FIRE PROTECTION IMPAIRMENT MANAGEMENT

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1.0 SCOPE

This data sheet provides guidance on managing impairments to fire protection systems that automatically or manually discharge fire extinguishing agents (e.g., water, foam, gaseous, or dry chemical).

For guidance related to the installation or repair of a fire protection system, refer to the relevant FM data sheet.

1.1 Hazard

For a description of the hazards associated with the lack of an effective impairment management program, see the following FM publications:
- *Understanding the Hazard: Improperly Closed Valves* (P0035)
- *Understanding the Hazard: Lack of Emergency Response* (P0034)
- *Understanding the Hazard: Hot Work* (P0032)

1.2 Changes

April 2019. This is the first publication of this document.

2.0 LOSS PREVENTION RECOMMENDATIONS

2.1 Introduction

Whenever fire protection water supplies, sprinklers, fire pumps, or special protection equipment is impaired for any reason, an unusual fire protection hazard exists and specific fire prevention procedures are necessary. Adhere to the procedures of the FM Red Tag Permit System or equivalent and the recommendations below to ensure complete precautionary measures are taken and ignition sources are controlled.

Note that routine inspection, testing, and maintenance (ITM) of fire protection equipment can create an impairment to the system, and even these brief impairments need to be properly managed. Refer to Appendix C for a list of common impairments due to ITM and a list of impairments often discovered through ITM.

2.2 Human Factor

2.2.1 Policy

2.2.1.1 Adopt a policy or management practice at each local facility to manage all fire protection system impairments. See Appendix D for a sample policy.

2.2.2 Before a Planned Impairment

2.2.2.1 Initiate an FM Red Tag Permit or equivalent.

2.2.2.2 Plan work on fire protection systems for times when the facility is not operating. If this is not possible, shut down any hazardous processes in the impaired area. This could include ignitable liquids and dusts. Ensure that valves for other, uninvolved fire protection systems remain open and secured during the impairment.

2.2.2.3 Limit the scope and duration of the impairment (i.e., impair the smallest area possible as opposed to the entire facility), and complete the work on a priority basis to minimize the amount of time fire protection is impaired.

2.2.2.4 Allow no hot work (i.e., cutting, welding, brazing, grinding) to be done in an unprotected area. Coordinate impairments with the person responsible for managing hot work. See DS 10-3 for more information.

2.2.2.5 Prohibit smoking in the impaired area.

2.2.2.6 Have all pre-work completed prior to impairing fire protection, including the following:

A. Have personnel ready to start work.

B. Have all piping laid out for new underground mains

C. Have all piping and sprinklers needed for a job onsite and available.

D. Have all piping, connections, and equipment installed and completed to the extent possible before impairing the fire protection system.

2.2.2.7 Ensure the work being done will be carried out without interruption until completion.

2.2.2.8 Provide temporary protection in the impaired area. For example, fire hoses connected to the sprinkler system and/or fire hydrant, extra extinguishers, charged hose lines, etc.

2.2.2.9 Contact the fire service and facility emergency response personnel to inform them of the impaired fire protection.

2.2.2.10 If you are a client of FM, inform the FM Customer Service Desk of the fire protection impairment by telephone, fax, e-mail, or via the RedeTag website (https://redetag.fmglobal.com). Provide your site index number, explain the impairment in detail, and, depending upon what type of fire protection is impaired, provide the following information:

A. The type of system being impaired (sprinklers, gaseous suppression, foam, dry chemical, fire pumps, water mist, water supplies, interlocks, etc.).

