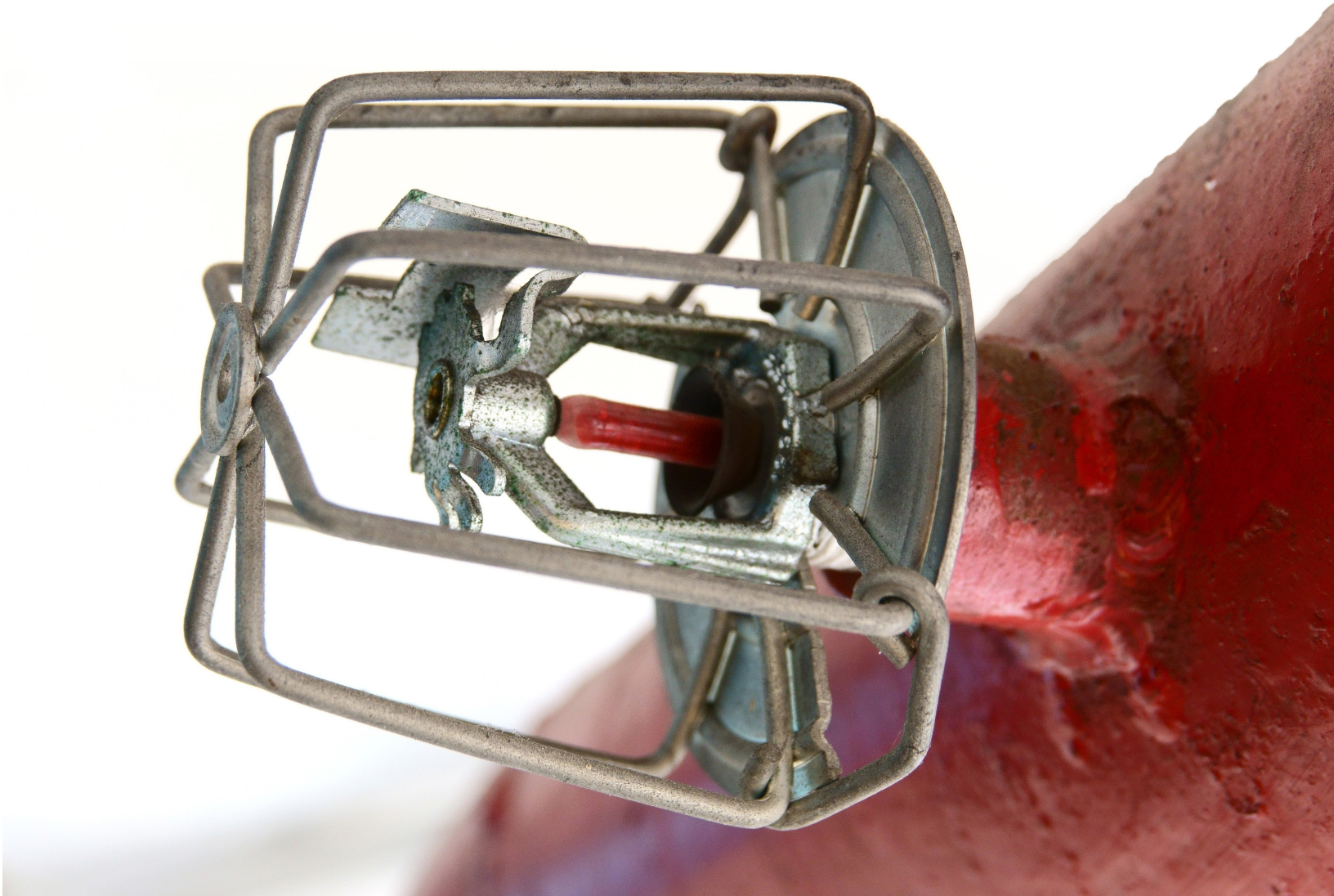
Property Loss Prevention Manual



Please feel free to reach out to your dedicated representatives for FM Global and HIROC with any questions:

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Additional training on each of the programs outlined on the following pages can be found online at https://fmglobaltraining.skillport.com/. Register using the account number **54887**

Table of Contents

Introduction

FM Global has partnered with HIROC with the goal of minimizing the potential for, and severity of losses taking place within healthcare facilities. The purpose of this Manual is to provide facilities with a basic understanding of critical human element programs which should be established in all facilities. This is the most important part of a good property conservation program, which is defined as a managed and organized effort aimed at eliminating and/or minimizing the potential for loss through both physical protection and improved operating practices. The emphasis on human element policies recognizes that the human factor is a company's most versatile resource and the key to achieving the common goal. Success requires the support of all personnel, especially management, and is measured by the elimination of losses, or where unavoidable, rapid recovery from the loss.

The following **10 programs** have been outlined in more detail below to provide each Facility Management team with a basic understanding of what is involved with implementing these programs. These are outlined as:

1.0 Implementation of a formalized Water Leakage Emergency Response Plan

2.0 Weekly inspections of fire protection control valves

3.0 Monthly exercising of non-indicating/outdoor water supply valves

4.0 Regular testing of fire pump

5.0 Annual fire pump performance testing

6.0 Flushing investigations for dry-pipe sprinkler systems

7.0 Locking open fire protection control valves

8.0 Sprinkler system impairment management (Red Tag Permit System)

9.0 Hot work management

10.0 No major physical exposures present on site

If any of the above systems are not present at a specific location, the measure of compliance will not be penalized as a result.

1.0 Implementation of a formalized Water Leakage Emergency Response Plan

A comprehensive water leakage response plan should be developed for each facility to provide site personnel with a detailed overview of actions to take before, during and after a water leak within the building. A template can be found in Appendix A of this document.

In addition to developing this response plan, site personnel should exercise critical isolation valves on a regular basis to ensure they are not seized and can close completely when needed. Records of all exercising should be retained on site.

2.0 Weekly inspections of fire protection control valves

Visually check all sprinkler control valves and exterior valves (PIV, PIVA, OS&Y, etc.) on a weekly basis to ensure they are locked in the wide-open position.

