the biggest factors influencing costs is the required water capacity. This affects all parts of the plan (tank, pumps, pipes). The figure opposite shows the indicative required water capacity, taking into account the most common design standards, for a wet sprinkler installation* in a car park.

The water requirements of a sprinkler system as given in the design standard are based on fire testing (worse case fire scenario) and experience, combined with a safety factor. This results in a system with a high degree of reliability, and confidence that it can control the fire in all circumstances. For a situation where the failure of the sprinkler system could lead to major consequences, this is what is wanted.



A practical solution?

Because a fire in most cases doesn't develop as a worst case scenario we see that usually not as many sprinklers are activated as assumed in the hydraulic design. Most fires are controlled with far fewer sprinklers (1-4). So, can we simplify the fire sprinkler system? In most cases the system will (partly) suppress the fire and give support to the fire brigade. Some thoughts about what is possible:

- Reduce the design area to fewer sprinklers, for example four sprinklers… Reduce the safety margins.
- Reduce the water delivery time to 30 minutes. In most situations the fire brigade will be there and can quickly extinguish the fire.
- If the latter is not possible the fire brigade can add extra water to the system through the fire department connection
- Do not install a monitoring system and fire brigade panel; just a flow alarm connected to a remote monitoring station.
- How can the inspection and maintenance requirements be optimised? Which are the critical parts and which parts can accept less frequent attention?

In Belgium, for example, a new system has recently been introduced in the Building Code (HR 1632 N R3 Parkings) Here, a short spray time and a lower hazard class for small car parks may be applied. This development is already a good step in the right direction.

Another way to see this concept is as a system that suppresses the fire when only one car is involved, preventing further spread of the fire to adjacent cars with only a limited number of sprinklers activated. Using a short spray time with the option for the fire brigade to supply water to the system after arrival further reduces tank size.

Summary

In practice, we see that many parties involved are not opposed to the realisation of a sprinkler system and certainly see it as an added value.

Due to the high costs of installation and then of maintenance, these installations are not widespread in car parks. Our idea is that the number of car parks that will be equipped with a sprinkler system can be significantly increased if we have a 'light' sprinkler standard.

Yes, the level of performance of the systems will drop a bit; but is that bad? We would rather see more systems with a good average performance than one system that is very good.

We could also apply this system to, for example, small schools and shops that are not currently equipped with a sprinkler system.

Of course this requires the necessary research, discussions etc. to make this possible. Who will take this on with us?

* When the car park is subject to low temperatures an antifreeze system or dry sprinkler system will be required (a dry system requires approximately 30% more water).

Do EU legislation changes affect your fixed foam system?

Foam based fire protection systems provide an important role in the protection of life, property and business continuity for facilities manufacturing and using Class B ignitable liquids. The risks posed cannot normally be managed by water alone and the scalable nature of a foam system makes it simpler and more cost effective than alternative methods of protection. As chemical analysis methods have improved over the past 20 years, it has become apparent writes Simon Barratt, Foam Product Manager, Viking EMEA that some of the ingredients used in fluorinated AFFF based foam concentrates can have a harmful and persistent effect on the environment and human life.

Legislation to restrict and ban the use of fluorinated surfactants is increasing globally and Europe already has legislation that affects fixed foam systems. There is a lot a chemistry behind this topic but to keep things simple we shall refer to these chemicals as PFAS (Perfluoroalkyl and Polyfluoroalkyl Substances). These manufactured chemicals are used in many industries to improve the strength, resistance and performance of products such as non-stick pans, stain-resistant furniture or fire-resistant clothing. In firefighting foam, PFAS is used to increase the speed of foam coverage and make the bubble structure more resistant to fire and heat. This is important for fast extinguishment but also to maintain post-fire stability to prevent re-ignition.

PFOS (Perfluorooctanesulfonic acid) and PFOA (Perfluorooctanoic acid) were commonly used in past foam concentrate formulations

and are sub-chemicals belonging to this common group of PFAS. The use of PFOS has been prohibited in Europe since 2011 and now pending legislation will restrict the use of PFOA, which will have a direct impact on many fixed foam-based fire protection systems. PFOA was regulated by the ECHA (European Chemicals Agency) in 2020 which first restricted its use for training and risk types but from 1st January 2023 it cannot be used in firefighting foam unless system discharges can be contained. In this case, the end user has until 4th July 2025 before the PFOA-based foam concentrate needs to be removed from service. Most foam concentrate manufacturers had stopped using PFOA in their formulations by 2016 so effectively any foam system installed before this time will probably need some form of remediation work to remove and dispose of the firefighting foam. Shorter chain PFAS chemicals were increasingly used from around 2012 (commonly referred to as C6) but they too are under additional pending restrictions, which will affect all PFAS-based firefighting foam systems in the next 5-7 years.

At this time, a way to avoid future legislative restrictions and future remediation cost is to use an SFFF (Synthetic Fluorine Free Foam) -based foam system. There is no doubt that the trend towards the use of SFFF in fixed fire protection systems is gathering pace. These foams are manufactured without any intentionally added PFAS chemicals whilst still providing good levels of fire performance. However, achieving suitable performance using the same parameters as in the past can be challenging and it means that SFFFs are often not a drop-in replacement. An example of this is with non-aspirated foam-enhanced sprinklers which are commonly used for the protection of ignitable liquids in storage or when used in production processes.

Non-aspirated foam sprinklers

Fire protection sprinklers and sprinkler nozzles are a simple but effective form of active fire protection used in many different applications globally. They are deployed in closed head systems with a fusible element or as sprinkler nozzles in open deluge systems with the fusible element removed. These fire sprinklers were not designed with foam use in mind. They are designed to distribute water

efficiently in the desired manner depending on the object or risk they are protecting. They are also small, discreet and, due to the high volume used throughout the world, have a sensitive, almost commodity-based price point. Despite this, used with the correct combination of system components and foam concentrate, they can perform very well as foam-enhanced sprinkler systems.

Why is a sprinkler different?

An conventional or standard spray fire sprinkler is considered a non-aspirated foam discharge device and typically gives a low expansion ratio of no more than 4:1, with fast drainage times. It is therefore important to select a foam concentrate that has been developed and then independently tested by a third party specifically for use with sprinklers. Factory Mutual (FM) and Underwriters

FM5130 non-aspirated sprinkler fire test

Laboratories (UL) are considered the most relevant and challenging authorities when it comes to fixed foam system product testing. Their respective foam test standards, FM5130 and UL162, include material testing, fire performance testing and follow-up manufacturing audits, which gives a higher level of consumer confidence compared to other standards commonly referenced, such as EN13565-1. Both these organisations recognise that conventional non-aspirated sprinklers are different in foam performance to other discharge devices and therefore, the traditional foam quality approach is not applicable. Instead, each sprinkler type is tested under prescribed conditions with variables such as foam concentrate type, K-Factor, application density, fuel type and installation height.

Use and availability of fixed foam systems

A fixed foam system is about its constituent components working together in a holistic way across a range of parameters such as temperature, density and discharge pressure – whilst delivering suitable fire performance. The availability of SFFF-based FM or UL approved systems at the time of writing remains relatively low with only four original manufacturers offering product lines capable of providing certificated solutions. Further, only one company is offering a range of non-aspirated sprinklers tested at different heights and K factors with both hydrocarbon and

Foam Water Sprinkler Discharge Devices

Foam water sprinklers are Approved with the concentrate specified in this listing and at the application rates specified in the table below. The use of foam water sprinklers with other concentrates or at other application rates may result in foam of significantly different fire extinguishing capabilities and burn back (reignition) resistance.

Product	Type of Equipment	Concentrate % in Water	Configuration	Approved Fuel Hazards	Min Solution Application Rate		Max Subsequent Water Application Rate		Min Installation Height		Max Installation Height		Connection	Orientation	K-Factor
					gpm/ft²	(mm/min)	gpm/ft²	(mm/min)	ft	(m)	ft	(m)			
VK1001, VK3001	Automatic Foam Water Sprinkler	3%	For use with proportioners specifically tested with this concentrate, pre-mixed solution or Water Motor-Powered Positive Displacement Pumps within acceptable viscosity range only.	Hydrocarbon, IPA, Acetone	0.3	(12.2)	0.3	(12.2)	6	(1.8)	24.8	(7.6)	1/2"	Upright	5.6
VK1021, VK3021	Automatic Foam Water Sprinkler	3%	For use with proportioners specifically tested with this concentrate, pre-mixed solution or Water Motor-Powered Positive Displacement Pumps within acceptable viscosity range only.	Hydrocarbon	0.3	(12.2)	0.3	(12.2)	6	(1.8)	20	(6.1)	1/2"	Pendant	5.6
VK1021, VK3021	Automatic Foam Water Sprinkler	3%	For use with proportioners specifically tested with this concentrate, pre-mixed solution or Water Motor-Powered Positive Displacement Pumps within acceptable viscosity range only.	IPA, Acetone	0.3	(12.2)	0.3	(12.2)	6	(1.8)	24	(7.3)	1/2"	Pendant	5.6
VK200, VK204, VK360, VK361	Automatic Foam Water Sprinkler	3%	For use with proportioners specifically tested with this concentrate, pre-mixed solution or Water Motor-Powered Positive Displacement Pumps within acceptable viscosity range only.	Heptane	0.4	(16.3)	0.4	(16.3)	9	(2.7)	45	(13.7)	3/4"	Upright	8.0
VK200, VK204, VK360, VK361	Automatic Foam Water Sprinkler	3%	For use with proportioners specifically tested with this concentrate, pre-mixed solution or Water Motor-Powered Positive Displacement Pumps within acceptable viscosity range only.	IPA	0.4	(16.3)	0.4	(16.3)	6.5	(2.0)	45	(13.7)	3/4"	Upright	8.0
VK200, VK204, VK360, VK361	Automatic Foam Water Sprinkler	3%	For use with proportioners specifically tested with this concentrate, pre-mixed solution or Water Motor-Powered Positive Displacement Pumps within acceptable viscosity range only.	Acetone	0.3	(12.2)	0.3	(12.2)	6.5	(2.0)	45	(13.7)	3/4"	Upright	8.0
VK200, VK204, VK360, VK361	Automatic Foam Water Sprinkler	3%	For use with proportioners specifically tested with this concentrate, pre-mixed solution or Water Motor-Powered Positive Displacement Pumps within acceptable viscosity range only.	Ethanol	0.3	(12.2)	0.3	(12.2)	6.5	(2.0)	45	(13.7)	3/4"	Upright	8.0
VK2021	Automatic Foam Water Sprinkler	3%	For use with proportioners specifically tested with this concentrate, pre-mixed solution or Water Motor-Powered Positive Displacement Pumps within acceptable viscosity range only.	Heptane	0.3	(12.2)	0.3	(12.2)	8.5	(2.6)	44	(13.4)	3/4"	Pendant	8.0
VK2021	Automatic Foam Water Sprinkler	3%	For use with proportioners specifically tested with this concentrate, pre-mixed solution or Water Motor-Powered Positive Displacement Pumps within acceptable viscosity range only.	IPA	0.3	(12.2)	0.3	(12.2)	6	(1.8)	44	(13.4)	3/4"	Pendant	8.0

polar solvent ignitable liquids. This offering enables a close overlap to the situation found with fluorinated foams and has enabled end users to start their transitioning work as an FM or UL approval is often mandated by their AHJ (Authority Having Jurisdiction) and required according to NFPA design codes.