B. Approximately how long the fire protection system will be impaired.

C. The reason the fire protection system is being impaired.

D. What area and occupancy does the impaired fire protection system protect.

E. If a sprinkler control valve is going to be closed, provide the following information:

1. What valve is being shut

2. What area this fire protection valve protects

3. The reason it is being shut

4. Approximately how long the system be impaired.

F. If a fire pump is going to be impaired, provide the following information:

1. The type of fire pump (diesel or electric)

2. Whether there is another fire pump provided that will remain in service

3. Whether there is an alternative water supply available

4. Whether the pump can be started manually in an emergency and, if so, whether there be someone on site 24 hours/7 days per week who knows how to start this pump in an emergency

G. If special protection (gaseous suppression, foam, dry chemical, water mist, interlocks, etc.) is impaired, provide the following information:

1. Whether there is automatic sprinkler protection available and in service

2. Whether the special protection system can be manually tripped in an emergency and, if so, whether personnel will be instructed/allowed to do this

H. If a fire alarm/detection system that activates an automatic fire protection system (e.g., interlocks, deluge, preaction, special protection) will be impaired, include whether automatic sprinkler protection will still in service.

I. If a water supply is impaired, include the following information:

1. Whether this is the only water supply available for fire protection and, if so, whether there is a way to obtain water from other sources nearby (river, lake, etc.)

2. Whether the fire service will be able to park a pumper truck at the facility while the water supply is impaired

2.2.2.11 Provide ongoing fire watch patrols of the unprotected area(s).

2.2.2.12 Have someone assigned to respond to or stand by the impaired fire pump or closed valve so it can be started/opened immediately in an emergency.

2.2.2.13 Communicate the impairment to all affected employees along with actions and precautions they may need to take.

2.2.3 During an Impairment

2.2.3.1 Monitor the recommended actions outlined in Section 2.2.2 throughout the duration of the impairment. If conditions change or the duration/scope of the impairment needs to be extended, review the items in Section 2.2.2 again.

2.2.3.2 In the case of an unplanned impairment, stabilize the situation and immediately follow the precautions recommended in Section 2.2.2.

2.2.4 After an Impairment

2.2.4.1 Restore fire protection equipment to full automatic service as soon as possible.

2.2.4.2 Complete any required/necessary testing to ensure the system is fully functional.

A. If work was done on automatic sprinkler protection, perform a 2 in. drain test on the downstream side of each valve that was closed. This test is very important as the final check to ensure all control valves have been left in the wide-open position.

B. If work was done to install new underground mains, hydrostatically test the new mains at 200 psi (13.8 bar) for 2 hours (or 50 psi [3.5 bar] greater than the working pressure of the system). This will ensure there are no leaks in the underground main. Furthermore, whenever a new underground main is installed or an existing underground main has been repaired, full flushing of the underground is recommended to ensure there are no rocks or other obstructions in the mains.

C. If work was done to fire pumps, ensure they are in full automatic operation.

2.2.4.3 Ensure all sprinkler control valves are locked in the wide-open position.

2.2.4.4 Reset the alarm system; notify the central station, if applicable.

2.2.4.5 Notify the ERT, fire service, and, if a client of FM, the FM Customer Service Desk that fire protection has been restored.

2.2.4.6 Complete the FM Red Tag Permit or equivalent.

3.0 SUPPORT FOR RECOMMENDATIONS

3.1 FM Red Tag Permit System and Impairment Precautions

To minimize the risk associated with fire protection system impairments, a comprehensive impairment management program should be developed and implemented. The FM Red Tag Permit System provides a clear understanding of the process to manage fire protection impairments when a fire protection system must be taken out of service. The probability of a fire causing major damage is increased whenever a fire protection system is impaired. The longer the fire protection system is impaired, the greater the probability becomes. Therefore, it is necessary to minimize the duration and scope of any impairment, or provide an alternative protection system.

The goals of an effective fire protection impairment program include the following:

A. Supervise the safe shutdown of fire protection systems.

B. Control potential fire hazards during impairments.

C. Restore the fire protection system to service as soon as possible.

3.2 Completing the FM Red Tag Permit System

Part 1 of the tag can be kept by the person responsible or the person who authorized the impairment, so that they in turn can confirm and ensure that all valves have been fully reopened when the fire protection is restored to service.

