During the 2015 Annual Conference of the American Society for Healthcare Engineering (ASHE), held in Boston in July, George Mills, MBA, FASHE, CEM, CHFM, CHSP, director of engineering for The Joint Commission, spoke to the capacity audience on the relevant issues concerning the physical environment in hospitals today. Mills led off with comments concerning performance improvement and the EC.04 standards.

“I really believe that the EC.04 standards that we have concerning performance improvement is an important feature of what we want you to be doing,” said Mills. “And I get a sense that after 20 years hospitals are still frustrated with how to really do this. Sometimes we overthink things, so I really challenge you to simply look at the performance improvement modules and see how you’re gathering the data and moving forward to make corrective actions and improve your environment. Performance improvement should really be improved performance.”

He explained that if you have committees whose members seem to be tired and distracted, maybe it’s time to shake up your committees and get some new blood into them.

“It’s something that I’m concerned about,” said Mills. “I think the link between the physical environment world and the clinical world intersects with the performance improvement. And as we monitor the physical environment, we can begin solving some of those 700,000 people who are infected each year in that physical environment. I think it is our chance to really get a hold of that 75,000 to 80,000 people who die every year from hospital-acquired illness, and that’s really the thing that performance improvement can get us as we go forward. So I challenge you to shake up your team and move up the concept of improved performance in your organization.”
Mills suggested revisiting the EC.04 standards and drilling down into them to see where improved practices can be implemented. One of the suggestions that he offered was dashboarding.

“Dashboarding is where you identify issues you want to make sure you’re doing the right things about and then monitor how you’re doing it,” said Mills. “So today’s world dashboarding is just the old day-timers from 30 years ago. But I am so convinced what we’re not doing is dashboarding. And when we talked about ASHE’s initiative to get into the C-suite, then we have to start putting out C-suite apps. The C-suite understands dashboarding. Our counterparts in clinical have been dashboarding for years. So if you’re not embracing the concept of dashboarding, then you’re behind.”

Mills then moved on to discuss The Joint Commission’s process to comply with CMS’ Alternative Equipment Management (AEM) program—specifically utilities management systems. This applies to both acute care hospitals and critical access hospitals (CAH), but it wasn’t always that way.

“Initially the AEM program was for acute care hospitals only, so we went back to CMS and said, ‘We really need to expand this to CAHs,’” said Mills.

One of the Joint Commission Environment of Care (EC) standards says the hospital will design and install utility systems that meet the operational needs for patient care. Mills addressed the issue of aging facilities and meeting this particular standard.

“Many of you have inherited older buildings, and God bless Senators Hill and Burton when they created the Hill-Burton act back in the 1940s,” he said. “Their vision was to put a hospital in every community, and that’s why when you go to the small towns in rural America you will see a hospital there, thanks to Hill-Burton funds. Now those buildings are 50-60 years old, and one of my biggest concerns is the aging infrastructure of our hospitals. So we look at how we designed and built hospitals over the years, and now we’re still using buildings that are 50 years old and trying to install new equipment and technology with that … good luck with that concept, right?”

Mills stated that hospitals really need to be looking at how an aging facility works to provide adequate and safe patient care delivery in the physical environment. Thus element of performance (EP) 1 of this standard really gets to the installation and design of

---

**EDITORS ADVISORY BOARD**

Matt Phillion, GSHA
Senior Managing Editor
mphillion@hcpro.com

Brad Keyes, CHSP
Senior Editor
Senior Consultant
Keys Life Safety Compliance
www.keyslifesafety.com

James R. Ambrose, PE
Technical Director,
Healthcare
Code Consultants, Inc.
St. Louis, Missouri

Joseph A. Berlensky, CHFM, CHE
Director, Plant Facilities
 Baptist Medical Center Beaches
Jacksonville Beach, Florida

Frederick C. Bradley, PE
Principal
FCB Engineering
Alpharetta, Georgia

Jamie Crouch
Safety and Security Manager
Metro Health Hospital
Wyoming, Michigan

Michael Crowley, PE
Senior Vice President,
Engineering Manager
Houston, Texas

A. Richard Fasano
Manager, Western Office
Russell Phillips & Associates, LLC
Elk Grove, California

Henry Kowalenko
Supervisor, Design Standards Unit
Office of Healthcare Regulation, Illinois Department of Public Health
Chicago, Illinois

David Mohile
President
Medical Engineering Services, Inc.
Leesburg, Virginia

James Murphy
President
MRP, Ltd.
Western Springs, Illinois

Thomas Salamone
Director, Healthcare Services
Telgain Corporation
Atlanta, Georgia

Terry Schultz, PE
Principal
Code Consultants, Inc.
St. Louis, Missouri

William Wilson, CFPS, PEM
Fire Safety Coordinator
Beaumont Hospitals
Royal Oak, Michigan

