

# Understanding the Hazard



FM Global



## Lack of Inspection, Testing and Maintenance of Water-Based Fire Protection Systems

### Understanding the Hazard

This series of publications is designed to help you understand the everyday hazards present at your company's facilities. For more information on how you can better understand the risks your business and operations face every day, contact your FM Global engineer.

#### UTH topic categories:

Construction

Equipment

Fire Protection

Human Factor

Natural Hazards

Process Hazards

### Hazard or Risk?

Lack of a proper inspection, testing and maintenance program can create a hazard and expose your facility to significant property damage, as well as cause an interruption to your business operations. The greatly increased loss potential associated with inoperable or out-of-service fire protection systems is a risk not worth taking. Your FM Global engineer can help you understand the risk you may face from this hazard.

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### The Hazard

Imagine what could happen if your fire protection system cannot properly respond to a fire emergency because of inadequate inspection, testing and maintenance. If your inspection, testing and maintenance program fails to detect a shut valve, inoperable fire pump or deluge sprinkler system, or some other serious condition (such as weakened fire mains that break during a fire), you could suffer a devastating fire loss. Such a fire could cause not only extensive property damage, but also a significant interruption to your business processes and all the problems that would create.

Consider, too, what might happen if fire protection system components that have not been properly inspected, tested and maintained were to suddenly fail—inappropriately releasing large amounts of water into your facility and onto valuable equipment, processes and stored materials.

Fire protection systems have evolved into state-of-the-art passive sentinels, always ready to respond to a fire emergency in your facility. They not only provide protection against devastating property loss, but also help maintain the continuity of business operations critical to your bottom line. That provides a powerful incentive to have a program in place to ensure your fire protection systems are in proper operating order and well-maintained. A formalized inspection, testing and maintenance program will help ensure your fire protection systems are entirely capable of responding to any fire emergency for which they were designed and installed.

### Science of the Hazard

The fire protection systems installed in your facility protect not only the physical property you own, but also the value your business operations create. Given the considerable investment you made to install these critical systems, it would be disastrous to have them inoperable at the time of greatest need due to human error, neglect, or undetected mechanical or electrical malfunction. Only a dedicated and knowledge-driven inspection, testing and maintenance program can ensure your systems are in the best condition possible and always ready to respond to any emergency.

## What You Can Do at Your Facility

### Now:

- Make sure you and your staff understand the functions of your fire protection systems and the hazards they protect against.
- Initiate an inspection, testing and maintenance program for all your fire protection systems and associated components.
- Make sure any outside contractors inspecting, testing or maintaining your systems are properly informed and take all necessary precautions should a system have to be shut down as part of their work.

### Soon:

- Formalize inspection, testing and maintenance procedures. Key personnel should be knowledgeable about systems, and preferably be part of your emergency response team (ERT) that will respond during a fire to ensure equipment is in service and properly functioning. Also, as part of this program, maintain records to allow accurate program monitoring.
- Establish a written policy for dealing with any outside contractors that may perform inspection, testing or maintenance services. The policy should be included in any contract and should clearly spell out procedures for any services that may necessitate shutting down any portion of your fire protection system.
- Establish a written policy for dealing with impairments (both planned and emergency) to your fire protection system.
- Consult with your FM Global engineer to iron out any details needed to make your program as strong as possible.

A hazard created due to an inoperable or compromised fire protection system can develop in three general ways:

1. **The system does not respond to a fire due to malfunctioning components.** This would include fire pumps that do not start or do not supply the water flow and pressure anticipated by its design; or a dry-pipe valve, deluge valve, or other system component that does not operate properly and prevents water from reaching the sprinklers or spray nozzles protecting your plant and the equipment involved. Additionally, dry-pipe system piping obstructed by scale, silt or other materials can prevent sufficient water flow through the piping during a fire and render the system ineffective.
2. **The system is shut down for either known or unknown reasons.** This could involve shut valves that were never reopened after planned system repairs, automatic-starting fire pumps left in the “off” position after testing or maintenance, or any other components not returned to service after shutdown for planned or emergency reasons.
3. **Failure of a system component, such as corroded piping or a pipe fitting, during a non-fire event.** Such a failure could lead to water release that causes significant property damage and production interruptions, and also creates an impairment to the fire protection system, requiring it to be shut down for repairs.