Application design standards such as NFPA11, NFPA30 or FMDS 7-29 require the use of Approved / Listed foam concentrates that have been tested on the subject fuels with the intended sprinkler manufacturer and type. This can limit choice because such testing is difficult and expensive but the user does at least have the assurance of proven fire performance.

Use of FM (Approved) or UL (Listed) foam concentrates tested with sprinklers is a sound approach to fire performance. Manufacturers using the freedom allowed under EN13565-2:2018 to justify the use of foams with non-aspirated sprinklers based on foam quality alone are not considering the full picture. This is because it is very difficult to take accurate and consistent foam qualities as non-aspirated sprinklers produce a low expansion and a very fast drain time, which is difficult to measure. In a look to the future, both these test standards are referenced in the draft revision to the European sprinkler system design standard, EN 12845-1 and a clause in the (foam) supplies section states that 'Where fluorine free foam concentrate is to be used, automatic sprinklers and aspiration devices shall be tested in combination with the specific foam solution to protect the risk. UL 162 or FM 5130 can be used as procedures to prove the system performance.' This is a positive move towards more robust foam system installations in Europe and gives decision makers clearer guidance on suitable product to use.

Transitioning of existing systems to SFFF

End users wanting to be compliant with the new regulations regarding the use of PFAS in firefighting foam will need to transition their systems to SFFF in the coming years. As previously mentioned, there are no drop-in solutions when changing foam but some situations will be easier and cheaper to resolve than others.

Proportioning equipment will normally need changing which would include a review of the storage tank and foam concentrate pipework. Then the discharge devices will need to be reviewed to check if the current densities, flows and pressures will work with the new foam. As the market moves more towards having robust certification such as FM and UL, this means that the selected concentrate should have test and accreditation data. If the existing hardware is already tested with the new SFFF foam then the transition exercise will be much easier than if none of the hardware matches the concentrate. In extreme cases, a complete new set of system components might be required. Transitioning from a fluorinated to non-fluorinated foam system is different from project to project so it is important to work with manufacturers and suppliers that can give design and product selection guidance based on tested solutions and product compatibility. For many end users, these PFAS restrictions are now looming ominously close.

A deeply unsatisfactory position

From time to time I receive questions about CE-marking writes Alan Brinson, Executive Director EFSN, who in this article explores this complex topic in detail.

This is a complicated subject, in particular since the rules around it have led to a situation that makes little sense to engineers. Briefly:

- The legal basis for the CE-marking of fire protection products is the Construction Products Regulation, and before 2011 the Construction Products Directive
- Under the CPD the European Commission mandated (instructed) CEN to produce standards. These mandates went into some detail. Fire protection products are covered by Mandate 109, which includes components for sprinkler systems, fire detection systems, gaseous extinguishing systems, foam systems, powder systems, hose reels and fire extinguishers. M/109 is well over 20 years old and did not include water mist, nor anything invented since the 1980s
- Under M/109 our industry produced five sprinkler component standards some 20 years ago. These standards were approved by the Commission and cited in the Official Journal of the EU. A cited standard is also called a harmonised standard.
- Products within the scope of a harmonised standard must be assessed in accordance with that standard and must be CE-marked. It is otherwise illegal to offer

them for sale in the EU and neighbouring countries that apply the CPR. ESFR, CMSA, EC and residential sprinklers were not in the mandate, nor were many more components.
- The above five standards were written more or less as we would like, including not just test protocols but their pass/fail criteria and a certain amount of specification. Under the CPR, pass/fail criteria and product specification (the valve body shall be metallic) are not allowed, so the five standards are not compliant with the CPR.
- Under the CPR, harmonised standards are no more than standardised test protocols. Performance of a product is assessed in a standardised way and then Member States (national governments) decide what performance they wish to see in buildings in their jurisdiction. While this approach might work for a fire door, no regulator is interested in specifying what performance they want for each sprinkler physical property test. One regulator told me that he expects our industry to tell him what is a good product, but under the CPR we cannot.
- To produce new harmonised standards under the CPR we need a Standardisation Request from the Commission. A few years ago the Commission asked the Member States their priorities for the updating of CPD Mandates to CPR SRs and promised to work on the top 10. M/109 came 11th, so is not a priority and we cannot expect an SR for our products in the medium term.

In as plain English as I can manage, we are not allowed to draft new harmonised standards and even if we were, we are not allowed to write them in such a way that a product assessed against a new harmonised standard, and CE-marked, could be assumed to be fit for purpose.

This is obviously a deeply unsatisfactory position. We and our colleagues in other active fire protection disciplines have complained to the Commission, CEN, Members of the European Parliament, national politicians and regulators. After years of complaints the Commission accepted there were problems, organised a series of consultations and on 30 March published a '*Proposal for a Regulation of the European Parliament and the Council laying down harmonised conditions for the marketing of construction products, amending Regulation (EU) 2019/1020 and repealing Regulation (EU) 305/2011.*' The latter is better known to us as the Construction Products Regulation, whose purpose the Commission summarises well in the opening paragraph of its proposal, '*The CPR ensures the smooth functioning of the single market and the free movement of construction products in the EU. It does so through harmonised technical specifications, which provide for a common technical language on how to test and communicate the performance of construction products (e.g. reaction to fire, thermal conductivity or sound insulation). The use of standards is mandatory when they are cited in the Official Journal of the European Union (OJEU). Construction products covered by such standards must bear the CE marking which indicates that they comply with their declared performance. Such products can then freely circulate within the single market. EU Member States are not allowed to require any additional marks, certificates or testing. The CPR does not set product requirements. EU Member States are responsible for the safety, environmental and energy requirements applicable to buildings and civil engineering works.*'

In 132 pages and 33 pages of Annexes, the Commission has set out a detailed proposal to amend the CPR. It recognises that there is a stalemate in applying the CE-mark to more construction products, and noted that, '*Due to these deficiencies, Member States apply national marks, certifications and approvals. This is in breach of the CPR and not in line with the jurisprudence of the European Court of Justice.*' Some readers will be aware of examples where a national authority has prevented the use of a product because it did not carry a national mark, or has forced manufacturers to pay for expensive and time-consuming retesting to be allowed to continue to sell a product in that country.

To obtain CE-marking and ensure such products are fit for purpose the EFSN has found a workaround, namely to create non-harmonised standards of test protocols with pass/fail criteria and reference these standards in EN 12845, the sprinkler system design standard, while encouraging companies that want their products to be CE-marked to request a European Technical Assessment ETA from one of the laboratories (known as Technical Assessment Bodies) that are members of the European Organisation for Technical Assessment. The TAB would then draft a European Assessment Document (EAD) against which to conduct the ETA, with the EAD including the same tests as in the non-harmonised standard, only without pass/fail criteria. ETAs are in the CPR and were intended to be for products that are not widely used and so for which there was little appetite among CEN members to draft a European standard. Instead it has become the only way to achieve CE-marking for fire protection products. This approach is complicated, but it works.

But back to the proposed CPR amendment. Among other things it would:
- *'Introduce a new empowerment for the Commission to (1) adopt technical specifications via Commission acts for cases where the standardisation system is not delivering on time and of sufficient quality; (2) set product requirements.*
- *Introduce environmental, functional and safety product requirements for construction products.*
- *Align with the Ecodesign for Sustainable Products Regulation on climate and environmental sustainability and on the Digital Product Passport.'*

A new power for the Commission to set product requirements (presumably under the advice of experts) could potentially solve the impasse described above, albeit in a bureaucratic way that would require laws (Commission Acts) drafted by the Commission to do so. The Digital Product Passport may be a burden but could be required anyway for projects. The Commission also claims, 'Further reducing the administrative burden for manufacturers will be achieved by eliminating the overlap between the CE marking and the declaration of performance.' If this happens in practice, it will be welcome.

Article 36 is about the development and adoption of European Assessment Documents. It states,

'*The procedure for developing and adopting European assessment documents shall respect the following principles:*

(a) be transparent to Member States, the manufacturer concerned and to other manufacturers or stakeholders that request to be informed;

(b) disclose as little as possible information protected by intellectual property rights, and protect commercial secrecy and confidentiality;

(c) specify appropriate mandatory time limits in order to avoid unjustified delay;
(d) allow at any stage for adequate participation by the Member States and the Commission;
(e) be cost-effective for the manufacturer; and
(f) ensure sufficient collegiality and coordination amongst TABs designated for the product in question.

The balancing of principles laid down in points (a) and (b) shall at least allow for the disclosure of the name of the product at the stage of the approval and the communication of the work programme'.

Annex III of the proposal clarifies that point (a) only involves other manufacturers if a group of manufacturers or an association approaches EOTA and requests an ETA.

The proposal under '*Article 78 empowers the Commission to set up an EU construction products database or system to facilitate the access to product information (especially DoP, DoC and instructions for use).*' For decades there have been complaints that there is no database to check whether a product that has a CE-mark has actually been tested by a recognised laboratory. However, on closer reading of the text it is not at all clear that this information would be publicly available:

1. *The Commission is empowered to supplement this Regulation by means of delegated act according to Article 87, by setting up a Union construction products database or system that builds to the extent possible on the Digital Product Passport established by Regulation (EU) ... [Regulation on ecodesign for sustainable products].*
2. *Economic operators may access all information stored in that database or system which regards them specifically. They may request that incorrect information is corrected.*
3. *The Commission may, by implementing acts give access to this database or system to certain authorities of third countries that apply voluntarily this Regulation or that have regulatory systems for construction products similar to this Regulation provided that these countries:*
   (a) ensure confidentiality,
   (b) are partners of a mechanism for lawful transfers of personal data compliant with the Regulation (EU) 2016/679,
   (c) commit to engage actively by notifying facts that might trigger the need for action of market surveillance authorities, and
   (d) commit to engage against economic operators infringing this Regulation from their territory.