---

Healthcare Life Safety Compliance (ISSN: 1523-7575 [print]; 1937-741X [online]) is published monthly by HCPro, a division of BLR®, subscription rate is $329 for one year and includes unlimited telephone assistance. Single copy price is $25; Healthcare Life Safety Compliance, 100 Winners Circle, Suite 300, Brentwood, TN 37027. Copyright © 2015 HCPro, a division of BLR. All rights reserved. Printed in the USA. Except where explicitly encouraged, no part of this publication may be reproduced in any form or by any means, without prior written consent of HCPro or the Copyright Clearance Center at 978-750-8400. Please notify us immediately if you have received an unauthorized copy. For editorial comments or questions or for technical support with questions about life safety compliance, call 781-639-1872 or fax 781-639-7857. For renewal or subscription information, call customer service at 800-650-6767, fax 800-639-8511, or email customerservice@hcpro.com. Occasionally, we make our subscriber list available to selected companies/vendors. If you do not wish to be included on this mailing list, please write to the marketing department at the address above. Opinions expressed are not necessarily those of HLSC. Mention of products and services does not constitute endorsement. Advice given is general and based on National Fire Protection Association codes and not based on local building or fire codes. No warranty as to the suitability of the information is expressed or implied. Information should not be construed as engineering advice specific to your facility and should not be acted upon without consulting a licensed engineer, architect, or other suitable professional. Final acceptability of such information and interpretations is always at the discretion of the authority having jurisdiction, which may differ from that offered in the newsletter or otherwise. Advisory board members are not responsible for information and opinions that are not their own.
systems to make sure they will support the organization’s needs.

Then Mills moved to EP 2 of this standard, which talks about the inventory of equipment.

“If you’re seeking accreditation for deeming purposes, then you need to follow what CMS has dictated to us,” he said. “One of the things they said is, ‘You need to include all of the operating components on the utility systems on the inventory.’ What does ‘all’ mean? Well, all means all. But we did look at this in detail and decided to define it like this: We’re looking at utility systems being on a hierarchical level. We have a heating system; we have a cooling system; we have a sewerage system; we have a waste disposal process. Those are the major systems, and the components to support those systems are really the things we want to look at on the inventory level. So let’s look at that as well. We see that your components are things that have to support the system. So in a heating system, if my boiler dies, do I have a heating system? No, because a major component (the boiler) just died. But what about a steam trap up on 3 West? If that steam trap fails and steam blows through, does that compromise my heating system? No, it’s an energy issue, but my heating system still functions. So do you see the difference between operating components and system-level devices? That is up to you to decide what to include in the inventory, but for a minimum we want you to include the operating components so if they failed, you would lose the system. Hopefully that will ease the burden on what does inventory mean, and what level of depth you have to go.”

Mills commented that hospitals should not hesitate to use the CMS AEM program just because it is new and requires a lot of documentation.

“If you are compliant with what Joint Commission required five years ago, you’re 80% compliant already with the AEM program,” he said. “Really, what you need to be doing is document what you’ve been doing all these years and show us your process that the reliability of the equipment exists in the built environment.”

EP 3 of the standard talks about identifying high-risk operating components in a hospital’s inventory. Apparently there has been some confusion on the definition of “high risk,” so Mills addressed that concern.

“We used to use the term life support,” said Mills. “Life support was somewhat narrow focused, so we brought in high risk as the defining term. Let’s use for example an emergency generator. Is the generator itself life support? No, it is just an engine that generates electricity. Now, a lot of what that electricity powers in the building is probably life support. But the generator itself is not life support based on the definition of supporting life. But if that generator fails, is there a high risk to the patient? There’s an adverse outcome to the patients if that generator fails. So that high risk just broadened what we’re talking about. So certainly a generator is a high-risk component. When we look at the definition of high-risk devices, it may not be equipment that is life support, but if it fails, we are going to have problems with patient care delivery.”

Mills stated that for EP 4, The Joint Commission combined two EPs into one, addressing frequency and what strategies a hospital uses to conduct its preventative maintenance programs. He noted that EP 4 is where the accreditor introduced the concept of the AEM program.

“Joint Commission believes you certainly have the ability to do the AEM program,” said Mills. “We encourage you to do it. Collectively, ASHE, The Joint Commission, and a group called the Association for the Advancement of Medical Instrumentation (AAMI) met and worked out a process for an alternative equipment maintenance program. We approached CMS and we negotiated, and we educated, and we worked with them, and we got this program for you to use to reduce those ongoing costs that manufacturer recommends. We’ve done this for you; please do not turn a blind eye to this. Document what you’re doing and follow the examples here, and you should be more than satisfied with that.”