Give Parts 2 and 3 of the permit to the person assigned to close the sprinkler control valve and ensure they count the number of turns it took to close this valve. This is done so that, when facility personnel are reopening

this valve (when work is completed), they can ensure the valve is completely reopened the same number of turns it took to close. The tag can then be attached to the closed valve so anyone walking by will see that the fire protection is impaired. **DO NOT LOCK ANY CLOSED SPRINKLER CONTROL VALVES**. Only lock the valves after they have been fully reopened and fire protection has been restored to service.

3.3 Unauthorized Valve Closures

Fire protection system control valves require primary attention because a closed valve at the time of a fire can lead to the loss of a major portion (possibly even all) of the protected facility. Take strong measures to reduce the possibility of a control valve being closed without authorization, both before and during a fire.

Improperly closed valves are most likely to occur when additions or renovations are made to a fire protection system. Often, individuals working on the system are unaware that the control valve must not be operated without first notifying responsible personnel. In other cases, there is no one assigned the responsibility of ensuring that proper valve impairment procedures are followed.

A valve supervision program should be implemented to ensure the following:

A. The valves are locked in the wide/full-open position.

B. Valve inspections are made (visual inspections and physically trying the valves as applicable) per Data Sheet 2-81.

C. The valve inspection list is complete, and the inspection form is carried by the inspector during the inspection.

D. The Red Tag Permit System for valve closures is used by both employees and contractors.

E. Main drain tests are made after a valve is reopened.

4.0 REFERENCES

4.1 FM

Data Sheet 10-3, *Hot Work Management*

Managing Fire Protection System Impairments (P9006)
Controlling the Shut-Valve Hazard (P7133)
Red Tag Permit System Wall Hanger Kit (P7427K)

Understanding the Hazard: Improperly Closed Valves (P0035)
Understanding the Hazard: Lack of Emergency Response (P0034)
Understanding the Hazard: Hot Work (P0032)

APPENDIX A GLOSSARY OF TERMS

Control valve: A valve controlling water or agent flow to an automatic fire protection system.

Fire protection system: Devices, equipment, and systems or combinations of systems used to detect a fire, activate an alarm, extinguish or control a fire, control or manage smoke and fire, or any combination thereof.

Fire service: This term is used for firefighters in any area of the world. Some equivalent local terms are fire department, fire brigade, fire and emergency services, and fire/rescue.

Fire watch: A dedicated person or persons whose sole responsibility is to look for fires within an established area.

Impairment: The planned or unplanned shutdown of a fire protection system.

Interlock: A device that senses a limit or off-limit condition or an improper sequence of events. It causes shutdown of the offending or related piece of equipment, or prevents things happening in an improper sequence, to avoid a hazardous condition.

Main drain (2-inch drain): The primary drain for a sprinkler system located on the system riser.

Maintenance: Work conducted to ensure continued satisfactory operation of a device or system.

Special protection system: A protection system used for sole or supplementary protection and designated as one of the following: carbon dioxide, clean agent, dry chemical, foam, halon 1301, hybrid, or water mist.

Supervision: An automatic means of monitoring the status of a system or device and indicating abnormal conditions.

Test: To physically operate a device or system for the purpose of verifying its working condition.

APPENDIX B DOCUMENT REVISION HISTORY

April 2019. This is the first publication of this document.

APPENDIX C FIRE PROTECTION SYSTEM IMPAIRMENTS

See Table 1 for a list of fire protection systems or components that are impaired during various ITM activities. See Table 2 for a list of fire protection system or component impairments that may be discovered during various ITM activities.