At this stage the proposed amendment has not been formally accepted by the European Parliament or Council (national governments). However, the European Parliament published an appraisal in March which largely supported the Commission's work. It had previously '*called on the Commission to explore the possibility of including in the CPR additional information obligations and product performance obligations in terms of health, safety and environmental aspects*.' No suggestions were given on how to do this or what information should be included but in Annex I of its proposal the Commission addresses this in detail.

We believe that very few unapproved sprinkler products are sold in Europe. However, many companies illegally offer them online so it was good to see that previously, '*Parliament also underlined the need to take into account products sold online in market surveillance activities, especially those made available by non-EU economic operators*.'

Looking ahead

While the proposal has not been adopted and it could take years before that happens, with haggling between the Parliament, Member States and the Commission, the above shows the likely direction for the future of the CPR. Overall it appears positive although it will not be until everyone tries to work with the revised CPR that it will become clear whether it can deliver what the market requires: a means to apply a CE-mark that indicates a product is fit for purpose.

Progress!

John van Lierop, Country Manager, EFSN

The Dutch building code does not include any requirements or direct incentives to fit sprinklers; the entire regulatory sprinkler market is based on equivalence, where sprinklers are installed as part of an alternative solution to that in the code. This approach has been highly successful and the Netherlands uses more sprinklers per capita than most other European countries. It is even close to introducing the first code requirement for sprinklers. Nevertheless the bulk of the regulatory market will continue to depend on equivalence. Some applications, such as the use of sprinklers to permit larger fire compartment sizes in warehouses, are routinely accepted. Our aim is to see the routine acceptance of more alternative solutions that incorporate sprinklers. To achieve this, we generate evidence that the sprinkler solution is as good or better than the code solution, then work with stakeholders to produce consensus guidance that can be used across the country.

Car parks

For the first time the building code will introduce a requirement to fit sprinklers in car parks, specifically below buildings where people sleep. While car park fires have not caused significant loss of life they have caused huge disruption and economic damage. There is also concern that a car park fire could cause major loss of life, particularly if the car park were below a building where people sleep. The government therefore announced that it would regulate in this area and commissioned research. Meanwhile the draft Dutch car park fire protection standard now includes requirements for electric cars.

A Dutch sprinkler association (VSI) committee will look to produce a more risk-related design for small car parks, aiming to make mains water supply more often feasible. That in turn would address the issue of water supply duration to protect against electric vehicle fires, which can burn for many hours.

Quality assurance

Sprinkler systems will only be used more widely if they are reliable. Studies performed in different countries on the reliability of sprinkler systems strongly and unsurprisingly suggest that enhanced quality assurance regimes lead to greater reliability, potentially exceeding 99%. In the Netherlands the government set up and partly funds a stakeholder body, Het CCV, that approves certification schemes for safety measures, including sprinkler systems. These schemes and related documents are periodically reviewed. One recent update was to Technical Bulletin 80, which provides detailed guidance on the management and maintenance of water-based extinguishing systems. Another document clarifies which approvals may be accepted for products that are not CE-marked. In this consensual way all

aspects of quality can be covered, emerging issues addressed and a level playing field applied of an appropriate level of supervision, with tougher inspection regimes for installers that are not third party accredited.

Fire service guidance

The fire service academy and VSI are working together on a protocol for the fire service in buildings equipped with sprinklers. This remains incomplete but there is a growing need for it, partly due to the increasingly large distribution halls and automatic warehouses.

High-rise buildings

Dutch building regulations apply to buildings up to 70 m high and do not require sprinklers. For buildings higher than that a consensus guidance document exists which does call for sprinklers. Yet 70m is a very high threshold for sprinklers, much higher than in other European countries where it is typically 30m or less; it is also not based on any obvious scientific or physical criteria. We are seeking incentives to fit sprinklers at lower heights, ideally codifying them in a Dutch standard, and have set up a standards committee working group with different stakeholders to work on a risk-based approach.

Residential buildings

A broad stakeholder group drafted guidance on how to value sprinklers in residential buildings. The draft was published for public comment and became a better document thanks to the comments. It is available on brandveiligwonen.org. It is not a code document but suggests what flexibilities in other measures may be acceptable if sprinklers are installed. Important stakeholders like consultants and fire officers now need to become more familiar with it.

Environmental considerations

While sprinklers are good for the environment because they prevent major damage to buildings and the release of large quantities of CO_2, we can do more to reduce their impact in the absence of a fire. A Dutch expert group came up with several good ideas to reduce energy and water consumption. These are discussed elsewhere in this edition of Sprinkler Outlook.

Smoke control

Sprinklers can be a core part of any smoke control strategy in a building. They prevent fire spread, limiting the production of smoke and heat, and cool hot gases so that they contract, pressures drop and smoke spreads less readily. The Netherlands is tightening requirements for smoke compartments, potentially adding significant cost. Sprinklers may be part of a more economical approach to achieve the same goals.

Wooden buildings

The Dutch government needs standards for buildings of wooden construction. A standards committee working group is currently conducting a literature survey as a first step towards a standard. We encourage the use of sprinklers as a core measure.

Reductions in fire resistance

A few years ago some independent research supported the development of guidance on how the structural fire resistance of steel may be reduced when sprinklers are fitted. Further research now under way is hoped to extend this concept.

Summary

Through many initiatives we are maintaining and even improving the quality of sprinkler systems in the Netherlands. We are also developing guidance on how sprinklers may be used to relax inflexible, prescriptive passive fire protection requirements so that buildings can better meet market demands, which makes them more valuable, all at lower cost.

Sprinkler promotion continues apace

Alfredo Alvarez, EFSN

High-rise buildings

The EFSN's first position paper was introduced in 2021 and covered the need to revise the Spanish Building Code Basic Document for Security in case of Fire (CTE DB SI), so as to reduce the maximum evacuation height to require automatic fixed firefighting systems in buildings of all uses. Currently in hotels sprinklers are enforced above 28 metres of evacuation height, while other buildings' uses only require automatic fixed firefighting systems if they are higher than 80 metres.

Our paper was presented in collaboration with APICI to the Spanish National Research Council CSIC and was also sent to the MITMA and different local Councils and Fire Officers in main Spanish regions. The paper was supported by the APTB, Tecnifuego and SFPE España amongst others.

The proposal in our paper was to reduce the height threshold from 80 to 28 metres to require water-based automatic extinguishing systems in all kinds of buildings.

Considering the next scheduled and approved building developments in Madrid, our campaign will carry on focusing on the capital to persuade the Council to consider using this highly efficient approved and proven technology in new construction. At the same time, we are directing the campaign to large developers such as Madrid Nuevo Norte to ensure they are aware of the current code requirements and that these are the minima, and not the protection that they should offer to future international flats and building owners in such an emblematic project.

Based on the fact that Europe´s average height threshold to protect buildings is 30 metres, Spain remains an exception, and this has been pointed out to decision makers to consider an amendment. If changes are not considered at the national level, each city will have to consider a mandate for these systems above that height.

To illustrate and present our position paper we used two real fire cases that recently occurred in Madrid and the difference between having a well-designed, installed and maintained automatic extinguishing system in place and not having it.

The fire in the Hotel Nuevo Madrid in June 2021 was a success story where just one sprinkler operated and prevented internal fire spread, providing enough time for the guests to evacuate the hotel without incident.

By contrast was the rapid fire development in December 2020 at the Torre Ambar, a block of flats just below 80 metres and therefore not protected with sprinklers. The block lost the top four floors, this time without victims but residents and firefighters were at very high risk.

Homes for the elderly and care homes

Our next EFSN position paper will focus on care residences and homes for the elderly where the residents are vulnerable in the event of a fire. Spanish codes do not require fixed water-based extinguishing systems for this type of occupancy and recent fires have shown they should be better protected against fire.

Since January 2022 over a dozen deaths in homes for the elderly due to fires have been reported. Considering the average number of deaths in building fires each year, it could be that nearly 10% will come from this sector during 2022.

Although the position paper is not yet ready, our promotional activities have started, including conversations with local councils to introduce EN16925:2020 as a basic pillar to design residential sprinkler systems to protect this kind of occupancy, where citizens are clearly at high risk when a fire occurs. This is why we are moving in the direction of cooperating with the third age residence sector on the development of the paper since they understand the need they have for protection.

The paper will also address the Normative Annex C of the code, which covers the alarm transmission to the fire brigade. This could be a case study for Spanish authorities, considering there will always be someone at the residence to confirm the alarm before fire services are deployed, which was a main concern.

The Spanish Royal Decree for fire protection products, RIPCI, is under review; the last being in 2017. Part of our campaign is directed towards the Ministry to ensure the understanding of this new design code and the importance of applying it in the RIPCI for better protection of those more vulnerable when a fire happens.

We recently published a promotional video in collaboration with the APTB to explain the importance of active fire protection like sprinklers and knowing the evacuation routes are essential measures for all building users.

Spanish authorities may consider a future revision of the CTE where residences for the elderly are protected with water-based automatic extinguishing systems as in other countries, depending upon the number of beds, residence size, number of floors, or some other criteria for improved fire protection.

Meanwhile a Madrid Local Order also mentions in an annexe that homes for the elderly with more than 100 residents and many other occupancies related to health and education will require a fire protection mandatory report.

Industry promotion

This year the Spanish industrial code is also under review and during the last few months we have made some recommendations to technical committees on some aspects we thought of importance that should be considered by the authorities in this future issue.

The code was last revised in 2005. Spanish code still reflects the “old formula” to calculate the fire load density that most countries no longer use as many things have changed since: construction materials; insulation; storage materials; methods and procedures. Most Northern European countries protect risks with sprinklers depending on the size.

While warehouses, we could say, are well protected with sprinklers; we could not say the same for the Spanish industrial buildings including food and medicine processing plants. For industrial buildings the fire load threshold in the Spanish Code to require sprinklers is too high and therefore few industrial fire load calculations using the formula will require sprinklers. Some countries require sprinklers at half of the fire density in Spain and others even lower, with compartment area limits.