Vigilance is the key to ensuring the best possible outcome of any emergency. Your primary concern is a well-designed and documented formal inspection, testing and maintenance program that includes regular reviews. It also is vital to have procedures in place for dealing with any system impairments, whether planned or due to emergencies. Be sure to closely monitor the activities of any contracted inspection, testing or maintenance service to ensure all proper precautions are taken during the performance of those services, the duration of any impairment is minimized, and all systems are left in operating condition at the completion of those services.

## Loss Experience

Because of the variety of system components that can fail or become inoperable during a fire or other damaging event, the loss experience is varied. However, all FM Global loss experience points to the need for an in-house program to ensure systems are functioning and in operating condition.

Following is a sampling of such experience, with statistics on losses due to shut-valve fires, fire pump impairments, plugged sprinkler systems, corroded sprinkler systems, and lack of automatic sprinklers.

### Shut-Valve Fires

A recent 10-year loss study showed 90 shut-valve fire losses. The total estimated gross loss was US\$375 million, with an average of US\$4.2 million per loss, as contrasted with an average loss of US\$400,000 for properly sprinklered fires.

### Fire Pump Impairments

A recent 10-year loss study showed 23 fire losses with some kind of fire pump impairment. The total estimated gross loss was US\$102 million. The largest of the losses was US\$23 million.

### Plugged Sprinkler Systems

A recent 18-year loss study showed 33 fire losses in which plugged systems were a factor, with an estimated gross loss of US\$185 million.

### Corroded Sprinkler Systems

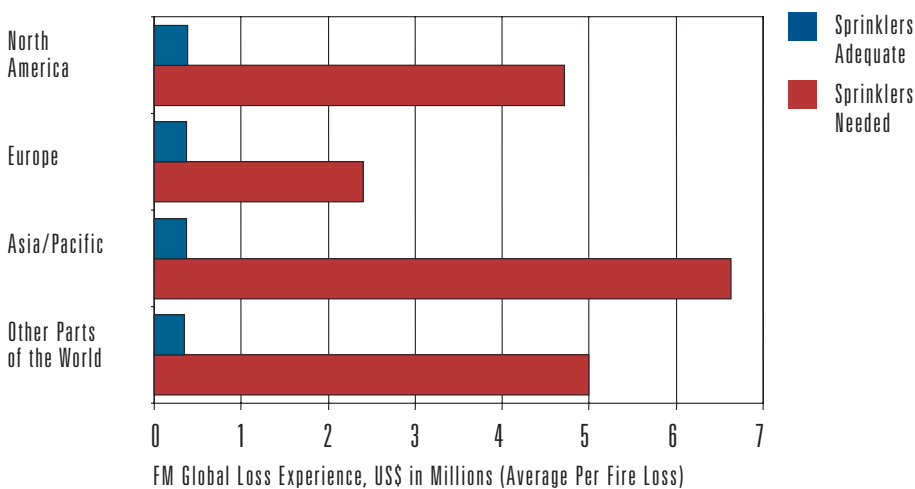
A recent 18-year loss study showed 43 sprinkler-leakage losses in which corrosion was a factor, with an estimated gross loss of US\$12.4 million.

### Lack of Automatic Sprinklers

FM Global loss statistics consistently show that, on average, fires at unsprinklered locations are four to five times more severe than those at adequately sprinklered facilities. The following bar graph shows FM Global experience from a dollar-loss standpoint where sprinklers were adequate versus where sprinklers were needed. These statistics can help put into perspective the hazard involved since the outcome of a loss associated with an inoperable fire protection system would be essentially the same as one where no automatic sprinklers were provided.