Table 1. Fire Protection Systems Impaired During ITM

Fire ProtectionSystem or Component	*ITM Activity*	*Impaired Devices*
Control Valve	Full-travel exercising	Control valve closed
Dry Sprinkler System	Dry-pipe valve trip test	Control valve closed until dry-pipe valve is reset
Preaction Sprinkler or Deluge System	Initiating or actuating device testing (e.g., heat detector)	Actuating device (e.g., solenoid valves) removed
Sprinkler System	Obstruction investigation	Closed control valve
Fire Pump (Diesel Engine)	Engine oil and filter change	Pump controller switched off
Fire Pump (Right-Angle Gear-Drive)	Oil change	Pump controller switched off
Suction Tank	Internal inspection	Tank emptied, pump controller(s) switched off, and/or control valve closed
Reservoir (Wet-Pit)	Inspection and/or cleaning	Pump controller switched off
Backflow Preventer	Annual tightness testing	Control valves closed
Special Protection System	Initiating or actuating device testing (e.g., heat detector)	Actuating device (e.g., solenoid valves) removed
Process or Building System Interlocks (actuated by system alarm)	Initiating or actuating device testing (e.g., heat detectors or waterflow alarm)	Isolation switch opened in alarm circuit, or controls jumpered/forced.

Table 2. Fire Protection System Impairments Discovered Through ITM

Fire Protection System or Component	*ITM Activity*	*Impairment Condition*
Control Valve	Inspection	A normally-open valve found more than 3 turns closed from full-open
Control Valve	Full-travel exercising	Number of turns-to-close differs from number of turns-to-reopen
Dry Sprinkler System	Inspection	Accelerator inlet or discharge valve closed
Dry Sprinkler System	Dry-pipe valve trip test	Trip times greater than 60 seconds
Preaction Sprinkler or Deluge System	Automatic control valve inspection	Actuating devices (e.g., solenoid valves) removed from automatic control valve trim
Preaction Sprinkler or Deluge System	Automatic control valve trip test	Automatic control valve fails to open
Sprinkler System	Obstruction investigation	More than a ½ cup of small particulate or large debris discovered
Sprinkler System (Refrigerated Area)	Ice plug inspection	Ice build-up greater than xx discovered
Pressure-Reducing Valve	Flow testing	Valve fails to open or reduces pressure to less than the set pressure
Pressure-Relief Valve	Flow testing	Valve fails to close at less than set pressure
Fire Pump	Inspection	Pump controller switched to off or manual
Fire Pump	Start and churn test	Pump fails to start automatically
Fire Pump (Diesel Engine)	Inspection	Diesel tank contains less than 8-hour fuel supply
Suction Tank or Reservoir	Inspection	Water level less than full.
Reservoir (Wet-Pit)	Inspection	Racks, screens, or strainer lined with debris or pit floor contains debris
Special Protection System	Inspection	Agent container less than full
Special Protection System	Inspection	Actuating devices (e.g., solenoid valves) removed from system

APPENDIX D SAMPLE FIRE PROTECTION IMPAIRMENT POLICY

The following template can be used to implement a fire protection impairment policy.

_____ FIRE PROTECTION IMPAIRMENT POLICY
(company name)

It is a requirement to use the FM Global Red Tag Permit system (or pre-approved equivalent) at _____ to manage all impairments caused by employees, contractors, or their subcontractors. An impairment is anything that results in the planned or unplanned shutdown of a fire protection system. This includes, but is not limited to, the shutdown of fire protection water supplies, sprinklers, fire pumps, special protection systems, and fire alarm systems controlling interlocks. The owner of this policy and all related material is:

_____,
(name and title of responsible person)
hereafter referred to as the Fire Safety Supervisor.

Any noncompliance with this policy could result in _____

_____
(any disciplinary or other ramifications)

This policy is effective from the date of the last revision noted below until any new or revised policy takes its place.

_____
Name of Fire Safety Supervisor (permit authorizer)

_____
Signature of Fire Safety Supervisor

_____
Name of Company Official

_____
Signature of Company Official

_____
Title of Company Official

_____
Effective Date of Policy

Fig. 1. Fire Protection Impairment policy template.