Each valve should be listed on a dedicated valve checklist and all checks should be documented. A sample valve checklist, which can be customized with sprinkler valves present at each facility can be found in Appendix B

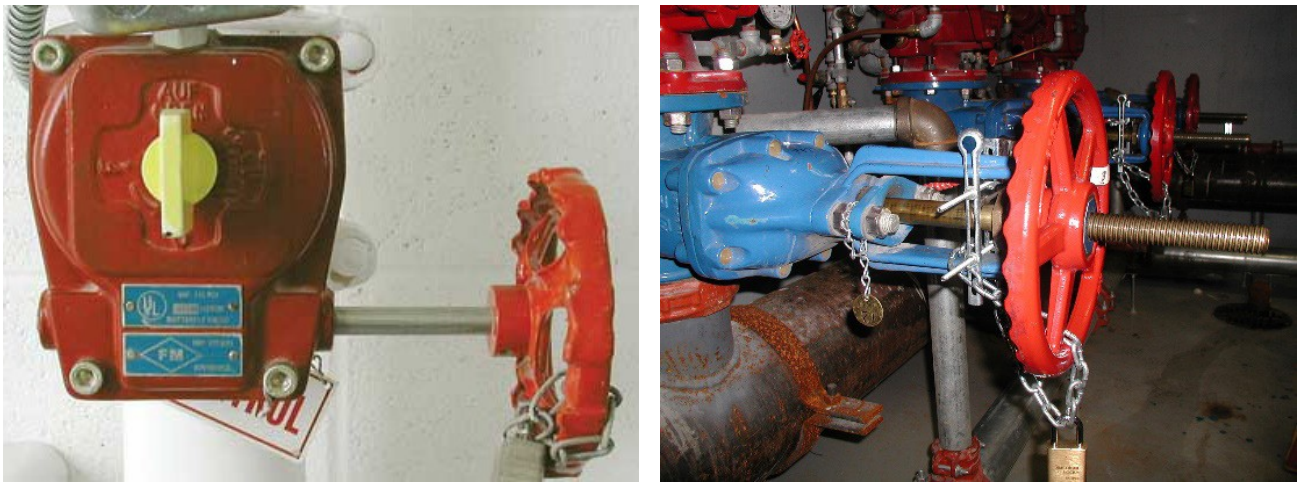


Figure 1: IBV left (open) and OS&Y right (open)

The two most common sprinkler control valves in hospital facilities will be an indicating butterfly valve (IBV) and an outside screw & yoke valve (OS&Y). For an IBV if the indicator is pointing to the open position, the valve will be open (i.e. butterfly valve will be parallel with the sprinkler pipe). For an OS&Y valve, if the stem is fully visible, the valve will be fully open (i.e. the OS&Y valve will be shut if the stem is not showing). If only half of the stem is visible, then it indicates the valve is only about half open.

If a valve is closed, ensure an Impairment Notification System is used as outlined in Section 8.0.

3.0 Monthly exercising of non-indicating/outdoor water supply valves

Conduct monthly exercising of all non-indicating valves (curb box valves) and exterior Post Indicating Valves (PIVs) to ensure they are in the fully open position and are not seized. Records of this testing should be retained on site.

Steps for Physical Valve Inspection (PIVs, WPIVs and curb box valves):

1. Unlock the valve.
2. Place the handle (PIV) on the valve. Turn the handle/wheel in the fully open position to verify it is currently open. Note: use a T-wrench to exercise curb box valves.

3. Turn it in the closed direction three turns to ensure operable condition.
4. Return to the fully open position.
5. Back off approximately one-quarter turn to relieve the strain.
6. Replace the handle (PIV) and lock the valve. Document the testing (date, name of person testing, additional comments).

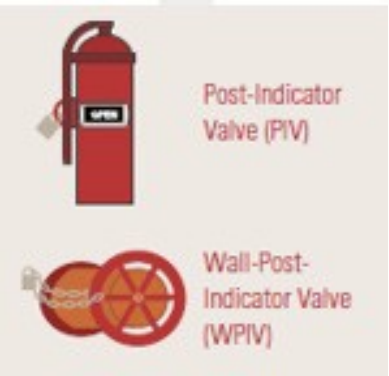


Figure 2: Common types of Post Indicating Valves

Figure 3: T-wrench used for exercising underground curb box valves

4.0 Regular testing of fire pump

If the site is equipped with a fire pump, it should be tested on a regular basis. It should be started by pressure drop through the pressure sensing line or inspectors test connection, and readings such as pump suction pressure, pump discharge pressure and any abnormal conditions should be recorded on a testing checklist. The pump should be left running for the specified duration, and manually turned off. The pump should not be equipped with an automatic stop feature.

Frequency of testing:

- Diesel driven fire pump: Weekly testing for 30 minutes
- Electric driven fire pump: Monthly testing for 10 minutes

5.0 Annual fire pump performance testing

The fire pump should be tested annually by flowing water through the flow meter or test header, up to an output of 150% the pump's rated capacity. Performance characteristics such as pump suction pressure, discharge pressure, revolutions per minute and flow rate should be taken at various flow points (typically no flow, 100% and 150% rated flow) to compare with nameplate data. Typically, a contractor would complete the testing for a facility, however if on-site personnel are competent in completing the testing, that is also an option. Alignment testing for the driveshaft should also be performed on an annual basis.

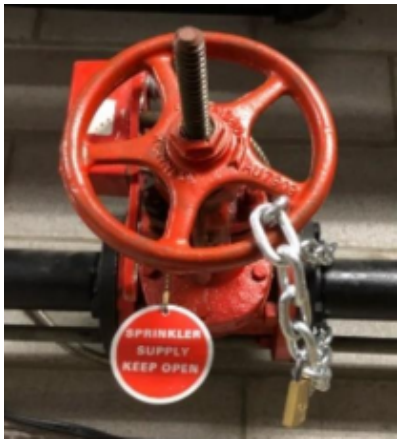
6.0 Flushing investigations for dry-pipe sprinkler systems

Dry pipe and preaction sprinkler systems have a humid environment which promotes scale buildup and degradation of the internal pipe walls. Flushing investigations will detect any significant scale accumulation which could potentially plug sprinkler heads in the event of a discharge. All dry pipe and preaction systems which utilize black iron piping should have a flushing investigation completed after they have been in service for 10-years, 20-years and every 5-years thereafter. If the system is 20-years older or more, it is likely that significant scale buildup is present and a full flushing should be performed. Please refer to FM Global Property Loss Prevention Data Sheet 2-81, contact your FM Global and HIROC representative for more information.

The three main methods to investigate obstruction in the sprinkler system piping are:

- Flushing Investigation
- Videoscope Inspection
- Ultrasonic Localized Guided Wave Evaluation

7.0 Locking open fire protection control valves



To be effective against a fire, automatic sprinklers need to have sufficient water delivered to them through a piping arrangement. A valve closed anywhere in this water supply piping system can prevent the flow of water to the sprinklers. When valves are closed, it is possible for a fire to quickly grow too large for sprinklers to control, even if the valve is reopened once the fire is discovered. As such, locking sprinkler valves in the wide-open position prevents malicious or accidental fire protection valve closures and ensures that full water flow is available to the sprinkler system.

All fire service control valves larger than 1-1/2 in. or controlling more than five sprinklers should be locked in the fully-open position with unbreakable locks and chains. Alternatively, if the sprinkler control valves are within a locked room with access restricted to only those responsible for fire protection equipment, then individual valve locks are not needed.

