TSIG NEWS

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DEFEND IN PLACE- Health Care's Fundamental Fire Safety Strategy

By Wayne A Kestler, CHFM, CJCP, CEM

In most commercial, education, and public buildings, the prescribed procedure for fire emergencies is to evacuate the facility. This is also true for ambulatory facilities classified as business occupancies. However, a health care occupancy operates very differently. Patients in most health care occupancy settings are NOT ambulatory and cannot easily move or be transported. In the event of fire, the fundamental strategy is to "defend in place"— that is to isolate patients and staff from fire and smoke while emergency personnel respond to the fire condition.

To enable caregivers to defend in place, health care facilities must be designed, built, and maintained with specific features of fire protection. These features are specified in NFPA 101, the *Life Safety Code* ® (*LSC*). Currently CMS and all other health care accrediting agencies require accredited organizations to comply with the 2000 edition of the *LSC*.

The "unit concept" is the best way to illustrate how building features support the defend-in place approach. The primary objective in any fire safety emergency is to contain fire and smoke in the smallest unit possible. By doing so, caregivers can avoid or delay an evacuation and, if necessary, move patients to a place of refuge while an actual evacuation might be taking place. According to the unit concept, a health care facility contains five units of defense:

1. The room
2. The smoke/fire compartment
3. The floor assembly
4. The building
5. The exit enclosure

LSC requirements protect the integrity of each type of unit.

Unit #1: The Room - First Unit of Defense

The patient room is the first and the smallest unit of defense in a health care facility. Ideally, patients won't need to move from their rooms during a fire. To protect rooms and other use areas, the *LSC* requires corridor walls to be smoke resistant and (if the smoke compartment is not sprinkled throughout) capable of resisting fire for 30 minutes. In addition, several requirements address corridor

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doors, door closures, windows, and other openings. Other *LSC* room-unit safeguards address waiting rooms, the maximum size of room suites, and the protection of hazardous areas. The ability to effectively defend in place at the room unit level depends on whether the area is protected by an approved automatic sprinkler system. If the area is sprinkled, the room unit can be a very effective unit of defense. However, patient rooms and other use areas are not required to be separated between the rooms by smoke and fire barriers, <u>so if an area is not sprinkled, individual rooms really do not provide much effective protection</u>. Nevertheless, because of *LSC* corridor requirements, patient rooms offer some lessor level of protection from fires in corridor areas. Finally, patients can seek refuge from a room-based fire by moving to a corridor.

<u>Unit # 2: The Compartment - Enables Horizontal Evacuation</u>

Dividing floors into separate compartments creates the opportunity to evacuate to a place of refuge on the same building level. If a fire condition renders one section of a floor hazardous, patients and staff can retreat to another section of the same floor that is protected by smoke and/or fire barriers.

The *LSC* requires any story with sleeping rooms for more than 30 patients to be divided into at least two smoke compartments. The maximum area of a smoke compartment is 22,500 square feet, and the maximum allowed travel distance from any point on the floor to a smoke compartment door is 200 feet in a sprinkled building and 150 feet in a non-sprinkled building. In new construction, more smoke barriers are required, and they still must be maintained in existing buildings when additional barriers exist.

Several *LSC* requirements address barrier and barrier door design. In general, smoke barriers must be rated to resist fire for 30 minutes, and doors should be smoke resistant and self-closing or automatic closing. There should be no unprotected openings in the barriers that form the smoke compartment. For example, air duct penetrations in a non-sprinkled compartment, generally must be fitted with smoke dampers activated by a local smoke detector.

<u>Unit # 3: The Floor Assembly – Provides Additional Containment</u>

Fire-resistance standards for floor slabs vary, depending on the construction type and the height of the health care occupancy. Generally, the taller the building, the more fire resistant the floor assembly needs to be.

To maintain the integrity of the floor assembly unit, all vertical penetrations must be protected. Furthermore, the *LSC* requires the following openings to be enclosed with construction that can resist fire for at least 1 hour:

- Stair enclosures, communicating or exit. (Note: In buildings with four or more stories, exit stairs must be fire-rated for 2-hours FRRA)
- Elevator shafts
- Ventilation shafts
- Light shafts
- Trash and Laundry chutes
- Utility chases

The *LSC* also specifies that waste and laundry chutes should have self-closing, positive-latching doors that are fire protection rated. Fire sprinklers should be positioned above the top and bottom openings of the chutes and above openings at alternate floors. Chute-fed collection rooms must be separated from corridors by at least a 1- hour fire-resistant barrier. Also, trash collection rooms should be used for no purpose other than collecting trash.