The EP 5 of the standard talks about some limits to the AEM program. If the state mandates certain requirements, a hospital cannot deviate from those mandates.

“There is also a caveat about new equipment,” Mills said. “If you have new equipment, how can you deviate from manufacturer’s recommendations? You have no history to go back to. But once you have the history, you can make modifications if it makes sense to do so. When we say new equipment, we’re not talking about replacement equipment. But if you’re installing one of those hyper plasma drives from Star Trek that will heat the building, who has experience with that? Neither do I, so that would be considered new equipment.”
EP 6 of the standard talks about a qualified individual who oversees the AEM program. Mills addressed the question of who’s qualified.

“Well, if your organization says you’re qualified to run the facilities, then you just met the requirements for qualifications,” he said.

EP 7 talks about segregating the equipment inventory based on the high-risk equipment in the AEM program. Mills stated hospitals need to be able to perform this segregation so they’ll know how to manage their equipment going forward.

So how will The Joint Commission be surveying the hospital’s level of compliance with the AEM program? “We’re going to be looking at your inventory first,” said Mills. “The inventory is really the fulcrum of a successful program. We will be looking at the accuracy of your inventory and what items are on it. We will be looking at your work order process and how you’re completing the work orders as per your schedule and are they on time.

And of course, we define time in the EC standards.”

Mills stated the surveyors will also be looking at the management program, policies, and procedures. They will look at how the hospital deals with things like miscalibration, how the hospital knows that the testing equipment will be reliable when needed, and whether the hospital is looking into equipment-related incidents.

“We want to make sure if you do have, God forbid, a problem with equipment in patient care delivery, that you’re drilling down to see if it was caused by a decision you made in the AEM program,” Mills said. “Or, was it just something that could have been avoided, or was it just one of those things that happened due to your aging infrastructure. So we do want to know if you have a process in that. We will also key in on high-risk components and make sure they are being managed appropriately because of the level of risk associated with those, and we’re going to talk with you about your various equipment strategies.”

Mills announced during his presentation that The Joint Commission has made changes to its survey process that will affect all hospital surveys.

“We made some changes with the process on how we will survey you with the life safety surveyors,” he said. “We’ve revised your survey agenda for how this will happen, and we’ve given you some tracking tools to help you get ready for survey. These are things the surveyors will ask for at the beginning of the survey. And we’ve put down a schedule for the life safety surveyors where they need to be, so they will stay on track with the priorities as they go through the survey. The goal for this change is to increase the thoroughness of our Life Safety Code® survey. The life safety surveyor’s primary goal is to assess compliance, so we wanted to set up a structure so when they come to your site, they can begin right away and start evaluating compliance pretty much from the get-go. So we Leaned out some things and tried to get them some extra time for that. We tried to do that by getting you better educated on what you need to have available for our surveyors at the beginning of survey. So when they come on-site, you can quickly gather the documents for review and make the process more efficient.”

Mills explained that there are some things the life safety surveyors are mandated to look at when they arrive on-site.

“On the first day of the survey when they arrive, they will ask for an escort right away to start the building tour,” he said. “They will start by reviewing your Statement of Conditions and signing off on any open Plans for Improvements (PFIs). They will also determine if you have any existing waivers or equivalencies on the books, and if you do, they will go through them as well. They will probably not go in with the overall survey team introduction meeting with the rest of the staff. We’re going to take that time and start surveying right away with the life safety surveyors. They’re quickly going to get to the operating rooms, probably by 10:30 in the morning on the first day. They’re going to check for pressure differentials, then they are going to go on and do the building tour for the rest of the time. So their primary focus is walking your building to assess your facility for life safety compliance.”

Mills explained that The Joint Commission has developed a new resource called “Life Safety and Environment of Care - Document List and Review Tool.” It identifies the documentation required by the hospital accreditation programs for life safety and selected EC standards. This tool is provided at no charge for use in the hospital’s continuous compliance and survey readiness efforts.

“I strongly encourage you to use this form,” said Mills. “It is free, and it is our hope that when you use that, it will speed up the survey time.”
The fire alarm system: What you need to know

Continuing our series on fire alarm systems, we look at the testing method requirements for occupant notification devices, supervising station transmission equipment, and interface equipment.

Initial and reacceptance testing of audible devices requires the use of a sound level meter to measure the sound pressure of the devices to ensure they meet the requirements for occupant notification. Audible occupant notification devices are not required to be measured with a sound level meter for routine and periodic testing, unless the area has been affected by building, system, or occupancy changes.

Visible notification devices must be tested in accordance with the manufacturer’s instructions, and the locations of each appliance must be verified and confirmed per the approved layout and floor plans. The candela rating of the appliance must be verified to agree with the rating identified on the approved layout and floor plans. Each visible appliance must be verified that it flashes.