Keys for the locks should be distributed to personnel directly responsible for fire protection.

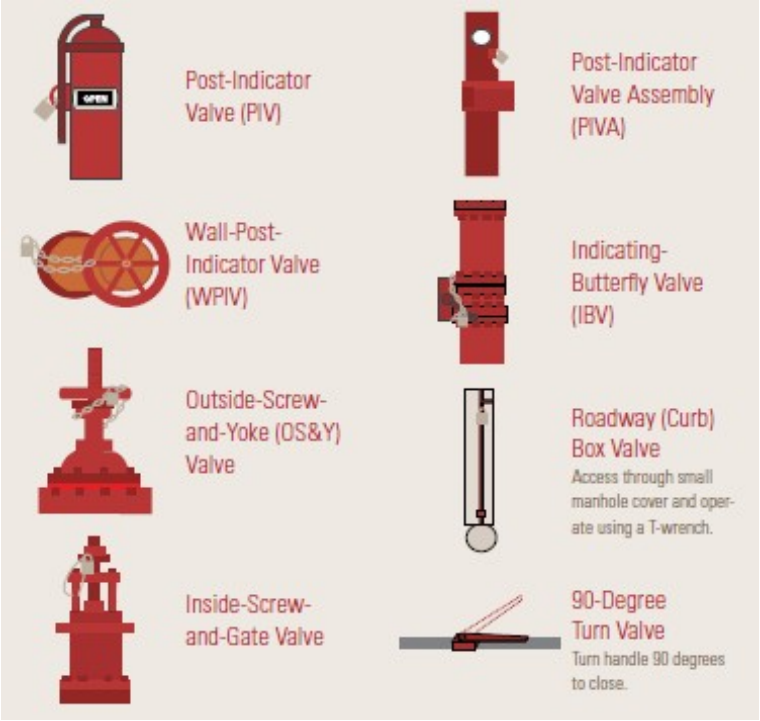


Figure 4: Common types of control valves for fire protection equipment.

8.0 Sprinkler System Impairment Management (Red Tag Permit System)

Each facility should implement an impairment management program to ensure that any time a sprinkler control valve is shut or a fire pump controller is turned to the "off" position, the appropriate personnel are notified and the system is returned to service once the impairment is no longer needed. The FM Global Red Tag Permit System outlines key precautions to take before, during and after an impairment takes place.

Some of the key steps include:

1. Management fills out, signs, and issues the Red Tag Permit, describing the location of the facility, the reason for impairment, and the planned duration of the impairment.

2. Notify FM Global at 1-800-955-3632 of the planned impairment. Alternatively, fill out the Red Tag Permit online using https://redetag.fmglobal.com/. (Refer to Appendix C for a sample copy).

3. During the impairment
   - Place Part 2 of the Red Tag in the centre pocket of the Wall Kit as a visual reminder of the impairment.
   - Issue Part 3 of the Red Tag to the Fire Protection Equipment Operator to attach to the impaired valve.
   - Take the necessary precautions. Eliminate ignition sources. Enforce the "no hot work" rule.
   - Assign a fire watch to patrol the area where protection is down.
   - Work without interruption.

4. After work is completed, restore fire protection to service and contact FM Global Customer Service Desk 1-800-955-3632 or reply to the auto-generated email from Online Red e-Tag in your inbox if submitted electronically to close the impairment. Lock fire protection control valves in the wide-open position.

Figure 5: The three parts of the Red Tag Permit

9.0 Hot Work management

A formal hot work management program should be established for every facility. This program should be followed by facilities personnel as well as contractors to manage the hazards that hot work creates. The FM Global Hot Work Permit outlines the key items to consider to mitigate the hazards associated with hot work. Refer to Appendix D for a sample copy of the FM Global Hot Work Permit.

Some of the key steps of the FM Global Hot Work Permit System include:

1. Available fire protection is verified to be in service and operable.
2. The 35-foot rule (10 m): Keep combustible materials at least 35 ft (10m) away from the hot work. Use FM Approved blankets, weld pads, or curtains to cover any combustible construction and/or nonremovable combustibles within a 35 ft radius.
3. Enforce all job-specific precautions as listed on the Hot Work Permit. Notify FM Global and/or HIROC if you have any questions about hot work activity.
4. Issue Part 2 of the Hot Work Permit to the person doing the job.
5. Ensure fire watch is provided during the hot work operations. Constant fire watch and the monitoring period after the hot work operations can be determined based on Figure 6 below. Contact your FM Global Field Engineer or HIROC for clarification on the fire watch and monitoring period.
6. Keep Part 2 on file for future reference, including signed confirmation that the post-work fire watch and monitoring have been completed.
7. Sign off the final check on Part 2 of the Hot Work Permit. Keep records for review by management and FM Global.

Occupancy Factors	Construction Factors					
	Noncombustible construction or FM Approved Class 1 or Class A building materials		Combustible construction without concealed cavities [3]		Combustible construction with unprotected concealed cavities [4]	
	Watch	Monitor	Watch	Monitor	Watch	Monitor
Noncombustible with any combustibles contained within closed equipment (e.g., ignitable liquid within piping)	30 min.	0 hours	1 hour	3 hours	1 hour	5 hours
Office, retail, or manufacturing with limited combustible loading (e.g., HC-1 or HC-2)[5]	1 hour	1 hour	1 hour	3 hours	1 hour	5 hours
Manufacturing with moderate to significant combustible loading (e.g., HC-3) except as noted below [5]	1 hour	2 hours	1 hour	3 hours	1 hour	5 hours
Warehousing	1 hour	2 hours	1 hour	3 hours	1 hour	5 hours
Exceptions: Occupancies with processing or bulk storage of combustible materials capable of supporting slow-growing fires (e.g., paper, pulp, textile fibers, wood, bark, grain, coal or charcoal)	1 hour	3 hours	1 hour	3 hours	1 hour	5 hours

Figure 6: Factors for Determining Post-Work Fire Watch and Fire Monitoring Periods

10.0 No major physical exposures present on site

FM Global Loss Prevention Visits include a detailed review of any physical exposures that may be present within a facility. Please consult the most recent Risk Report for your facility, or if a Risk Report is not available, please reach out to your FM Global and HIROC representatives to discuss next steps.