If the formula is to be used to calculate the fire load in an industrial building, it is recommended to consider all new materials used in the construction and production process, for example the materials used on the façade, the insulation, dividers and many others; it is also very important to consider localised fire loads that could easily spread in open areas. Fires spreading in areas of over 1500 square metres are difficult not to say impossible to control, since firefighting equipment will not have enough pressure to reach the centre of the fire. This is why we see more and more disproportionate industrial fires with firefighters limiting their work to avoid fire spreading to other buildings, cooling the surrounding area and waiting for the affected building to collapse.

Sprinkler monument

We could not end this article without covering the impressive two metre high bronze sprinkler monument which has been inaugurated at the sprinkler plaza in Alcobendas in Madrid last September. Pacisa, a leading Spanish sprinkler contractor, led the project and those who contributed to funding the monument, including the EFSN, are listed on the plinth.

Next steps

Following the summer break we are preparing a presentation in line with our first case in collaboration with the APTB and Fundación Mapfre, as part of the Fire Safety Weeks, to influence decision makers at holiday locations with high rise buildings.

There are some ideas for organising a national event next year featuring sprinklers and conversations amongst the EFSN Spanish stakeholders have begun. It is still soon, but the intention is there and we will work for it to happen.

During 2023 our second position paper on old people residences will be finished and ready to present to the Spanish authorities to follow the same process as in the first one. We will run both campaigns in parallel and try to achieve positive changes for those whom we believe are more vulnerable to fire.

rociadoressalvanvidas.org

A return to normality

Keith MacGillivray,
Chief Executive, BAFSA

After what seemed like two very long years of lockdown because of COVID 19, it was both a relief and a sign of things in the UK and Europe returning to normality when we were able to attend and support FSI 2022 in London.

BAFSA were pleased to work with EFSN and jointly support the conference, the conference provided a much-needed opportunity for sprinkler installers, manufacturers, and users to get together both professionally and socially to catch up on what had happened during the intervening period.

This was the first time that BAFSA and EFSN had jointly hosted a joint conference since 2014 and provided an opportunity for our shared Membership together with our UK, European and American Members to get together.

The last two years have proved devastating for many industries across the world, in particular the entertainment, hotel and restaurant sectors. We have seen the closure of many venues, with some unlikely to reopen. However, we have also seen many organisations taking this as an opportunity to work differently, the number of face-to-face meetings has been reduced and replaced by shorter online meetings. Throughout the lockdown period BAFSA was able to conduct its business in this manner, with lockdown now finished it was time for BAFSA to consider how it would continue to run its business.

BAFSA Council has seen the use of the online meeting as a way forward, it has allowed us to carry out our business throughout the pandemic and equally has provided significant time savings both to the committee Members and BAFSA staff, together with a reduction in travel costs. Moving forward it is anticipated that we will continue to work using this model, however we will have our AGM and Annual Dinner in person.

BAFSA AGM and Annual Dinner 2022

This year's Dinner and AGM will be on Thursday 3rd November at the Marriott Forest of Arden Golf and Country Club near Birmingham. The day will start with a buffet lunch from 1200hrs followed by several presentations of interest to all sectors of the industry, the formal AGM will follow the presentations and our Annual Dinner will take place in the evening. Tickets are available from the bafsa.org.uk/events.

Post-Pandemic Activity

How has the sprinkler industry been affected by the pandemic?

Initially there were a few problems with construction sites in the UK being closed to reduce infections, however this was a fairly short period and thereafter the majority of construction and maintenance projects were recommenced with appropriate protection measures.

In fact, the industry has seen a large increase in the number of sprinkler heads installed throughout the UK, particularly in 2022. Within Scotland and Wales, we have seen increasing numbers of sprinklers being installed in new built housing, schools, care homes and sheltered housing.

In England we have also seen an increasing number of housing projects being fitted with sprinklers although at present there is no legislative requirement to do so, except in high-rise residential buildings. It is also pleasing to see that several care homes and sheltered housing developments in England are following Wales and Scotland's examples and installing sprinklers, however the same cannot be said for schools in England where there is still considerable resistance to the installation of sprinklers in new built schools.

BAFSA continues to lobby for sprinklers in schools, sheltered housing and care homes in England and following the ending of lockdown will resume its seminars and presentations in local authority areas throughout England.

There continues to be retrofit work in Scotland and Wales where there are many existing care homes, sheltered housing and local authority housing without sprinklers, therefore it is timely to persuade owners that when they are refurbishing premises, they should also consider installing sprinklers to protect their investment and bring the properties up to current day standards.

BAFSA Membership

Many of our installer Members had taken the opportunity of the enforced lockdown to increase the training for their installers and designers. There has been a large increase in the numbers of installers sitting the SFJ IQ L2 Certificate in Fire Sprinkler Installation. Similarly, there has been an increasing number of applications for the four Design Courses presented by BAFSA; Basic Design Course, FHC Course, Intermediate Design Course and the Inspectors Course, all are available online through bafsa.org.uk/skills-qualifications/skills-qualifications/fire-sprinkler-design-courses/

The professionalism of the sprinkler industry is dependent on ensuring our members continue to encourage their employees to take part in all development courses both installation and design, this will ensure that the high standards shown by our members continue throughout the industry.

BAFSA continues to ensure our Membership is at the highest level in the industry by requiring our Membership to be Third Party Accredited through LPCB, FIRAS or IFC. Again, we have seen increasing numbers of companies going through the accreditation process with these bodies and consequently our Membership has continued to rise.

Maintenance of Water Mist systems

Recent experience of a number of water mist systems which have been audited or reviewed by consultants suggest there are serious shortfalls in the maintenance provision in some domestic water mist systems in the UK. While there may be fewer residential mist systems in other European countries, there is no reason to believe that the problems are not widespread.

While proper maintenance of all fire protection systems is essential, the need for this is particularly acute in respect of life safety systems. This is of course a legal requirement under all UK fire law. And probably under most other jurisdictions. Failure to ensure that all systems and equipment are "subject to a suitable system of maintenance and are maintained in an efficient state, in efficient working order and in good repair" will see the dutyholder and in most cases any appointed maintenance contractor facing prosecution. The special nature of water mist systems and the very critical tolerances in nozzles and waterways makes proper maintenance critical.

This article summarises the appropriate test and maintenance regimes for both residential and industrial and commercial water mist systems.

In the UK, guidance on the procedures to be followed for maintaining residential water mist systems is contained in Section 8 of BS 8458, and for industrial and commercial systems in Section 11 of BS 8489-1. The UK CEN mirror committee believes there are omissions in the EN 14972 series of documents.

In particular, comparison with the rigorous maintenance regime for automatic fire sprinkler systems suggests that there is a need to look again at this topic.

Maintenance programmes are restricted by the 'closed protocol' nature of all water mist systems whereby only the manufacturer/installer of the system has access to spare parts etc. This lack of interoperability contrasts unfavourably with sprinkler systems where any certificated installer can support and maintain any sprinkler system.

Summary of maintenance and testing procedures

At a minimum, the following checks should be undertaken on a regular basis:

- The water mist nozzles' heat sensing capacity and their spray pattern is not impeded.
- The hazard has not been changed.
- The system has not been modified, except in accordance with the original design standard
- System strainers and nozzle strainers are unimpeded.

Where any restriction in nozzles and pipework is suspected, these should be cleaned or replaced if necessary.

Systems should be tested and inspected as follows:

- The system should be visually inspected wherever possible for water leaks. If a leak is suspected, the pipework should be pressure tested for one hour to the highest pressure to be experienced in the system
- The test valve should be operated to determine whether the system's design flow rate is achieved
- Alarms should be tested to determine whether they function as designed
- Stop valves should be exercised to ensure free movement
- Any remote monitoring arrangements should be tested to determine whether they are being transmitted and received correctly
- Where trace heating is installed, its operation should be tested
- On completion of testing, the person carrying out the inspection and tests should complete and sign the system logbook

Logbooks

Each system must have its own logbook into which should be recorded details of:

- The dates of inspections
- Details of all tests conducted and their results
- Confirmation or otherwise of the water mist system's operational status
- Confirmation or otherwise of the alarm system's operational status
- Details of any recommendations or comments
- Confirmation that the hazard rating for the system remains within its original design

Any serious system faults must be relayed to the occupants or owners as soon as possible and confirmed in writing within 24h.

User's programme for inspection and checking

As is the case with sprinkler systems, much of the routine checking work can be undertaken by suitably trained personnel employed by the system owner. Training should be provided by the installer as part of the installation/maintenance contract.

The supplier must provide the user with a programme containing a documented inspection and checking procedure for the system.

The programme specified by the installer must include instructions on the action to be taken in respect of faults and operation of the system, with mention of the procedure for emergency manual starting of pumps, and details of the weekly and monthly routines specified.

Reducing the environmental impact of sprinklers

A sprinkler system ensures that a fire is very limited and in most cases is extinguished automatically. A sprinkler system is thus an inherently sustainable option, as buildings cannot burn down, which minimises emissions of toxic smoke, preserves precious raw materials and ensures business continuity writes John van Lierop, EFSN and VSI.

Installing and keeping a sprinkler system operational obviously costs raw materials, energy and water. By making a sprinkler installation smarter, but also by combining the installation with other applications, fire sprinklers contribute to sustainability.

Possible measures

The Dutch United Sprinkler Industry (VSI) association made an overview of options to make sprinkler installations more sustainable. These measures fall under one or more categories, such as saving energy, reducing water consumption or extending the life of the installation:

1. Limiting water consumption in testing

To guarantee the reliability of sprinkler installations, maintenance and testing are necessary. However, the use of water can be reduced. As we know the standards require periodic testing of the system. Sprinkler installations are provided with test connection(s), including the so-called Inspection Test Connection (ITC), which is used for functional testing of the system. Opening the ITC simulates activation of a single sprinkler head. The test shall result in the activation of the alarm valve, flow switch, sprinkler pump, fire alarm to the alarm receiving station and of the fire alarm and evacuation system.

By using specific test units, water is circulated so that the flow switch is tested in an alternative way. For example, these test units can also be activated remotely and are particularly suitable for hard-to-reach places. Self-testing flow switches and electronic system monitoring are innovative solutions that allow sprinkler installations to be tested and monitored electronically. These options are also available for the pressure switches on the alarm valves. Activation and reading can take place remotely, cutting down on travel. As an option, the test water can be returned to the extinguishing water supply.