A test must be performed on all system functions and features in accordance with the equipment manufacturer’s instructions. An initiating device must be activated, and a receipt of the correct signal must be received at the supervising station within 90 seconds.

Interface equipment consists of relays and control modules that connect the building fire alarm system to another system or feature of life safety. The connection is designed to either transmit a signal when the control panel is activated for another feature to operate, or it is designed for the control panel to receive a signal when another feature of life safety is activated. Interface equipment operations must be confirmed by either operating the other feature of life safety and confirming the appropriate signal is received at the fire alarm control panel, or by activating a signal at the control panel and confirming the other feature of life safety operates.

Testing frequencies

The frequency for testing the various components of the fire alarm system has mostly been the same for many years, but the way it is accomplished is up to the individual facility managers. Many healthcare organizations prefer to test all of the components that have an annual requirement at the same time; others prefer to stagger the periods when they are tested. For example, for a four-story facility, all of the smoke detectors, heat detectors, and pull stations may be tested on a per-floor basis—one floor each quarter. While the NFPA 72 does not specify whether or not you have to test all of the annual devices at the same time, there is a serious concern of meeting the intended frequency. NFPA 72 says a device that is required to be tested annually cannot be tested in January in year one, and then next in December of year two, because that is 23 months between tests and does not meet the intent of annual.

The accreditation organizations have taken this issue even further. They say when an item is required to be tested or inspected annually (or every 12 months), then that means the test of inspection must be accomplished 12 months from the previous test, plus or minus 30 days. That allows for a 60-day window of opportunity which should be sufficient time to make this test or inspection happen.

When the testing periods are scattered (i.e., on a quarterly basis) it may cause an issue whether or not the annual items actually meet their window of opportunity. On the other hand, there are quarterly requirements for testing and inspection, and having the service contractor come back on a quarterly basis can be beneficial to the healthcare organization. However, the window of opportunity for quarterly testing and inspection activities is even less: three months from the previous test/inspection, plus or minus 10 days.

It is a given that all components of the fire alarm system are required to be tested upon initial installation, or for a replacement of a particular device. If during a periodic routine testing of the system a pull station is found to be defective, the pull station is required to be repaired or replaced, and then tested to confirm proper operation. One never wants to assume the device will function properly after a repair, or even with a new replacement part directly out of the box. A test to confirm its operation is required.

The actual control equipment (i.e., fire alarm control panel, Notification Appliance Panels or NAC panels, remote annunciators, etc.) must be tested to ensure that
the function of alarms, troubles, and supervisory signals are received and transmitted. Further, items such as lamps, fuses, interfaced equipment, LEDs, transponders, and the primary power supply must be verified on an annual basis.

The NFPA 72 actually requires the facility to test the engine-driven generator that serves as secondary power to the fire alarm system on a monthly basis. NFPA 99 already requires generators to be tested monthly, so NFPA 72 is just echoing this requirement.

Most fire alarm control panels have sealed lead-acid type batteries. The batteries have three unique tests that must be accomplished:
- Charger test on an annual basis
- 30-minute discharge test on an annual basis
- Load voltage test on a semiannual basis

It is not uncommon for the load voltage test to be overlooked and not performed on a semiannual basis. NFPA 72 says batteries need to be replaced within five years of manufacture, or more frequently as needed. Don’t forget the batteries in the remote annunciators or the NAC panels; they must adhere to the same frequency for testing.

For initiating devices, the following requirements apply:
- Duct detectors, smoke detectors, heat detectors, and pull stations are all required to be tested annually.
- Sprinkler valve tamper switches and waterflow switches are required to be tested semiannually.
- Supervisory signal devices that are not sprinkler valve tamper switches (i.e., switches that monitor pressure, temperature, water level, and other suppression supervisory initiating devices) are to be tested quarterly.
- Smoke detector sensitivity calibration testing is required to be tested one year after installation, then alternating years thereafter. If after the second required sensitivity calibration test the device has remained within its listed and marked sensitivity range, the length of time between calibration tests is permitted to be extended to a maximum of five years.

The interface relays and modules that are used to communicate between the fire alarm control panel and other systems and devices are required to be tested annually by ensuring the activation of the other systems and devices. For example, if the interface relay is to a magnetic hold-open device on a fire-rated door, then the test must ensure that the magnet not only releases door upon activation of an alarm, but the door must also close and latch. Interface relays serve the following typical functions in a common healthcare facility:
- Magnetic hold-open devices for doors
- Air-handler shutdown
- Kitchen hood suppression system
- Elevator recall
- Magnetic locks
- Electric door strikes
- Fire pump
- Smoke dampers
- CO2/clean agent suppression system
- Sprinkler dry-pipe/pre-action systems
- Overhead rolling fire doors

Audible and visible notification appliances must be tested annually. Oftentimes, the testing vendor will provide a check-box to indicate that all of the devices were tested without providing a list of the individual locations. Most authorities having jurisdiction now require an itemized list of the occupant notification appliances, identifying their location and whether or not it passed its test.