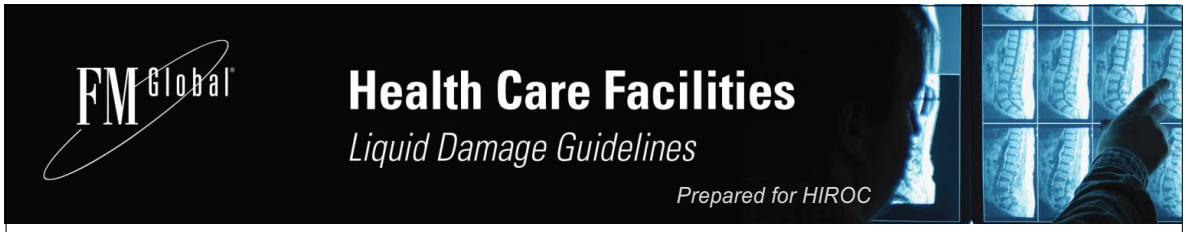
Appendix A:
Liquid Damage Resources

Water Leakage Emergency Response Plan (sample document)

https://www.hiroc.com/resources/risk-resource-guides/sample-water-leakage-emergency-response-plan-fm-global

Water Leakage Emergency Response Plan (sample document) is available to HIROC Subscribers and must logged in to HIROC.com. Subscribers without access to our website should send the request to inquiries@hiroc.com.

Appendix A-1:
Liquid Damage Guidelines for Finished Facilities



Mitigation Steps for Existing Facilities

Mitigation steps can be taken to help reduce the severity and frequency of damage due to liquid losses. Shielding, leak detection and regularly scheduled preventive maintenance programs can help minimize this exposure.

High-Value Equipment

Definition: For the purposes of this section, high-value equipment can be defined as equipment with either high replacement value or high operational impact, if lost. This can vary greatly by scale, size and complexity of facility.

- Survey rooms and seal wall, roof and ceiling penetrations to reduce the potential for water intrusion.
- Where domestic and chilled water lines are present in ceilings above critical equipment, reroute or provide protection.
- Noncombustible pans can be used over high-value equipment. Pans should be provided with leak protection. Obstruction of ceiling sprinklers should be considered when installing pans.
- Where domestic and chilled water lines are directly above high-value equipment, lines should be provided with secondary containment, such as concentric piping. (Secondary containment should be drained to a safe location and provided with leak detection.)

Below-Grade Occupancies

Below-grade occupancies are susceptible to surface water runoff, flooding and sewer backup losses. To reduce the potential of loss, consider the following:

- Provision of sump pumps may be necessary in points of water ingress or collection (i.e., low points or around open floor drains near backflow prevention valves). These pumps should be a minimum of 50 gpm and should be connected to emergency power. Please ensure that the power supply is appropriately sized for the pump. Test the device on a quarterly basis and before major storm events.
- If external drainage systems are present, conduct monthly evaluations to ensure they remain free and clear.
- Review door thresholds and door/window seals to ensure they are water impervious.
- Provide leak detection, which alarms to a constantly attended location, for high-value equipment areas and critical occupancies in below-grade areas.
- Equip sewer lines with backflow prevention, e.g., backflow prevention valve, designed to prevent a backup of municipal services from entering the facility, such as in a flash flood.
- Review exterior grading to ensure there is adequate slope away from building and openings.
- Review downspouts and ensure they are extended away from building.

Domestic and Chilled Water Lines

- Ensure all shutoff valves are well-marked and accessible. Use PTFE-lined ¼-turn valves for floor shutoff.
- Post a diagram of the domestic and chilled water lines and shutoff valve locations for first responder use.
- Label supply lines for domestic and chilled water services indicating the direction of water flow.

Health Care Facilities *Liquid Damage Guidelines* | Prepared for HIROC 1 of 4

Preventive Maintenance Programs

- Roofing systems: Quarterly inspect roofing systems. This inspection should include:
  1. Roof drains free and clear of debris
  2. Roof covering and seams in good condition
  3. Loose debris and materials that could cause roof damage (screws and nails) or that could obstruct roof drains removed
  4. Flashing properly attached
  5. Mechanical equipment securely fastened
- Sanitary sewer line: Quarterly clean main sewer lines using a pressurized water system.
- Winterization: ahead of freezing temperatures.
  1. Ensure space heaters and small room heaters are maintained and working.
  2. Confirm appropriate heat is provided for sprinkler, chilled and domestic water systems. In particular, consider the following areas:
     - Top and bottom of stairwells where exterior doors are present
     - Diesel generator rooms
     - Fire pump and sprinkler riser rooms
     - Trailers and temporary housing/office structures
     - Penthouses
  3. Inspect and confirm good condition of non-freeze and dry pipe sprinkler systems.
  4. Drain all low points.
  5. Verify adequate air pressure is being maintained.
  6. Verify adequate antifreeze charge in non-freeze systems.
- Domestic and chilled water lines: Semi-annually inspect and exercise domestic and chilled water line control valves to ensure good working order of the valves.

Preparation and Emergency Response

Emergency Response

A written emergency response plan should be in place and training provided to the first responders.

- Include on the emergency response team at least the following personnel with alternates on all shifts:
  - Designated lead person
  - Someone designated to investigate leak and determine the source and severity
  - Someone authorized and trained to the shut valves to stop leaks
  - Someone designated to retrieve mitigation supplies
- Provide training on a semi-annual basis. Simulate emergency scenarios and evaluate action plans and response. First responders should be familiar with:
  - The location of floor and building shutoffs for sprinkler systems, domestic and chilled water systems
  - Electrical systems and how to de-energize critical pieces of electrical equipment
  - Mitigation efforts such as water cleanup, dehumidification and protecting equipment.
- Include liquid leak scenarios in the emergency response plan and training drills. Time is of the essence to limit damage.
  - Shut off the source, if possible.
  - De-energize electrical equipment, if necessary.
  - Begin cleanup of liquid.
  - Initiate repairs.
  - Investigate and evaluate any damage to drop ceilings, drywall, equipment and floor coverings.

- Check wall cavities for water. Do not try to dry insulation; it should be replaced. Loss experience shows this is a leading source of mold generation.
- Contact internal Risk Management to report the incident and potential loss.
- Contact HIROC Claims and fill out a claim form in the HIROC website as soon as possible for significant water escape/leak. This is to facilitate qualified experts in initiating assessment and accelerated drying as soon as possible.
  - HIROC Website, www.hiroc.com – log in to Subscriber Area, click "Report a Claim"
- For significantly large events, HIROC will contact the FM Global Claims Department.
- Consider providing supplies needed by first responders on a spill control cart. Cart supplies typically include the following:
  1. Wet vacuum
  2. Absorbent material
  3. Tarps
  4. 2-way radios – ensure units have fully charged batteries
  5. Flashlights
  6. Diagrams of roof drains and water supply lines
  7. Dehumidifiers

- Prequalify a restoration contractor. Consider the following items during the qualification process:
  - Response time
  - Geographical reach
  - Staffing
  - Capabilities such as:
    1. Water extraction and drying
    2. Dehumidification
    3. Mold and mildew treatment
    4. Electronics restoration and corrosion control
    5. Equipment availability
    6. References
    7. Liability insurance

Flood Prone Areas

Health care facilities located in a flood prone area should have a written Flood Emergency Response Plan (FERP). The FERP should consider mitigation as well as restoration activities prior to and after the flood.