2. More efficient use and protection of sprinkler pump sets

In a sprinkler system, the system pressures should not exceed a certain level. Traditionally, this is ensured by mechanical relief valves. A speed pressure control can limit the overpressure protection to the maximum system pressure in an alternative way.

Protecting pump sets

The speed pressure control protects the engine from cavitation damage, as well as damage caused by misuse during testing. Switching the pump sets on and off must be done in a controlled manner during testing, otherwise rapid wear and damage will occur. As soon as the engine stops, the oil distribution also stops and an abrupt stop is very harmful to bearings in, among other things, the turbo. The abrupt stopping of a diesel engine is by far the biggest cause of turbo damage.

The speed pressure control system supports testing, such as heating at a low speed and cooling gradually. As a result, the operator need not follow detailed procedures.

Optimise design

Speed pressure control is also used to optimise water usage across the sprinkler pump's entire operating range, without the need for mechanical facilities in the sprinkler lines for hydraulic balance. Each sprinkler pump is based on the theoretically most unfavourable conditions and is therefore always oversized. In addition to limiting the maximum closed head pressure (pressure without sprinkler discharge), the speed pressure control will optimise the discharge pressure, i.e. depending on the number of heads that actually respond, so that the fuel consumption is minimised. The speed pressure control ensures that the sprinkler pump sets function more efficiently, resulting in optimal fuel consumption and reduced exhaust emissions.

Biodiesel
More and more biodiesel is being blended in diesel, with 7% the standard concentration in the Netherlands. There are questions about using biodiesel in sprinkler systems since it degrades. But through good housekeeping and cleaning, the risk can be managed. It is good to know that there are alternatives to diesel from crude oil but it is important to ensure they do not affect the efficiency and power output of the engine.

3. Combining a sprinkler system with a thermal energy storage system
Due to limits on the energy consumption of buildings, every country has their own rules and heat and cold storage installations are increasingly used. The reservoir for a thermal energy storage system can be used to supply a sprinkler system since a sprinkler system only uses water in case of a fire. The capacity of an average heat and cold storage installation is approximately 100 to 400 m^3 per hour and appears to be sufficient for the average need for a sprinkler installation in a utility building.

Collective fire extinguishing water supply
More and more industrial and office areas have a collective fire-fighting water supply to which several buildings are connected. More and more collective heat and cold storage installations are being made that consist of a large number of heat and cold storage reservoirs. Together, these reservoirs are suitable for supplying water to sprinkler installations that require a greater flow, such as those in distribution centres. The fire extinguishing water needs of distribution centres are often up to 1,200m^3 per hour.

4. Using the fire extinguishing water supply for energy saving
In the Netherlands we are also working on the energy transition in which hardly any CO_2 is released. By 2050, energy supply must be almost completely sustainable and CO_2-neutral.

Heating
The extinguishing water from sprinkler systems is often stored in sprinkler tanks and clean water cellars with a volume ranging from 250m^3 to > 1,000m^3 and can be used for energy savings. Energy is extracted by installing a heat pump and connecting it to the central heating system. Calculations show that up to 60% can be saved on the gas bill. More information is available on : sprinkler.nl/duurzaamheidsopties-voor-sprinklerinstallaties/

Cooling
Fire extinguishing water can also be used to save energy in cooling installations. This capacity is limited, but excellent as a backup system. Cooling capacity of the extinguishing water could be used to improve the operational reliability of critical systems.

5. Extend the life of sprinkler pipes
An important way to make a sprinkler system more sustainable is to extend its lifespan, for example, by protecting the installation against internal corrosion. Oxygen, present in air and in water, can lead to corrosion. Applying automatic air vents has a positive influence on the lifespan of sprinkler installations. In wet systems, air collects in the higher parts of the installation. Precisely in those places where 'trapped air' is present, the risk of corrosion appears to be greater. The piping system can be designed during the engineering phase in such a way that the number of places where air can collect is minimised.

Reduction of oxygen with nitrogen
Research shows that when the oxygen level is less than 2% hardly any corrosion occurs. Using nitrogen when pressurising/filling a 'wet' system will result in a minimal residual amount of oxygen in the piping system. For 'dry' sprinkler systems, an automatic nitrogen replenishment system (instead of compressed air) can provide this minimum oxygen level. Read more in the Dutch VSI publication 'Corrosion control in sprinkler systems': sprinkler.nl/corrosiebeheersing-in-sprinklerinstallaties.

6. Applying more sustainable materials
Materials can lose their original properties through corrosion, aging and wear. The use of materials that are less sensitive to this ensures that components can be used for longer and are therefore more durable. If parts of the installation, such as pipes, do not corrode, they can be reused (disassemble and assemble) in the 'next' building. The sprinkler industry often works with a grooved connection technique that is extremely suitable for the (non-destructive) disassembly of a sprinkler system. More and more manufacturers are offering materials and solutions which are better protected or hardly change over time. Examples include the internal coating of steel pipes or the use of plastic pipes. Such sprinkler pipes create less pressure loss when water flows through them, so that pipe diameters can be smaller.

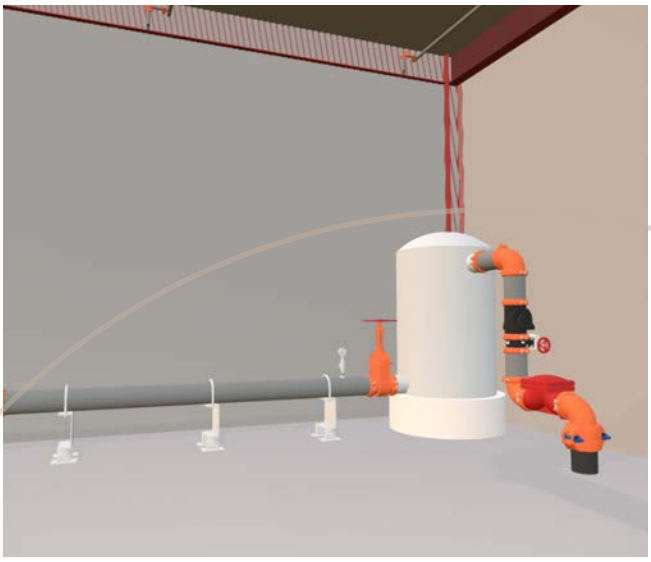
BIM
The use of a building information model (BIM) supports the management process and provides the "data" with regard to the service life, so that every component receives the correct maintenance and remains technically in a nominal condition. In fact, BIM can be used as a materials passport, which can contribute to sustainable reuse of sprinkler materials.

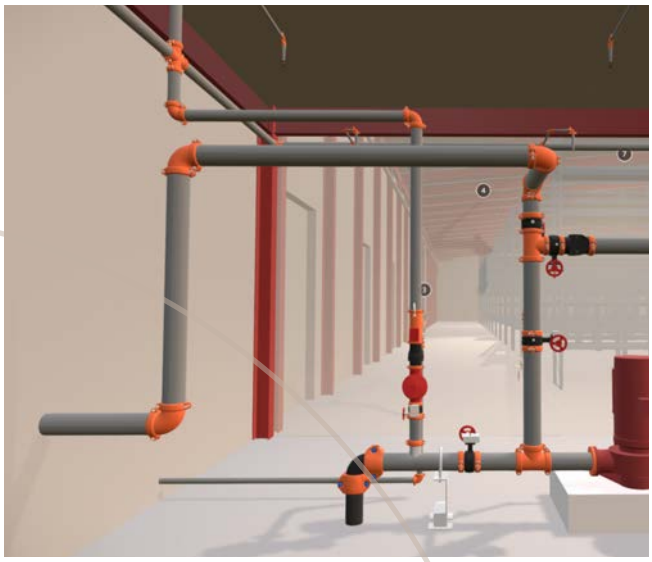
7. Sustainable maintenance
In the initiation phase of a project, the drafter of the fire safety concept, specifically in the programme requirements (In Dutch UPD), can include matters that promote sustainable maintenance and thus also a maintenance-friendly design. This should be part of the award in a tender. The performance of maintenance by specialised companies, the certified sprinkler installers, also contributes to the service life of the installation. It is important that materials are handled correctly so that the parts are not damaged.

How to get the measures implemented?
Having said all that, I would like to highlight two points which if implemented would benefit the owner!

Total Cost of Ownership
The lowest investment in the installation does not automatically mean the lowest total cost of ownership! Include sustainability in the process when selecting your contractor. Use the knowledge of the contractor and manufacturer for your sustainability requirements.

How resilient is the building to fire?
When a customer invests in a new building, he/she has the right to know how resilient a building is to fire. Is there a burnout scenario? Our aim is that when designing a building under the BREEAM and LEED schemes, an assessment must be added to provide insight into 'fire resilience' on the basis of a number of fire scenarios. The results should tell the future owner something about the robustness of the design and the extent to which the building can withstand a fire, so that a prediction can be made about the future chance of damage. The aim is also to stimulate awareness; not everyone realises that a building that does not burn down is sustainable!





Safe & sound

Fire protection systems are a life-saving but often invisible part of any construction project reflects Graeme Leonard, Director of Sales, Fire Protection, Victaulic, who believes the manufacturing sector's answer will be through focusing on high-quality products which can be installed swiftly and straightforwardly, without compromising on cost and dependability.

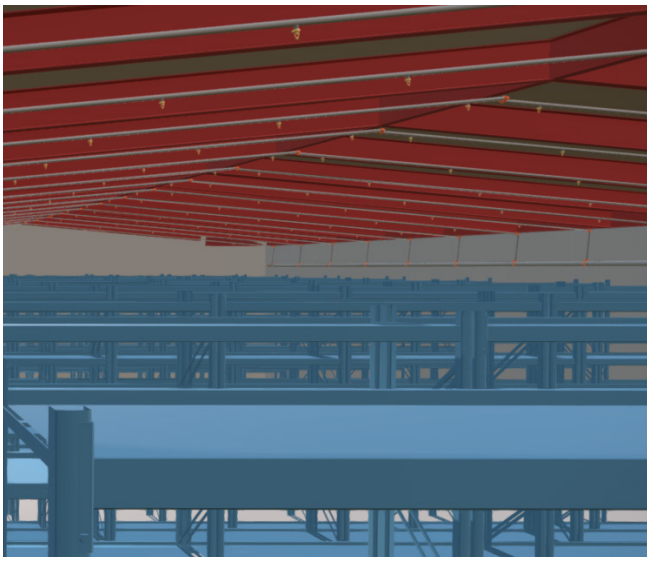
Though specific guidelines and standards may vary, the European fire protection industry is united in believing buildings must have properly installed fire protection systems that will protect people, equipment, and the actual building from harm, should a fire start. The sector is currently re-examining the application of fire protection systems in buildings with high occupancy, such as schools, care homes and high-rise buildings.