Records
A set of reproducible as-built installation drawings, including operation and maintenance manuals, and a written sequence of operation must be provided to the building owner’s representative. A copy of the site-specific software is also required in order to restore system operation in the event of a catastrophic system failure. Without the backup of the system software, restoration of the system could be substantially delayed. These records must be maintained for the life of the system.

The purpose of the as-built installation drawings and operation and maintenance manuals is to provide the technician with valuable assistance in promptly diagnosing and repairing system faults. The owner’s representative is responsible to ensure these records are maintained on-site for the fire alarm system.

Next month we will complete our look at fire alarm systems by exploring the changes required with the test reports.
Internal inspection, obstruction investigation, and impairments of sprinkler systems

Prior editions of NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, did not require internal inspections of sprinkler piping, but the 2011 edition, which is referenced by the 2012 *Life Safety Code®* (LSC), does. This may be the most significant change for facility managers to understand and implement in their sprinkler maintenance program.

The interior of sprinkler piping can accumulate pipe scale and corrosion that, if left unchecked, can contribute to the failure of the system to operate as designed. Periodic internal inspections of the piping system are intended to identify this problem so corrective action may be taken. NFPA 25, 2011 edition, has divided this section of the standard into three distinctly different requirements:

1. Internal inspection (required once every five years)
2. Obstruction investigation (required only when certain conditions exist)
3. Ice obstruction inspection (required annually on dry pipe systems serving freezers)

The internal inspection applies to all types of sprinkler systems: wet, dry, preaction, and deluge. It was added to current requirements in an attempt to prevent the destruction of piping systems by microbiological influenced corrosion (MIC). To be sure, this is an inspection, not a complete obstruction investigation. The internal inspection is intended to reveal the presence of MIC, zebra mussels, and inorganic material, such as rust and scale or material that may have been left in the pipe during installation. The internal inspection is only required to be performed in two locations, and may be combined with other five-year inspection activities where the water is drained from the system. As an alternative, x-ray, ultrasound, and remote video systems may be used in lieu of impairing the sprinkler system to conduct a visual examination. If slime is found during the internal inspection, then the system must be checked for the presence of microbes affiliated with the development of MIC. Test kits are available to perform this check in the field, or the slime may be sent to a laboratory. If the presence of MIC is confirmed, then special flushing and treatment activities are required. According to NFPA 25, if sufficient presence of foreign material is found during the internal inspection, then the more rigorous and costly obstruction investigation is required. NFPA does not define the term “sufficient,” but it does say in its handbook on NFPA 25 that “… small amounts of scale or soft sediment are often found within a sprinkler system. The presence of such scale should not necessarily trigger an obstruction investigation.”

Non-metallic pipe used in sprinkler systems is exempt from the internal inspection requirement, since corrosion is associated with metal pipe. In dry pipe and preaction systems, scale and corrosion typically accumulate at the far end of the branch that does not contain an inspector’s test valve. Removal of a sprinkler at the far end of a branch line after a trip test may reveal any corrosion and slime. The internal inspection of piping is not required where the pipe is not readily available. Inspections of cross-mains are not required where there is no means of inspection.

Obstruction investigations are not the same as internal inspections, and have a completely different function. Obstruction investigations do not have a specific frequency to be performed. Instead, they are required when certain events or circumstances occur within the system itself, or within the water supply infrastructure.

According to NFPA 25, an obstruction investigation must be conducted on the sprinkler system whenever any of the following conditions exist:

1. Defective intake for fire pumps taking suction from open bodies of water
2. The discharge of obstructive material during routine water tests
3. Foreign materials in fire pumps, in dry pipe valves, or in check valves
4. Foreign material in water during drain tests of plugging of inspector’s test connections
5. Plugged sprinklers
6. Plugged piping in sprinkler systems dismantled during building alterations
7. Failure to flush yard piping or surrounding public mains following new installations or repairs
8. A record of broken public mains in the vicinity
9. Abnormally frequent false tripping of a dry pipe valve
10. A system that is returned to service after an extended shutdown (greater than one year)
11. Reason to believe that the sprinkler system contains sodium silicate or highly corrosive fluxes in copper systems
12. A system has been supplied with raw water via the fire department connection
13. Pinhole leaks
14. A 50% increase in the time it takes water to travel to the inspector’s test connection from the time the valve trips during a full flow trip test of a dry pipe sprinkler system when compared to the original system acceptance test

Take a look at item #8 above: “A record of broken public mains in the vicinity.” What does the word “vicinity” mean? A few blocks? A mile? Anywhere in the municipal supply system? This is undefined, and when an NFPA code or standard does not provide a definition for a word or phrase, it is up to the authority having jurisdiction (AHJ) to decide what it means. If you have any doubts concerning a public main in your area, contact your state or local AHJ on fire safety and ask whether you need to perform an obstruction investigation.