References and Resources

FM Global publications and resources: fmglobalcatalog.com

FM Global Property Loss Prevention Data Sheets: fmglobaldatasheets.com

- Data Sheet 1-24, *Protection Against Liquid Damage*
- Data Sheet 1-28, *Wind Design*
- Data Sheet 1-29, *Roof Deck Securement and Above-Deck Roof Components*
- Data Sheet 1-52, *Field Verification of Roof Wind Uplift Resistance*
- Data Sheet 1-54, *Roof Loads for New Construction*
- Data Sheet 2-8, *Earthquake Protection for Water-Based Fire Protection Systems*
- Data Sheet 9-0, *Maintenance and Inspection*
- Data Sheet 9-7, *Property Conservation*
- Data Sheet 10-2, *Emergency Response*

Vendor List

Service Type	Contractor name	Contractor number
Plumbing		
Dehumidification		
Mold abatement		
Flood cleanup		
Roof repair		
Emergency power/Electrician		
Automatic sprinkler system		
Sewer		
General contractor		

Feel free to direct any questions to:

FM Global Account Engineering Department Representative for HIROC:

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(905) 763-5586

Appendix B:
Fire Protection Control Valve Checklists

Refer to the site-specific "Fire Protection Inspection Form." The list should be updated as necessary to include every control valve located at the property that pertains to automatic sprinklers, backflow preventers, fire pump (where applicable), curb box valves (where applicable), post indicator valves (where applicable), and special protection systems (where applicable). A blank template is available for reference.

FM Global

Fire Protection Inspection Form

Account Number: Index Number:

Sample Only	No one form can be designed to fit all conditions. Use this sample as a basic guide in developing your own form. Items that do not apply can be omitted; other items can be expanded or added as desired. ***For assistance, consult the FM Global engineer who visits your facility, and reference FM Global Data Sheet 2-81,*** **Fire Protection System Inspection, Testing and Maintenance and other Fire Loss Prevention Inspections.**
Instructions to Inspector:	*Complete this form while inspecting fire protection. Send the completed form to your supervisor for necessary action. The report should be held for review by the FM Global engineer who visits your facility.*

Facility:	Location:	Date:

Valve Inspections
Visually inspect all locked valves weekly and physically try them monthly as required.* Record both weekly and monthly inspections.

*Physically try gate valves, including nonindicating and indicator-post-gate valves. FM Approved post-indicator-valve assemblies (PIVAs), indicating-butterfly valves (IBVs) and standard outside-screw-and-yoke (OS&Y) valves do not have to be tried, but should be checked visually at close range.

All inside and outside valves controlling sprinklers or fire protection water supplies are listed below. Check the condition of the valve. Do not report a valve open unless you have personally inspected it.

	Valve Location	Area Controlled	Open	Shut	Locked	Physically Turned
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						

The FM Global *Red Tag Permit System* is used to guard against delayed reopening of valves. The *Red Tag Permit* should be used every time a sprinkler control valve is closed. When the valve is reopened, the 2-in. (51-mm) drain should be flowed wide-open to ensure there is no obstruction in the piping. The valve then should be relocked.

Were any valves closed since the last inspection?	☐ Yes	☐ No
Were FM Global *Red Tag Permits* used?	☐ Yes	☐ No
Was the valve(s) reopened fully and a 2-in. (51-mm) drain test conducted before the valve(s) was relocked?	☐ Yes	☐ No
Comments:		

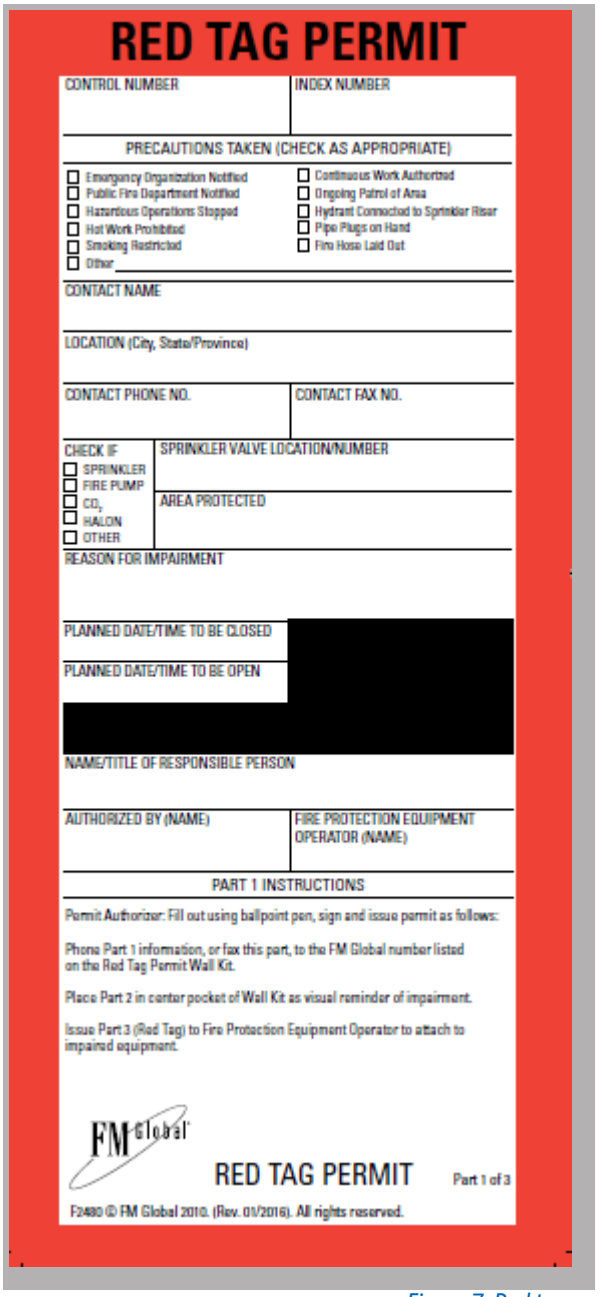
X264 (Revised September 2007) Printed in USA

Figure 6: Sample Valve list

Appendix C: Impairment Form

Red Tag Permits and wall kits can be ordered through the FM Global Resource Catalog at http://www.fmglobalcatalog.com or toll free at 1.877.364.6726.

The eRed Tag permit can be access at www.fmglobal.com/redetag



RED TAG PERMIT

CONTROL NUMBER | INDEX NUMBER

PRECAUTIONS TAKEN (CHECK AS APPROPRIATE)

- ☐ Emergency Organization Notified
- ☐ Public Fire Department Notified
- ☐ Hazardous Operations Stopped
- ☐ Hot Work Prohibited
- ☐ Smoking Restricted
- ☐ Other
- ☐ Continuous Work Authorized
- ☐ Ongoing Patrol of Area
- ☐ Hydrant Connected to Sprinkler Riser
- ☐ Pipe Plugs on Hand
- ☐ Fire Hose Laid Out

CONTACT NAME

LOCATION (City, State/Province)

CONTACT PHONE NO. | CONTACT FAX NO.