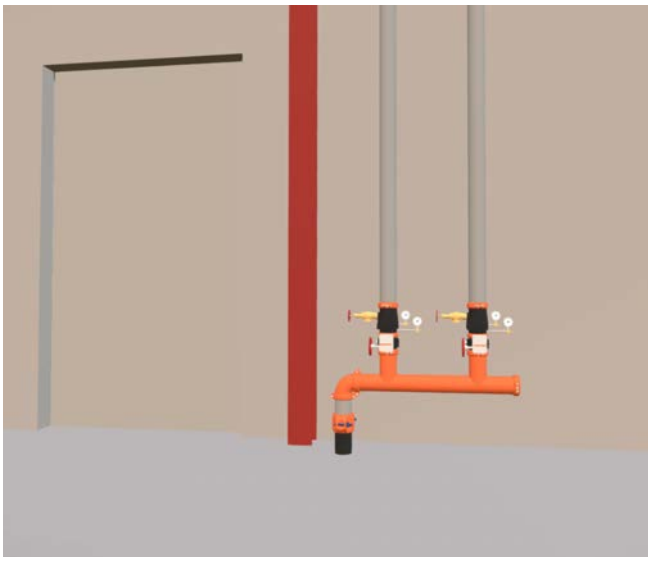
Fire safety professionals find themselves having to re-evaluate traditional methods due in part to a simple need for the industry to modernise, but primarily because of a number of challenges they increasingly face. For contractors, projects are impacted as they simultaneously come under pressure to achieve high standards, whilst being restricted by limited budgets, tight deadlines and uncertainties around availability and quality of labour.

I believe the industry's answer will be through focusing on high-quality products which allow for speed and ease of installation, without compromising on cost and reliability.

Certainty in installation

A key challenge faced by the fire protection industry is installations which do not comply with locally applicable codes and standards. If products are installed incorrectly, it not only serves to run the risk of systems not providing adequate protection in case of fire but can even exacerbate the threat of danger. Problems can arise from sprinklers being installed too close





to the ceiling or incorrectly spaced, impacting how comprehensively an area is covered. Alternatively, the wrong sprinkler is used for a specific risk – not an uncommon sight for fire protection systems unfortunately – which can lead to a misaligned system which may not function as required in case of an emergency.

Using products which have been specifically designed to allow for easy installation helps to avoid several of these issues. Our V9 suite of storage sprinklers, for example, was specifically created so it could be installed with more speed and certainty of a proper installation than a threaded sprinkler, while also avoiding the mess and consumables of threading, like oil drippings, shavings, thread sealant and PTFE tape. Contractors have confidence and comfort that systems will be installed correctly first time, allowing them to better control their labour and optimise the number of workers on the ground.

Innovation helping reduce risk

The age-old question posed to contractors has revolved around how quickly can a project be done to the highest standard at a reasonable cost? The contractor will receive the question and speedily go to its supply partners to produce the best framework for the project. Backed by its team of specialists, the contractor will return to the client with a solution which hopefully fits the bill.

Regarding fire protection projects, contractors are on the lookout for new products; a new option to increase efficiency whilst maintaining high quality. While traditional methods, like threaded sprinklers, have worked in systems for over 100 years, occasional leaks can't be avoided and often result in additional man-hours and costs to resolve the issue. Recently, new alternatives have entered the scene, incorporating innovative product design to raise the bar for reliability and speed of installation.

Modern methods have also looked to improve the problem of reduced pipe thickness suffering from corrosion at the point of threading while enabling contractors to use lighter, smaller piping in the first place – in turn resulting in an installation that provides consistent quality over the life of the system for a potentially reduced cost.

Our answer has been the Firelock IGS line, which enables contractors to use mechanical pipe joining on 25mm pipe, avoiding the need for threading and the mess and risk of pipe corrosion that comes with it. We've also looked to answer clients' questions over reliability by incorporating our visual confirmation of pad-to-pad installation to ensure leak-free joints.

Avoiding Unexpected Costs

Inherently linked to system installation, contractors are often subjected to costing and cash flow fears throughout a project. We advocate for products that are simple enough to use, and also encourage the application of prefabrication and modularity.

Well-established in the HVAC sectors, Building Information Modelling (BIM)-enabled software has also seen rapid recent growth in popularity in the fire protection sector across Europe, particularly in the UK, The Netherlands and Scandinavian countries. The increasing use of BIM-enabled software, such as Revizto, allows for models of fire protection systems to be visualised, shared and amended in real time. By introducing this technology into the pre-site process, contractors and engineers can be confident that the materials which arrive on site meet their requirements and avoid potential surprises on site, which result in increased man-hours and impact the total cost of installation.

In addition, the application of BIM-enabled products means that potential system threats can be simulated and mitigated earlier on in the project. Not only does this change in behaviour allow for an efficient approach to developing projects, particularly in the fire protection sector, it also means budget costings can be considered earlier in the process. Contractors are also confident that the materials are prepared to correct specifications and thus are ready to be installed, without the need for amendments down the line. As time has already been taken to pre-plan and pre-fabricate the system, the project can therefore save labour costs normally present at installation.

Getting fire safety right

It's not easy getting fire safety right, but we all know why it is so important it's delivered to a high standard. New products, providing reliability, ease of installation, and ultimately confidence to clients – alongside pre-worksite preparation – come together to provide an industry landscape where contractors can take the project from start to finish with the assurance that they're getting it right.

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Viking and its partners have worked hard to develop a range of SFFF foam concentrates and compatible hardware for use in fire protection systems. It is important to note that SFFF foams are not always a drop in replacement for existing AFFF or AR-AFFF systems. This is why Viking worked with international approval and certification bodies, carrying out extensive fire and performance tests to recognised test standards, demonstrating real life performance of the complete system.

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PROGRAMME

08:30–09:30	Registration
09:30–10:50	Session 1
	Welcome from President of SFPE Italy – Luciano Nigro, Jensen Hughes, Italy
	Welcome from Chairman of EFSN – Volker Bechtloff, Minimax, Germany
	Welcome from Italian National Fire Brigade – Stefano Marsella, Ministry of Interior, Italy
	How the IFSA can help you – Paul Sincaglia, IFSA, USA
	Italian regulatory requirements/incentives for sprinklers – Piergiacomo Cancelliere, National Fire Brigade, Italy
10:50–11:30	Coffee Break
11:30–13:15	Session 2
	NFPA standards update – Bo Hjorth, Albacon, Sweden
	Corrosion protection with polymer enhanced pipe – Chris Gill, Viking, Luxembourg
	European standards update – Alan Brinson, EFSN, UK & Björn Schaumburg, EFSN, Germany
13:15–14:30	Lunch
14:30–16:00	Session 3
	The impact of sprinklers on structural fire resistance – Giovanni Cosma, Jensen Hughes, Italy
	Interactions between sprinklers and smoke ventilation – Tom Roche, FM Global
	UK EN 12845-3 Guidance for earthquake bracing – Stefano Grimaz, Udine University, Italy
16:00–16:30	Coffee
16:30–17:30	Session 4
	Appropriate fire scenarios and sprinkler system reliability for fire engineered designs – Francisco Joglar, Jensen Hughes, USA
	Water mist in Italy – Luciano Nigro, Jensen Hughes, Italy
17:30 –18:00	General discussion and Closing

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PROGRAMMA

08:30–09:30	Registrazione
09:30–10:50	Sessione 1
	Benvenuto dal Presidente di SFPE Italia – Luciano Nigro, Jensen Hughes, Italia
	Benvenuto dal Presidente di EFSN – Volker Bechtloff, Minimax, Germania
	Benvenuto dal Vigili del fuoco nazionale – Stefano Marsella- Direzione Centrale per la Prevenzione e la Sicurezza Tecnica - Ministero dell'Interno, Italia
	Come l'IFSA può aiutarti – Paul Sincaglia, IFSA, Stati Uniti d'America
	Requisiti normativi italiani/incentivi per gli sprinkler – Piergiacomo Cancelliere, Vigili del fuoco nazionale, Italia
10:50–11:30	Caffè
11:30–13:15	Sessione 2
	Aggiornamento alle norme NFPA – Bo Hjorth, Albacon, Svezia
	Protezione dalla corrosione con tubo rinforzato in polimero – Chris Gill, Viking, Lussemburgo
	Aggiornamento alle norme europee – Alan Brinson, EFSN, Regno Unito & Björn Schaumburg, EFSN, Germania
13:15–14:30	Pranzo
14:30–16:00	Sessione 3
	L'impatto degli sprinkler sulla resistenza al fuoco strutturale – Giovanni Cosma, Jensen Hughes, Italia
	Interazioni tra sprinkler e ventilazione del fumo – Tom Roche, FM Global, Regno Unito
	EN 12845-3 Guida per il rinforzo antisismico – Stefano Grimaz, Università di Udine, Italia
16:00–16:30	Caffè
16:30–17:30	Session 4
	Scenari di incendio appropriati e affidabilità del sistema sprinkler per i progetti antincendio – Francisco Joglar, Jensen Hughes, Stati Uniti d'America
	Acqua nebulizzata in Italia – Luciano Nigro, Jensen Hughes, Italia
17:30 -18:00	Discussione generale e chiusura conferenza

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SPEAKERS

Paul E. Sincaglia

Paul Sincaglia is the Managing Director of the International Fire Suppression Alliance, Ltd., a not-for-profit association created in 1999 to promote the use of effective water-based fire protection systems globally. Holding degrees in mechanical engineering and fire protection engineering from Worcester Polytechnic Institute, Paul has over 30 years of experience in the fire safety industry including the founding of an independent fire engineering consultancy, operating as the lead design professional for several international engineering firms, serving as a fire fighter & brigade officer, and as a code enforcement official.