Once an obstruction investigation is completed and evidence of foreign material is found, it is the intent of NFPA 25 for the foreign material to be removed, and another obstruction investigation will not have to be performed until one of the 14 indicators presents themselves again. However, for those situations where the foreign material cannot be completely removed, such as zebra mussels, then another obstruction investigation is due in five years.

Dry pipe or preaction sprinkler system piping that protects or passes through freezers or cold storage rooms is required to be internally inspected annually for ice obstructions at the point where the piping enters the refrigerated area. The purpose of the annual inspection is to ensure the piping is not obstructed with ice and the fittings are not fractured due to ice buildup. Alternative nondestructive methods of examination are permitted, such as ultrasound, x-ray, and remote video camera.

An impairment is the shutdown of a portion of the sprinkler system or the entire system itself. The response to an impairment is the same whether the impairment was planned or unplanned. Having a well-written impairment program allows for the managing of a deficiency in such a way that the system will be quickly restored to service.

An impairment coordinator must be assigned by the owner or the owner’s representative. This is usually a member of the building’s maintenance department, or perhaps a safety coordinator, but it must be someone who is on-site and familiar with the layout of the building. The impairment coordinator is granted the authority to notify fire departments, insurance carriers, alarm companies, property owners, property supervisors, and tenants of the system impairment. Prior to removing a system from service, the impairment coordinator should ensure that the necessary tools, equipment, and replacement parts are on hand to minimize the duration of the impairment. This typically involves collaborating with the contractor or service provider who is scheduled to perform the work that necessitates the shutdown of the system.

A tag must be used to alert building occupants and any responding firefighters that a system, or a part thereof, has been removed from service. The tag must be posted at each fire department connection and the system control valves, indicating which system or system parts have been removed from service. An impairment tag that is only mounted on the system riser could go unnoticed by firefighters.

The impairment coordinator must be consulted before any planned impairment is carried out on the sprinkler system. The coordinator is responsible for verifying the following procedures have been implemented:
1. The extent and expected duration of the impairment has been determined
2. The areas or buildings involved have been inspected and the increased risk to the occupants has been determined
3. Recommendations have been submitted to management or the property owner’s representative
4. Where a required sprinkler system is out of service for more than 10 hours in a 24-hour period, the impairment coordinator must arrange for one of the following:
– Evacuation of the building or the portion of the building that is affected by the system out of service
– An approved fire watch
– Establishment of a temporary water supply
– Establishment and implementation of an approved program to eliminate potential ignition sources and limit the amount of fuel available to a fire

5. The fire department has been notified
6. The insurance carrier, alarm company, property owner and other AHJs have been notified
7. The supervisors in the affected areas have been notified
8. A tag impairment system has been implemented
9. All necessary tools and materials have been assembled on the impairment site

It’s important to note in item #4 above that the “10 hours in a 24-hour period” phrase has been seriously challenged by CMS. In its proposed rule to adopt the 2012 LSC, issued in April 2014, CMS stated it will not allow the 10-hour feature and will stay with the four hours in a 24-hour period that previous editions of NFPA 25 required. Although many organizations have issued public comments decrying this proposal, CMS has not issued a final rule on the subject, and it is unclear what outcome will prevail.

The actions required by the impairment coordinator concerning a planned impairment are similar to those required by the LSC for alternative life safety measures (ALSM), or interim life safety measures, as they are sometimes called. The major difference between the two is that an impairment program needs to be documented in writing prior to the event regarding the specific actions required for a planned impairment, while an ALSM is an assessment done after an impairment has occurred to determine what additional measures should be implemented. An ALSM may not be required if the impairment can be resolved the same day it is created, while an impairment program is required to be implemented up front, prior to the impairment itself.

Also in regard to item #4, a fire watch is defined differently by various AHJs. CMS has issued memos to state survey agencies requiring fire watches that are continuous, from the start of the impairment until the end of the impairment, and conducted by dedicated individuals who perform no other function. This means if the person conducting the fire watch in a select area is able to walk the area in 10 minutes, then that person has to start the fire watch walk-through all over again, without taking any break. If the person needs to take a break, then another qualified individual needs to take that person’s place. Not all AHJs agree with this strict interpretation of a fire watch. It would be advisable for every organization to determine what their AHJs require for fire watches and follow the most restrictive interpretation.