CHECK IF: ☐ SPRINKLER ☐ FIRE PUMP ☐ CO_2 ☐ HALON ☐ OTHER

SPRINKLER VALVE LOCATION/NUMBER

AREA PROTECTED

REASON FOR IMPAIRMENT

PLANNED DATE/TIME TO BE CLOSED

PLANNED DATE/TIME TO BE OPEN

NAME/TITLE OF RESPONSIBLE PERSON

AUTHORIZED BY (NAME) | FIRE PROTECTION EQUIPMENT OPERATOR (NAME)

PART 1 INSTRUCTIONS

Permit Authorizer: Fill out using ballpoint pen, sign and issue permit as follows:

Phone Part 1 information, or fax this part, to the FM Global number listed on the Red Tag Permit Wall Kit.

Place Part 2 in center pocket of Wall Kit as visual reminder of impairment.

Issue Part 3 (Red Tag) to Fire Protection Equipment Operator to attach to impaired equipment.

FM Global

RED TAG PERMIT Part 1 of 3

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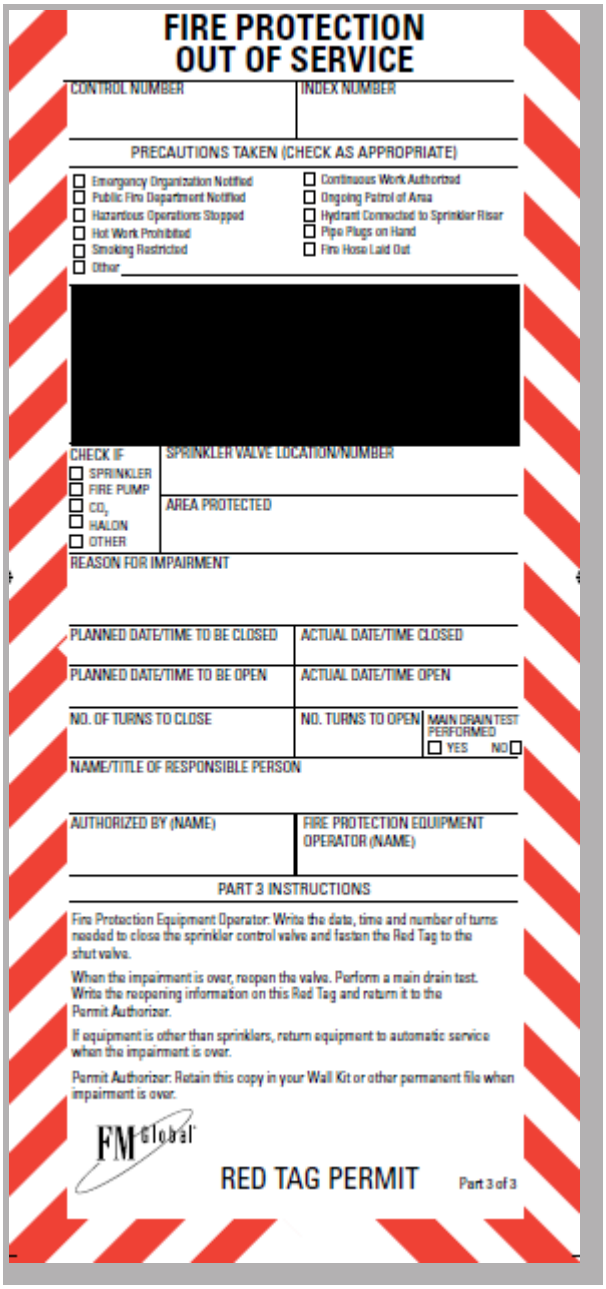


FIRE PROTECTION OUT OF SERVICE

CONTROL NUMBER | INDEX NUMBER

PRECAUTIONS TAKEN (CHECK AS APPROPRIATE)

- ☐ Emergency Organization Notified
- ☐ Public Fire Department Notified
- ☐ Hazardous Operations Stopped
- ☐ Hot Work Prohibited
- ☐ Smoking Restricted
- ☐ Other
- ☐ Continuous Work Authorized
- ☐ Ongoing Patrol of Area
- ☐ Hydrant Connected to Sprinkler Riser
- ☐ Pipe Plugs on Hand
- ☐ Fire Hose Laid Out

CHECK IF: ☐ SPRINKLER ☐ FIRE PUMP ☐ CO_2 ☐ HALON ☐ OTHER

SPRINKLER VALVE LOCATION/NUMBER

AREA PROTECTED

REASON FOR IMPAIRMENT

PLANNED DATE/TIME TO BE CLOSED | ACTUAL DATE/TIME CLOSED

PLANNED DATE/TIME TO BE OPEN | ACTUAL DATE/TIME OPEN

NO. OF TURNS TO CLOSE | NO. TURNS TO OPEN | MAIN DRAIN TEST PERFORMED ☐ YES NO ☐

NAME/TITLE OF RESPONSIBLE PERSON

AUTHORIZED BY (NAME) | FIRE PROTECTION EQUIPMENT OPERATOR (NAME)

PART 3 INSTRUCTIONS

Fire Protection Equipment Operator: Write the date, time and number of turns needed to close the sprinkler control valve and fasten the Red Tag to the shut valve.

When the impairment is over, reopen the valve. Perform a main drain test. Write the reopening information on this Red Tag and return it to the Permit Authorizer.

If equipment is other than sprinklers, return equipment to automatic service when the impairment is over.

Permit Authorizer: Retain this copy in your Wall Kit or other permanent file when impairment is over.

FM Global

RED TAG PERMIT Part 3 of 3

Figure 7: Red tag permit (first and last pages)

The Red Tag Permit

The fire safety supervisor uses this three-part permit to authorize the impairment and record critical information needed to manage the impairment.

Part 1:

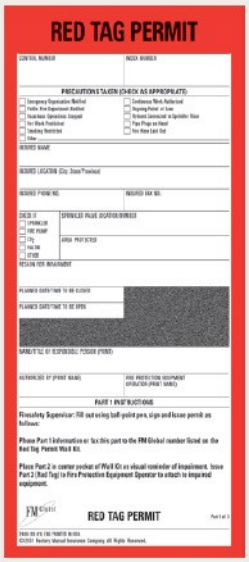
The fire safety supervisor completes the permit, signs and issues it, notifies FM Global, and follows the precautions listed.