If your facility has new or renovated areas where sprinklers are not provided, or if your fire protection system is out of service or compromised, it is likely that any fire will result in a far more severe loss than if the system was available and in proper operating condition.

Effectiveness of Automatic Sprinklers



Source: FM Global clients

## Do I Have Alternatives?

Based on FM Global loss experience over the past century, it is clear that many of the most devastating fires occur due to improperly working or out-of-service fire protection systems. Alternatives that reduce inspection frequencies or take shortcuts with proper testing procedures only increase the risk. Your FM Global engineer can help you formulate a program suited to your needs.

Central to any program is a formalized process for inspection, testing and maintenance; supervision of any outside contracted service; and coordination between your emergency response team (ERT) and any other team members who may be responsible for carrying out these duties.

Because your ERT is responsible for responding during an emergency and ensuring your systems are operating properly, be sure its members are familiar with the inspection, testing and maintenance processes. This way you know there are no gaps in protection or miscommunication with emergency personnel that could lead to property damage and business interruption.

Additionally, it may be helpful to have your local fire service visit your facilities to discuss prefire planning. You should familiarize firefighters with your program and the specific hazards present at your facility. FM Global's *Pocket Guide to Prefire Planning* (P9809) provides more information on this important subject.

## Need More Information?

Ask your FM Global engineer about the following:

- Setting up a program for inspecting, testing and maintaining your fire protection systems
- Locating a qualified contractor
- Other Understanding the Hazard publications covering related topics, including:
  - *Dry-Pipe Sprinkler Systems Flushing Investigations* (P0241)
  - *Fire Pumps* (P0252)
  - *Ice Plugs* (P0118)
  - *Lack of Emergency Response* (P0034)
  - *Poor Valve Supervision* (P0035)
- FM Global Property Loss Prevention Data Sheet 9-0, *Maintenance*

## Ordering Information

### For Understanding the Hazard

For additional copies of *Understanding the Hazard* publications, contact your FM Global engineer or client servicing team.

### For all other FM Global publications

All other FM Global brochures and educational materials can be found in the FM Global Property Loss Prevention Resource Catalog and ordered online at [www.fmglobal.com/store](http://www.fmglobal.com/store).

Or, for personal assistance worldwide, contact our U.S.-based customer services team:

- Toll-free: (1)877 364 6726 (Canada and United States)
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## But What About...

...contracting and outside testing, inspection and maintenance service?

When contracting, use a qualified company that knows your facility and the hazards present, and understands the importance of taking all proper precautions if systems need to be shut down. You may need additional personnel from the contractor or members of your emergency response team (ERT) present to respond immediately if an emergency occurs during the performance of these services while systems are shut off. For example, pumps may need to be restarted, closed valves reopened, or other actions taken. When any service visit is concluded, all systems should be checked to ensure they are left in operating condition.

...our building? We don't own it.

There may be local codes that require the building owner to inspect, test and maintain the fire protection systems, unless that responsibility has been transferred to you by the lease agreement. If the building owner has that responsibility, you should make sure, for your own peace of mind, that all relevant items are covered and that procedures are properly carried out and documented. If the responsibility rests with you, your FM Global engineer can help you decide the nature and scope of what is needed to ensure your systems are in service and in proper operating condition.

...the time and labor to carry out these functions?

Your vigilance in ensuring your fire protection systems are in service is vital to maintaining the production and/or service capabilities your business critically depends upon. In today's competitive world, there is no good reason not to have an inspection, testing and maintenance program in place. Schedule the planned maintenance and testing elements as part of your maintenance management program and do not allow these elements to backlog. (See FM Global Property Loss Prevention Data Sheet 9-0, *Maintenance*.)

## Don't Let This Happen to You



*Don't let a fire find an impairment to your fire protection system before you do.*