When all impaired equipment is restored to normal service, the impairment coordinator must verify that the following procedures have been implemented:

1. Any necessary tests and inspections have been performed to verify the affected systems are operational. The most common tests required would be a hydrostatic pressure test to verify the piping will not leak and a main drain test to verify that all of the control valves have been returned to their full open positions.
2. Supervisors have been advised that protection has been restored.
3. The fire department has been advised that protection has been restored.
4. The property owner, insurance carrier, alarm company, and other AHJs have been advised that protection has been restored.
5. The impairment tags have been removed.

Emergency impairments are often the result of a system discharge, a leak, a water supply interruption, frozen or ruptured piping, or equipment failure. In the event of a successful operation of the sprinkler system during a fire, the system will have to be shut off and the activated sprinkler heads will have to be replaced. This emphasizes the importance of having the requisite replacement heads and tools on-site.

At the conclusion of an impairment, all impairment tags must be removed and accounted for. The collection of these tags can serve as verification that all system control valves have been returned to their normal operating position, signifying the system is now fully operational.


Smoke detectors in existing facilities

Q Are existing healthcare occupancies required to have smoke detectors if they are fully sprinklered?

A Yes, smoke detectors are required in certain areas of healthcare occupancies, but they are not dependent upon whether the facility is sprinklered. But what type of healthcare occupancy are you referring to? A hospital? A nursing home? There are slightly different requirements for smoke detectors depending on the use of the healthcare occupancy. For example, a hospital is not required to have smoke detectors in the corridors or patient sleeping rooms, but according to the 2000 edition of the Life Safety Code® (LSC), a hospital is required to have smoke detectors in the following areas:

• Within five feet of a door held open by a magnet, or protection with smoke detectors for the entire area served by the door
• In areas open to the corridor that are not directly supervised
• In elevator lobbies, mechanical rooms, and shafts where the elevator travels more than 25 feet in any direction above or below the level best served by the responding firefighters
• In the room where a fire alarm panel (including an NAC panel) is located, if the room is not continuously occupied
• Any other area where smoke detectors are installed to satisfy a local or state requirement, or an equivalency approved by an authority

In addition to the above, a nursing home is required to have smoke detection in the corridors.

Business occupancy testing

Q What are the testing requirements for a two-story medical office building with a fire alarm system and sprinkler system? I believe we are required to have an annual fire drill, but what about the testing of fire alarm system and sprinkler system?

A Assuming the two-story office building that you refer to is classified as a business occupancy, the requirements for testing, inspection, and maintenance are found in section 39.3.4.1 of the 2000 LSC, which refers to section 9.6. Section 9.6.1.4 requires the fire alarm system to be tested, inspected, and maintained in accordance with NFPA 72 (1999 edition). Likewise, section 9.7.5 mandates required sprinkler systems to be maintained in accordance with NFPA 25 (1998 edition). If your sprinkler system is not a “required” system, you still need to maintain it, according to 4.6.12.2. The testing, inspection, and maintenance requirements found in NFPA 72 and NFPA 25 are the very same requirements that healthcare occupancies need to comply with. The bottom line: You need to test, inspect, and maintain the fire alarm system and the sprinkler system in a business occupancy at the very same frequency and level as you would in a hospital.

Controlled access locks

Q While conducting fire drills in the hospital, one of the questions on our drill evaluation sheet is, “Did the security doors in the fire zone release properly?” We have controlled areas where the doors are locked to control access into the unit. To exit the unit only requires the push of a button and the doors

---

Editor’s note: Each month, Senior Editor Brad Keyes, CHSP, owner of Keyes Life Safety Compliance, answers your questions about life safety compliance. Our editorial advisory board also reviews the Q&A column. Follow Keyes’ blog on life safety at www.keyeslifesafety.com for up to date information.
release. So are we in compliance with this controlled access not releasing during the fire alarm activation since the exit is not controlled? Or should the doors release to allow free entry and exits?

A Doors in the path of egress in a healthcare occupancy are not permitted to be locked. However, there are three exceptions to this requirement:

- Delayed egress locks complying with section 72.1.6.1, 2000 LSC
- Access control locks complying with section 72.1.6.2
- Clinical needs locks complying with section 19.2.2.2.4

By the sound of your situation, it seems to me that you do not have delayed egress locks and you do not have clinical needs locks, which leaves access control locks. However, it also appears that your description of the security door locks may not be in compliance with section 72.1.6.2. Here is a summary of the requirements for access control locks:

1. A motion sensor must be mounted on the egress side to detect occupants approaching the door and automatically unlock the door in the direction of egress.
2. A loss of power to the control system must automatically unlock the door in the direction of egress.
3. A manual release button must be mounted 40 to 48 inches above the floor, and within five feet of the door, that when operated will directly interrupt the power to the lock, independent of the control system, for a minimum of 30 seconds. The button must be labeled with the words “PUSH TO EXIT.”
4. The door must unlock in the direction of egress upon activation of the building fire alarm system or the building sprinkler system.