Part 2:

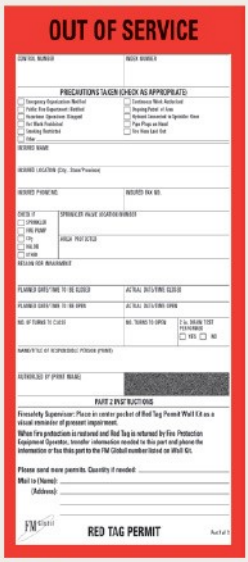
The fire safety supervisor places the permit in the center pocket of the wall hanger as a visual reminder that a valve is shut.

Part 3:

The fire safety supervisor issues the permit to the fire protection equipment operator, who documents each step of the impairment. Include date, time, type of valve and number of turns needed to close the valve. Attach the tag to the shut valve as a weather-resistant, visual reminder that a particular valve is closed. Also, attach the *Reusable Impairment Tag for Fire Service Connections* (P7427t) to the fire-service-pumper connection associated with the impaired fire protection system.



Part 1



Part 2

Part 3

Figure 8: Red tag permit (instructions)

Appendix D:
Hot Work Permit

Hot work permits and wall kits can be ordered through the FM Global Resource Catalog at http://www.fmglobalcatalog.com or toll free at 1-877-364-6726.

HOT WORK PERMIT

STOP!
Avoid hot work when possible! Consider using an alternative cold work method.

This Hot Work Permit is required for any temporary operation involving open flames or producing heat and/or sparks conducted outside a Hot Work Designated Area. This includes, but is not limited to: brazing, cutting, grinding, soldering, torch-applied roofing and welding.

Part 1

Instructions for Permit Authorizer

1. Specify the precautions to take.
2. Fill out and keep **Part 1** during the hot work process.
3. Issue **Part 2** to the person doing the job.
4. Keep **Part 2** on file for future reference, including signed confirmation that the post-work fire watch and monitoring have been completed.
5. Sign off final check on **Part 2**.

HOT WORK BY
☐ Employee
☐ Contractor _____

DATE | JOB NUMBER

LOCATION OF WORK (BUILDING/FLOOR/OBJECT)

WORK TO BE PERFORMED

NAME OF PERSON PERFORMING HOT WORK

NAME OF PERSON PERFORMING FIRE WATCH

I verify the above location has been examined, the Required Precautions have been taken, and permission is authorized for this work.

PERMIT AUTHORIZER (PRINT AND SIGN)

THIS PERMIT EXPIRES ON (LIMIT AUTHORIZATION TO ONE SHIFT):

DATE: TIME: AM/PM

Note: Emergency notification on back of form.
Use as appropriate for your facility.

Need more permits? Order additional Hot Work Permits at fmglobalcatalog.com; or, download the FM Global Hot Work Permit App via fmglobal.com/apps.

FM Global

Required Precautions

Y NA

☐☐ The fire pump is in operation and switched to automatic.
☐☐ Control valves to water supply for sprinkler system are open.
☐ Extinguishers are in service/operable.
☐ Hot work equipment is in good working condition.

Requirements within 35 ft. (10 m) of hot work

☐☐ Shield combustible construction using FM Approved welding pads, blankets and curtains.
☐☐ Remove combustibles or shield nonremovable combustibles using FM Approved welding pads, blankets and curtains.
☐☐ Isolate potential sources of flammable gas, ignitable liquid or combustible dust/lint (e.g., shut down equipment).
☐☐ Remove ignitable liquid, combustible dust/lint and combustible residues.
☐☐ Shut down ventilation and conveying systems.
☐☐ Remove combustibles and consider a second fire watch on opposite side of floor, wall, ceiling or roof when openings exist or thermally conductive materials pass through.
☐☐ Is work on a combustible roof? If yes, treat as a "Hot Work High-Risk Area" and provide **ADDITIONAL REQUIRED PRECAUTIONS** below.

Hot work on/in closed equipment, ductwork and piping

☐☐ Isolate equipment from service.
☐☐ Remove ignitable liquid and purge flammable gas/vapor.
☐☐ Prior to work, and/or during work, monitor for flammable gas/vapor. LEL reading(s): _____
☐☐ Remove combustible dust/lint or other combustible materials.
☐☐ Is work on/in equipment with nonremovable combustible linings or parts? If yes, treat as a "Hot Work High-Risk Area" and provide **ADDITIONAL REQUIRED PRECAUTIONS** below.

Fire watch/fire monitoring the hot work area
(Refer to FM Global Property Loss Prevention Data Sheet 10-3, *Hot Work Management*, for guidance on categorizing hot work areas.)

☐ Perform a continuous fire watch during hot work.
☐ Perform a continuous fire watch following hot work completion for ☐30 or ☐60 minutes depending on category.
☐☐ Perform fire monitoring following fire watch completion for ☐1 ☐2 ☐3 ☐4 or ☐5 hours depending on category.

ADDITIONAL REQUIRED PRECAUTIONS:

Figure 9: Hot work permit (front view)

WARNING

HOT WORK IN PROGRESS! Watch for fire!

Part 2

Instructions

Person performing hot work: Record time started and display permit at hot work area. After hot work is completed, record time and leave permit displayed for fire watch.

Fire watch: Watch area during hot work and after work completion. Prior to leaving area, perform final inspection, sign, leave permit displayed and notify Fire Monitor or Permit Authorizer.

Fire Monitor: Monitor area after post-work fire watch completion. Perform final inspection, sign and return to Permit Authorizer.

HOT WORK BY
☐ Employee
☐ Contractor _____

DATE	JOB NUMBER

LOCATION OF WORK (BUILDING/FLOOR/OBJECT)

WORK TO BE PERFORMED

NAME OF PERSON PERFORMING HOT WORK

NAME OF PERSON PERFORMING FIRE WATCH

I verify the above location has been examined, the Required Precautions have been taken, and permission is authorized for this work.

PERMIT AUTHORIZER (PRINT AND SIGN)

THIS PERMIT EXPIRES ON (LIMIT AUTHORIZATION TO ONE SHIFT):

DATE:	TIME:	AM/PM
Hot Work Date:	Start Time: Finish Time:	am/pm am/pm
Post-Work Fire Watch Name	Finish Time:	am/pm
Fire Monitor ☐ Person ☐ Other Name/Other	Finish Time:	am/pm
Final Check Name	Time:	am/pm

Required Precautions

Y NA

☐☐ The fire pump is in operation and switched to automatic.
☐☐ Control valves to water supply for sprinkler system are open.
☐ Extinguishers are in service/operable.
☐ Hot work equipment is in good working condition.