Paul Sincaglia è l'amministratore delegato della International Fire Suppression Alliance, Ltd., un'associazione senza fini di lucro creata nel 1999 per promuovere l'uso di efficaci sistemi antincendio a base d'acqua a livello globale. Con una laurea in ingegneria meccanica e ingegneria antincendio presso il Worcester Polytechnic Institute, Paul ha oltre 30 anni di esperienza nel settore della sicurezza antincendio, compresa la fondazione di una società di consulenza indipendente di ingegneria antincendio, operando come professionista di progettazione principale per diverse società di ingegneria internazionali, servendo come un vigile del fuoco e ufficiale di brigata, e come un funzionario di applicazione del codice.

Piergiacomo Cancelliere

Piergiacomo Cancelliere has a degree in Electrical Engineering and PhD in Electrical Energy Conversion. He began his career in 1998 working in industrial automation for ABB SACE. From 2001 to 2006 he was a research assistant in electrical machines and drives at the University of Cassino. He joined the Italian National Fire Service (C.N.VV.F.) in 2006. Following a period in the command of the Fire Brigade of Frosinone, from 2011 to 2018 he served at the Central Directorate for Fire Prevention and Technical Safety, following the qualification and certification of fire products and fire protection systems. He represented the C.N.VV.F. for fire safety aspects relating to the Construction Products Regulation. Piergiacomo is a member of UNI and CEI Italian technical standards bodies and contributed to the development of the Italian Fire Prevention Code. From 2018 to 2020 he was deputy commander of the Italian Fire Academy in Rome, responsible for training courses for the executive and managerial staff of the C.N.VV.F. In 2021 he became Commander of the Rimini Fire Brigade.

Piergiacomo Cancelliere... è laureato in Ingegneria Elettrica e PhD in Conversione dell'Energia Elettrica. Ha iniziato la sua carriera nel 1998 lavorando nell'automazione industriale per ABB SACE. Dal 2001 al 2006 è stato assegnista di ricerca in Macchine e Azionamenti Elettrici presso l'Università di Cassino. È entrato a far parte del Corpo Nazionale dei VV.F. nel 2006. Dopo un periodo al comando dei Vigili del Fuoco di Frosinone, dal 2011 al 2018 ha prestato servizio presso la Direzione Centrale Prevenzione Incendi e Sicurezza Tecnica, seguendo le qualificazioni e certificazioni dei prodotti e dei sistemi antincendio. Ha rappresentato il Corpo Nazionale dei VV.F. per gli aspetti di sicurezza antincendio relativi al regolamento sui prodotti da costruzione. Piergiacomo è membro degli organismi di normazione tecnica italiani UNI e CEI e ha contribuito allo sviluppo del Codice Italiano di Prevenzione Incendi. Dal 2018 al 2020 è stato vicecomandante dell'Accademia Italiana dei Vigili del Fuoco di Roma, responsabile dei corsi di formazione per il personale dirigente e direttivo del C.N.VV.F. Nel 2021 diventa Comandante dei Vigili del Fuoco di Rimini.

Bo Hjorth

Bo Hjorth Bo is the principal of Swedish fire protection inspection and advisory company AlbaCon AB. He has more than 40 years of experience from the field of fixed suppression systems, especially of the fire sprinkler kind. Bo is the Swedish representative in CEN WG5 and WG10 since the mid-1990s, as well as chairperson of the Swedish mirror committee for CEN and ISO-standards for suppression systems. He is a member of the NFPA 13 AUT-SSD committee since 2005. Bo has experience from sprinkler review and inspection services in more than 20 countries outside Sweden, in Europe, Asia and Central America.

Bo Hjorth. Bo è il titolare della società svedese di ispezione e consulenza antincendio AlbaCon AB. Ha più di 40 anni di esperienza nel campo dei sistemi fissi di soppressione, in particolare dei sistemi sprinkler. Bo è il rappresentante svedese nel CEN WG5 e nel WG10 dalla metà degli anni '90, nonché presidente del comitato mirror svedese per gli standard CEN e ISO per i sistemi di soppressione. È membro del comitato NFPA 13 AUT-SSD dal 2005. Oltre che in Svezia, Bo ha esperienza nei servizi di revisione e ispezione degli impianti sprinkler in più di 20 paesi tra Europa, Asia e America Centrale.

SPEAKERS

Chris Gill

Chris Gill is the Product Manager for Water products for Viking in the EMEA region. He has a Master's degree in Chemical Engineering with Environmental Technology. He began his career over 20 years ago working for the Loss Prevention Council (LPC) in the UK, conducting sprinkler research projects to support the LPC Sprinkler Rules. He later moved to the LPCB where he managed active fire protection equipment approvals for sprinklers, gas systems, fire extinguishers and hose reel testing and certification. Chris joined Viking in 2004. Today he helps end users, insurers and fire authorities find the right fire system solution and ensures Viking has a complete product line for its customers. He is a member of several International and European standards committees on water, foam and powder systems and participates in many active fire protection associations.

Chris Gill lavora nel settore dell'acqua nebulizzata e degli irrigatori da oltre 20 anni. Ha lavorato nel collaudo e nella certificazione di molti componenti e sistemi di protezione antincendio attiva ed è stato product manager con Viking negli ultimi 16 anni, dove è responsabile della gestione della linea di prodotti sprinkler e water mist per Viking in tutta l'area EMEA. Chris è attivo in molti comitati europei e internazionali e attualmente presiede il gruppo di lavoro ISO TC21/SC5 sulle valvole dei sistemi di irrigazione.

Alan Brinson

Alan Brinson is the Executive Director of the European Fire Sprinkler Network. He has a degree from Cambridge in chemical engineering and first worked as a research process engineer for Shell and Proctor & Gamble before joining Tyco in 1992. With Tyco he held a series of European fire protection business and product management roles, culminating in responsibility for the European sprinkler components business. In 2003 Alan left Tyco and set up the EFSN. For the past 19 years he has led and participated in successful sprinkler campaigns in many European countries, working with EFSN members, fire chiefs and officials to ensure that new buildings are fitted with sprinklers. Alan is an active member of fire safety standards and regulatory committees for BSI, CEN and NFPA, and is a chartered chemical engineer.

Alan Brinson è il direttore esecutivo della rete europea degli sprinkler antincendio. Dopo essersi laureato all'Università di Cambridge, è entrato in Shell come ingegnere dei processi di ricerca, passando a Proctor & Gamble prima di entrare in Tyco, dove ha lavorato per 10 anni in ruoli di sviluppo aziendale internazionale per la protezione antincendio e di gestione dei prodotti. Nel 2003 Alan ha lasciato la Tyco e ha fondato l'EFSN. È membro degli standard di sicurezza antincendio e dei comitati di regolamentazione per BSI, CEN e NFPA ed è un ingegnere chimico abilitato.

Björn Schaumburg

Björn Schaumburg supports CEN standards-writing on behalf of EFSN, currently serving as the secretariat for CEN/TC 191 Working Group 5, which is responsible for sprinkler standards. Björn also works part-time for the Berlin Fire Brigade and as a consultant. He first became involved in standards and fire protection systems while working at DIN. Björn has an M.Sc. in Industrial Engineering from the Technical University of Berlin.

Björn Schaumburg supporta la stesura degli standard CEN per conto dell'EFSN, che attualmente funge da segretariato per il CEN/TC 191 Working Group 5, responsabile degli standard degli sprinkler. Björn lavora anche part-time per i vigili del fuoco di Berlino e come consulente. È stato coinvolto per la prima volta in norme e sistemi di protezione antincendio mentre lavorava in DIN. Björn ha un M.Sc. in Ingegneria Industriale presso l'Università Tecnica di Berlino.

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Giovanni Cosma

Giovanni Cosma is a Senior Fire Safety Consultant at Jensen Hughes with an international background obtained through many years spent across different European countries, thanks to which he learned how to provide customer-focused engineered solutions tackling problems with an holistic attitude. His experience covers smoke and heat ventilation system design, CFD analysis and performance-based approach. His career has a focus on human behaviour in fire, fire-fighting tactics and scenario-based design with a constant focus on teamwork, time management and lifelong learning.

Giovanni Cosma... è un Consulente Antincendio Senior presso Jensen Hughes con una formazione internazionale ottenuta in molti anni trascorsi in diversi paesi europei, grazie ai quali ha imparato a fornire soluzioni ingegnerizzate incentrate sul cliente affrontando problemi con un atteggiamento olistico. La sua esperienza copre la progettazione di sistemi di ventilazione di fumo e calore, l'analisi CFD e l'approccio prestazionale. La sua carriera si concentra sul comportamento umano durante l'incendio, sulle tattiche antincendio e sulla progettazione basata sugli scenari con un'attenzione costante al lavoro di squadra, alla gestione del tempo e all'apprendimento permanente.

Tom Roche

Tom Roche is Assistant Vice President, Senior Consultant within the International Codes and Standards Group for FM Global. Tom works to share FM Global's knowledge and expertise to influence building codes and loss prevention standards. He has worked in various engineering roles within FM Global over the last 30 years gaining experience of loss prevention projects in a variety of industries and countries. His role currently focuses on working to provide input to building codes and regulations in Europe. He is the current Secretary of the Business Sprinkler Alliance and the Fire Protection Director for the Fire Sector Federation in the UK.

Tom Roche è un consulente senior per FM Global nel loro International Codes Group. Ha lavorato in vari ruoli ingegneristici all'interno di FM Global negli ultimi 30 anni, acquisendo esperienza in progetti di prevenzione delle perdite in una varietà di settori e paesi. Il suo ruolo attualmente si concentra sul lavoro per fornire input a codici e regolamenti edilizi in Europa. È l'attuale segretario della Business Sprinkler Alliance e il direttore della protezione antincendio per la Federazione del settore antincendio nel Regno Unito.

Stefano Grimaz

Stefano Grimaz is the Chairholder of the UNESCO Chair on Intersectoral Safety for Disaster risk reduction and Resilience at the University of Udine (Italy), where he is the Director of Safety and Protection Intersectoral Laboratory (SPRINT-Lab) at the Polytechnic Department of Engineering and Architecture. He is the Professor of Engineering Seismology and of Safety and Civil Protection at the master's degree Courses of Engineering. He carries out research on safety and emergency management with a holistic and intersectoral approach for developing multi-hazard safety assessment and decision-making support tools. He is a scientific consultant for national and international institutions and organizations working in the fields of safety, disaster management and resilience. He led the working group of the Italian Ministry of Interior which developed the guidelines for the seismic vulnerability reduction of fire protection systems. He is the author of more than 150 papers in the fields of industrial, civil and territorial safety and risk prevention.