So, it seems to me that you are missing the motion sensor on the egress side of the door that would automatically unlock the door when someone approaches. Also, it sounds like your locks are not interconnected to the building fire alarm system to automatically unlock on an alarm. According to section 72.1.6.2, these are required. Also, check the “PUSH TO EXIT” button to make sure it interrupts power to the locks for a minimum of 30 seconds when depressed.

Fire damper installation

Q Do you need a fire smoke damper at floor level in an open duct shaft? Or where the duct comes out through the shaft wall?

A Section 19.75.1 of the 2000 edition of the LSC requires compliance with section 9.2. Section 9.2.1 requires compliance with NFPA 90A, Installation of Air Conditioning and Ventilation Systems, 1999 edition. If you have a copy of that standard, take a look at Figure A-3-3 in the appendix of the book—there is a nifty diagram that points out all of the possible locations where fire and smoke dampers would be required. But, to directly answer your questions, section 3-3.2 of NFPA 90A requires a fire damper at the floor level of any HVAC duct that penetrates a fire-rated floor if the duct is not enclosed within a fire-rated shaft. But section 3-3.4.1 says an air duct that passes through floors of buildings that require the protection of a vertical opening (such as a hospital would) must be enclosed with walls with one-hour fire resistance rating if the shaft penetrates three or fewer stories, and two-hour fire resistance rating if the shaft penetrates four or more stories. The exception to 3-3.4.1 says you do not need a fire-rated shaft if the air duct passes through only one floor, or if the air duct passes through only one floor and an air-handling equipment penthouse floor, whereby the air duct would require a fire damper where the duct penetrates the floor.

In reply to your second question, according to section 3-3.4.4, fire dampers are required in any opening into or out of a shaft required in 3-3.4.1, regardless of whether the shaft opening contains an air duct or is ductless. A fire damper is required, even if the shaft is only one-hour fire rated. So, in conclusion, you do need fire dampers if the duct is not enclosed in a fire-rated shaft and penetrates one floor (but only one floor), and you do need fire dampers where the duct exits a rated shaft.
Quick tip

Summary of top EC/LS findings from Joint Commission surveys in 2014

The Joint Commission recently announced the top 10 Environment of Care (EC) and Life Safety (LS) findings made by surveyors during 2014. The following chart lists the top findings related to the Environment of Care or the Life Safety chapters during hospital surveys in both 2014 and in previous years. The changes in the rankings and the addition of standards to the list reflect an adjustment in the importance of the standards in the eyes of surveyors over the past few years. Changes on the list during that time frame are a result of a sharper focus on surgery site fires; medical gas labeling; generator testing; ventilation, temperature, humidity, and air pressure relationships; and noncompliant storage near sprinklers.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EC.02.06.01</td>
<td>56%</td>
<td>39%</td>
<td>35%</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>A safe, functional environment is established and maintained.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC.02.05.01</td>
<td>53%</td>
<td>47%</td>
<td>34%</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>The risks associated with the utility systems are managed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LS.02.01.20</td>
<td>50%</td>
<td>52%</td>
<td>51%</td>
<td>57%</td>
<td>51%</td>
<td>46%</td>
</tr>
<tr>
<td>The integrity of the means of egress is maintained.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC.02.03.05</td>
<td>48%</td>
<td>45%</td>
<td>40%</td>
<td>42%</td>
<td>42%</td>
<td>38%</td>
</tr>
<tr>
<td>Fire safety equipment and features in the building are maintained.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LS.02.01.10</td>
<td>46%</td>
<td>48%</td>
<td>46%</td>
<td>57%</td>
<td>49%</td>
<td>48%</td>
</tr>
<tr>
<td>Features of fire protection are maintained to minimize the effects of fire, smoke, and heat.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LS.02.01.30</td>
<td>43%</td>
<td>45%</td>
<td>39%</td>
<td>47%</td>
<td>40%</td>
<td>37%</td>
</tr>
<tr>
<td>Building features are maintained to protect occupants from smoke and fire.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LS.02.01.35</td>
<td>43%</td>
<td>36%</td>
<td>34%</td>
<td>33%</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Fire extinguishing systems are maintained.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC.02.02.01</td>
<td>36%</td>
<td>34%</td>
<td>30%</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Risks related to hazardous materials and waste are managed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC.02.05.09</td>
<td>27%</td>
<td>21%</td>
<td>23%</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Medical gas systems are tested, inspected, and maintained.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC.02.05.07</td>
<td>21%</td>
<td>23%</td>
<td>22%</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Emergency power systems are tested, inspected, and maintained.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>