Requirements within 35 ft. (10 m) of hot work

☐☐ Shield combustible construction using FM Approved welding pads, blankets and curtains.
☐☐ Remove combustibles or shield nonremovable combustibles using FM Approved welding pads, blankets and curtains.
☐☐ Isolate potential sources of flammable gas, ignitable liquid or combustible dust/lint (e.g., shut down equipment).
☐☐ Remove ignitable liquid, combustible dust/lint and combustible residues.
☐☐ Shut down ventilation and conveying systems.
☐☐ Remove combustibles and consider a second fire watch on opposite side of floor, wall, ceiling or roof when openings exist or thermally conductive materials pass through.
☐☐ Is work on a combustible roof? If yes, treat as a "Hot Work High-Risk Area" and provide **ADDITIONAL REQUIRED PRECAUTIONS** below.

Hot work on/in closed equipment, ductwork and piping

☐☐ Isolate equipment from service.
☐☐ Remove ignitable liquid and purge flammable gas/vapor.
☐☐ Prior to work, and/or during work, monitor for flammable gas/vapor. LEL reading(s): _____
☐☐ Remove combustible dust/lint or other combustible materials.
☐☐ Is work on/in equipment with nonremovable combustible linings or parts? If yes, treat as a "Hot Work High-Risk Area" and provide **ADDITIONAL REQUIRED PRECAUTIONS** below.

Fire watch/fire monitoring the hot work area

(Refer to FM Global Property Loss Prevention Data Sheet 10-3, *Hot Work Management*, for guidance on categorizing hot work areas.)

☐ Perform a continuous fire watch during hot work.
☐ Perform a continuous fire watch following hot work completion for ☐30 or ☐60 minutes depending on category.
☐☐ Perform fire monitoring following fire watch completion for ☐1 ☐2 ☐3 ☐4 or ☐5 hours depending on category.

ADDITIONAL REQUIRED PRECAUTIONS:

_____
_____
_____
_____
_____

Figure 10: Hot work permit (back view)

WARNING

HOT WORK IN PROGRESS!
Watch for fire!

In case of emergency, call the contacts listed below before attempting to extinguish the fire.

Contact	Number

Construction and Occupancy Factors for Post-Work Fire Watch and Monitoring Periods

		Construction Factors					
		Noncombustible construction, or FM Approved Class 1 or Class A building materials		Combustible construction without concealed cavities		Combustible construction with unprotected concealed cavities	
		Watch	**Monitor**	**Watch**	**Monitor**	**Watch**	**Monitor**
Occupancy Factors	Noncombustible with any combustibles contained within closed equipment (e.g., ignitable liquid within piping)	30 minutes	0 hours	1 hour	3 hours	1 hour	5 hours
	Office, retail or manufacturing with limited combustible loading	1 hour	1 hour	1 hour	3 hours	1 hour	5 hours
	Manufacturing with moderate to significant combustible loading except as noted below	1 hour	2 hours	1 hour	3 hours	1 hour	5 hours
	Warehousing	1 hour	2 hours	1 hour	3 hours	1 hour	5 hours
	Exceptions: Occupancies with processing or having bulk storage of combustible materials capable of supporting slow-growing fires (e.g., paper, pulp, textile fibers, wood, bark, grain, coal or charcoal)	1 hour	3 hours	1 hour	3 hours	1 hour	5 hours

When performing torch-applied roofing, apply additional precautions and conduct a minimum 2 hours fire watch and 2 hours fire monitoring. If an infrared camera is utilized, reduce to a 1 hour fire watch and 1 hour fire monitoring.

When performing hot work on/in equipment containing nonremovable combustible linings or parts, apply additional precautions and conduct a minimum 1 hour fire watch and 3 hours fire monitoring within the equipment, and in the surrounding areas per Table above.

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Figure 11: Hot work permit (Page 3)

Appendix E:
Summary of Sprinkler Testing Requirements

The following is a summary of key sprinkler system testing requirements, which can be utilized to ensure contractors are following FM Global recommended servicing intervals. Note that some of the below items may be performed by facilities personnel if they are competent in performing the task.

Any time a sprinkler control valve is shut, or fire pump is turned to the 'off' position, the FM Global Red Tag Permit System should be utilized. The duration of the impairment should be kept to a minimum, and hot work should not be permitted during this time.

Weekly

- Visual inspection of all sprinkler control valves
- Start diesel fire pumps via pressure drop and leave running for 30 minutes

Monthly

- Exercising of non-indicating valves and PIVs
- Start electric fire pumps via pressure drop and leave running for 10 minutes
- Perform physical inspection and operational test of Pressure Reducing Valves (PRVs)

Quarterly

- Test all waterflow alarms (annually for antifreeze systems)

Semi-Annually

- Test all supervisory (tamper) switches for sprinkler control valves

Annually

- Test building interlocks associated with fire alarm system
- Flow test from system main-drain to check for obstructions in water supply
- Conduct full exercising of non-indicating valves and PIVs, record number of turns to close & open valve
- Perform alignment check on pump driveshaft
- Perform full pump performance test through full range of flows (0% through 150% of rated capacity)
- Test antifreeze solution for antifreeze systems
- Partial trip test of dry pipe sprinkler systems
- Inspect and flow test yard hydrants
- Perform full flow test of PRVs
- Conduct full flow-test for backflow preventers

3 Years

- Full trip test of dry pipe sprinkler systems

5 Years

- Flushing investigation of wet pipe sprinkler systems fed by open water source, regardless of pipe material

10 Years, 20 Years, and Every 5 Years After

- Flushing investigation of dry pipe sprinkler systems with black iron piping. This is to be performed after 10-years, 20-years, and every 5 years thereafter of the system being installed.

Keeping Score

In order to keep track of your site's progress over time, the scoring system below can be used to visualize your site's risk quality. In addition, for subscribers with multiple locations, the scoring system can be used for comparison purposes between multiple sites.

The scoring system is based on the latest FM Global Risk Report for your site. Each category above will be allocated a point if at least one recommendation exists associated with that category. No more than one point per category, even if multiple recommendations exist under that category. For the final score, subtract the total number of recommendations from 10. The range will be from 0 = poor risk quality to 10 = good risk quality. Locations with poor risk quality are more likely to experience a loss and if a loss does occur, it will likely be more severe. These sites require immediate attention to implement measures that will help protect your property. This scorecard can be used to prioritize the implementation of recommendations for your sites and improve your property risk quality over time.

#	Category	Score
1	Water Leakage Management	
2	Control Valves – Weekly Inspection	
3	Control Valves - Monthly Inspection	
4	Fire Pump – Regular Testing	
5	Fire Pump – Annual Performance Testing	
6	Dry Pipe Systems – Flushing Investigations	
7	Sprinkler Control Valves – Lock Open	
8	Impairment Management (Red Tag Permit System)	
9	Hot Work Management	
10	Major Physical Exposure	
Total Number of Recommendations		
Final Score (10 - # of recommendations)		

Additional training on each of the programs outlined on the following pages can be found online at https://fmglobaltraining.skillport.com/.
Register using the account number **54887**

Revised: March 2021