Stefano Grimaz è Presidente della Cattedra UNESCO sulla Sicurezza Intersettoriale per la Riduzione del Rischio di Disastri e la Resilienza dell'Università degli Studi di Udine (Italia). Direttore del Laboratorio Intersettoriale Sicurezza e Protezione (SPRINT-Lab) presso il Dipartimento di Ingegneria e Architettura del Politecnico dell'Università degli Studi di Udine dove è Professore Ordinario di Sismologica applicata alla Ingegneria e di Sicurezza e Protezione Civile ai Corsi di Laurea Magistrale in Ingegneria. Svolge attività di ricerca sulla sicurezza e sulla gestione delle emergenze con un approccio olistico e intersettoriale per lo sviluppo di strumenti di valutazione della sicurezza multirischio e di supporto al processo decisionale. È consulente scientifico di istituzioni e organizzazioni nazionali e internazionali operanti nei settori della sicurezza, gestione catastrofi e resilienza. Ha guidato il gruppo di lavoro del Ministero dell'Interno italiano che ha sviluppato le linee guida per la riduzione della vulnerabilità sismica dei sistemi antincendio. È autore di oltre 150 pubblicazioni in materia di sicurezza industriale, civile e territoriale e prevenzione dei rischi.

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Francisco Joglar

Francisco Joglar is a Senior Consultant at Jensen Hughes with experience in the fields of fire risk assessment, fire modeling and reliability engineering. His clients include the commercial nuclear industry, energy and military applications for the US Government. He has been developing fire protection and fire risk technology for the Electric Power Research Institute (EPRI) and supporting joint research projects between EPRI and the US NRC Office of Research. Francisco is a member of the NFPA 550 and 551 committees, chair of the working group developing the second edition of the SFPE Engineering Guidelines on Fire Risk Assessment, author of the Reliability Engineering Chapter in the SFPE Handbook and editor of the Fire Risk Section of the upcoming revision of the SFPE Handbook. He also teaches master's degree courses in risk analysis at the University of Maryland, Department of Fire Protection Engineering and in risk-based regulation at Cal Poly.

Francisco Joglar... è Senior Consultant presso Jensen Hughes con esperienza nei settori della valutazione del rischio di incendio, della modellazione di incendi e dell'ingegneria dell'affidabilità. I suoi clienti includono l'industria nucleare commerciale, l'energia e le applicazioni militari per il governo degli Stati Uniti. Ha sviluppato tecnologie per la protezione antincendio e il rischio di incendio per l'Electric Power Research Institute (EPRI) e ha sostenuto progetti di ricerca congiunti tra EPRI e l'Ufficio di ricerca NRC degli Stati Uniti. Francisco è membro dei comitati NFPA 550 e 551, presidente del gruppo di lavoro che sviluppa la seconda edizione delle SFPE Engineering Guidelines on Fire Risk Assessment, autore del Reliability Engineering Chapter nel SFPE Handbook ed editore della Fire Risk Section della prossima revisione dell'Handbook SFPE. Insegna anche ai corsi di laurea magistrale in analisi del rischio presso l'Università del Maryland, Dipartimento di Ingegneria della Protezione antincendio e in regolamentazione basata sul rischio presso Cal Poly.

Luciano Nigro

Luciano Nigro is the President and Technical Director of Jensen Hughes srl in Milan, where he is responsible for planning execution and analysis of fire protection design, research and development projects. He is a project manager for risk analysis and risk assessment consultancy services, and responsible for the planning and execution of large fire protection installations, including their verification and acceptance testing. He is a specialist in water mist system design and acceptance testing. Luciano has a PhD in Chemical Engineering from the University of Padoa, as well as an M.S. in Advanced Chemical Processing and in Insurance Engineering from Milan Polytechnic.

Luciano Nigro è Presidente e Direttore Tecnico della Jensen Hughes srl di Milano, dove si occupa della progettazione, esecuzione e analisi di progetti di progettazione antincendio, ricerca e sviluppo. È un project manager per i servizi di consulenza sull'analisi e la valutazione del rischio e responsabile della progettazione e dell'esecuzione di grandi impianti antincendio, comprese le loro verifiche e prove di accettazione. È uno specialista nella progettazione di sistemi water mist e nei test di accettazione. Luciano ha un dottorato di ricerca in Ingegneria Chimica presso l'Università di Padova, nonché un M.S. in Advanced Chemical Processing e in Ingegneria Assicurativa presso il Politecnico di Milano.

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Bocciolone Antincendio S.p.A

Bocciolone Antincendio S.p.A. is the Italian leader manufacturing company for Fire Fighting Equipment and Fire Protection Systems & Solutions, the most historical facility located in Vercelli area as from 1898.

The automatic FIREFLOW® WET-1000 Alarm Valve and FIREFLOW® DRY-1000 Dry Pipe Valve for Sprinkler Systems are the last new products, expression of company's technical experience and reliability, synonymous of the best quality Made in Italy, approved by EN 12259 European Standard.

The complete product range also include Fire Brigade Connections, Hose Reels & Cabinets, Lay-flat Hoses, Dry & Wet Pillar Hydrants, Digital Flowmeters, Fire Valves, Nozzles & Branchpipes, according to the main International Standards such as EN, DIN, BS, GOST, AFNOR. As Italian leader manufacturing company, Bocciolone Antincendio S.p.A. yearly make investments in R&D of new products & solutions, by internal assembly and test in our prototype facility, with strong support of local Certification Laboratories.

Bocciolone Antincendio S.p.A. is an international supplier for worldwide customers, organized by a dedicated Distribution Network, applied to different markets such as Residential, Commercial, Manufacturing, Logistic & Service Industry.

bocciolone.com

Fire Piping

FIRE PIPING is the EU leader for prefab piping for: Quality & Environment: VdS and FM APPOVED and ISO 9001 and 14001; Production capacity: 6 ROBOTS and upgraded POWDER COATING LINE for over 3 MILLION sockets/year; Cost effective, Fast Delivery & Engineering cutsheets and plan piping support.

We add value to top EU contractors with main benefits: Cost-effective (prefab+Installation+Fast delivery) and non-competition activities; Experience with skilled team engineering-manufacturing-logistics for fast deliveries on jobsite; Technical support for prefab with friendly own software.

firepiping.com

FM Approvals

FM Approvals offers international certification services for products related to property risk mitigation. Recognized and respected across the globe, FM Approvals certification assures that a product or service has been objectively tested and conforms to rigorous property loss prevention standards. The FM APPROVED mark, backed by scientific research and testing helps set these products apart from others on the market.

We test and Approve property loss prevention products with one overarching goal in mind: to verify that they work each and every time they are used.

Products with the FM APPROVED certification mark adhere to the highest standards in quality, technical integrity and performance.

fmapprovals.com

JCI

With over 130 years in the fire sprinkler industry, Johnson Controls is uniquely qualified to deliver cost-effective solutions that can be customised to a building configuration of fire protection applications. Through ongoing, world-class research and development, we're continually expanding our capabilities. Our commitment to excellence is back by an industry-leading 10-year Limited Warranty and world-class technical support.

tyco-fire.com

Metraflex Fire Protection Division

Metraflex has been supplying piping specialty products since 1958. With the introduction of the UL listed, FireLoop seismic expansion joint, Metraflex has brought its expertise in seismic expansion joints to the fire sprinkler industry. The introduction and rapid industry acceptance of the FireLoop for fire sprinkler systems, plus its compliance with NFPA 13 guidelines, has made it the seismic expansion joint of choice. Metraflex has a long history of innovative piping products for vibration isolation, noise dampening, thermal expansion and contraction, pipe alignment and seismic movement, pump connections and flow conditioning.

metrafire.com

Rapidrop Global Ltd

Rapidrop Global Limited are a UK based manufacturer of fire detection and suppression equipment. Offering international sales and distribution which serves the needs of the fire service industry, Rapidrop offers clients a variety of accredited and competitive solutions for projects around the world.

You will find Rapidrop projects in locations across the United Kingdom, Europe, UAE and more. Rapidrop includes dedicated and skilled supply and engineering teams who pride themselves on providing extensive experience and knowledge to the products they provide.

rapidrop.com

Snapdrill AS

Rethink pipe hole-cutting.

Snapdrill is the only hand-held and automatic hole-cutting tool.

Fasten the clamp, pull the trigger and let Snapdrill do the work for you. With our patented technology you'll save time, money and improve work safety from the first cut.

How? Self-centering clamp. Automatic feed. Carbide cutting teeth. Unparalleled stability. Incredible tool life and see to believe speed.

It will change the way you work with sprinkler. Combine fabrication grade precision with field flexibility.

Say good-bye to broken wrists, pilot bits and off-center outlets. Say hello to Snapdrill.

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snapdrill.no

EXHIBITORS

Société Française de Reservoirs

Société Française de Reservoirs brings you the best solution for the development of your projects in fire protection, potable water, industrial and untreated water.

The company was founded in 1996 and is headquartered in south-west of France: we work all around Europe and worldwide. Bolted cylindrical steel tanks. Internal sealing with reinforced PVC liner 800g/m^2. Diameter from 2.34m to 17.94m and height from 1.50m to 19.00m. Galvanized steel sheets of our tanks can be powder coated or treated to suit aggressive environments. Volumes up to over 5000m^3.

We design our tanks according to climatic elements such as wind, snow and seismicity, and we are FM Global Approved. Applicable Standards: APSAD, NFEN, NFPA, FM Global, VDS. From our industrial site in Vielle Saint Girons, our teams support you anywhere in the world. A 100% French manufacturing guarantee of quality.

france-reservoirs.com

Victaulic

Victaulic® innovation began in 1919 with the first grooved-end mechanical pipe joining technology. Today, Victaulic technology includes a complete offering of certified sprinklers, couplings, fittings, valves, flexible hoses, accessories, and tools to meet the needs of any fire protection application. Avoid the risk of leaking threaded pipes and save on labour with our unique, one bolt coupling and say goodbye to incorrect sprinkler installation with our revolutionizing grooved sprinkler range. All our products are designed to minimize installation time and to mitigate labour risk and incorrect installations without compromising on quality.

victaulic.com

FM Approvals®

Member of the FM Global Group

PASSPORT TO GLOBAL MARKETS

FM Approvals' worldwide presence and globally accepted certifications support your expansion within existing and into new markets

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RIGOROUS TESTING AND CERTIFICATION OF PROPERTY LOSS PREVENTION PRODUCTS

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