All utility penetrations must be properly sealed with fire-resistant material matching the required rating of the floor. (Examples include penetrations for pipes, conduits, bus ducts, cables, wires, air ducts, and pneumatic tubes).

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Unit # 4: The Building & Overall Integrity

The *LSC* requires that a building as a whole be able to withstand the effects of fire for a sufficient amount of time to enable care givers to defend in place. Key elements of building integrity are exterior bearing walls, the structural frame, the floor construction, and the roof construction.

Also, health care buildings must use an allowable type of construction, and comply with height limits for each construction type. Construction type and height also determine whether a complete sprinkler system (throughout) is required for existing health care facilities.

Business and health care occupancies within the same building must be separated by a 2-hour FRRA barrier or meet the more stringent requirements of a mixed occupancy. This helps protect the integrity of the health care building unit. The same requirement applies to common walls shared by two buildings.

Unit # 5: The Exits – The Last Unit of Defense

Like goalies in hockey or soccer, exits provide the last unit of defense with respect to fire conditions, and occupant safety.

LSC-compliant exits enable patients and staff to seek refuge in uninterrupted sequential units within the building and, ultimately, outside the building to the public way. Properly functioning exits also help contain smoke and fire in the areas of the building that have already been evacuated.

It's worth noting the exits are highly effective as a unit of defense. Consider that while nearly 3,000 fatalities occurred during the attack on the World Trade Center on 9/11/2001, tens of thousands of occupants escaped the tragic episode safely via exits. Only a handful escaped via elevators. Elevators should never be used by caregivers as an area of refuge or means of exiting unless under the direct supervision of emergency responders.

Permitted exit types include the following:

- Doors that open directly outside
- Properly enclosed stairs
- Smoke-proof towers
- Outside stairways
- Horizontal exits
- Ramps (Class A or B)
- Exit passageways

To meet compliance with the *LSC*, an effective "*means of egress*" must be established and maintained. The *LSC* defines the means of egress as "a continuous and unobstructed way of travel from any point in a building or structure to a public way consisting of three separate and distinct parts: (1) the exit access, (2) the exit, and (3) the exit discharge".

All exits, including exit passageways, must be separated from the rest of the building by construction having a fire resistance rating appropriate for the height of the building. The exit discharge should be carefully examined because it is an area often overlooked by health care organizations. (Look for and ensure effective lighting and clear unobstructed access to the public way).

The *LSC* requires patient sleeping rooms or suites of patient sleeping rooms greater than 1,000 square feet to be provided with at least two exit access doors that are remote from each other. The same applies to other rooms or non-sleeping suites greater than 2,500 square feet. The travel distance from any point in a patient sleeping room to an exit access can be no more than 50 feet, unless it is within a suite. In that case 100 feet is permitted.

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Epilogue: People Factors

While building design and construction that conforms to *LSC* standards are central to defending in place, the people factor is equally important. Health care organizations need to develop practices and processes for preserving the integrity of fire and smoke barriers as well as the means of egress. Organizations need to create processes for ensuring that corridor, smoke and fire doors are closed whenever the fire alarm system is activated, and also ensure that no other emergency procedures are delayed. This is the reason why the majority of health care organizations have adopted and trained staff to respond to fire emergencies using the acronym *R.A.C.E.*

R = **R**escue;
A = **A**ctivate the Alarm;
C = **C**onfine the fire (close doors)
E = **E**xtinguish or Evacuate

I'd also encourage organizations to not only plan for, but also to exercise procedures for moving patients to different units of refuge during fire drills. Contingency plans are best exercised by going through them one step at a time. Such exercises can be accomplished without using or substantially disturbing real live patients. The most important thing to remember is that during an actual fire emergency, caregivers do not want to encounter things that make the evacuation process more demanding or problematic.

Another important people factor in life safety is barrier maintenance. When fire/smoke barriers are not maintained properly, caregivers cannot count on being able to defend in place. Health care organizations should routinely assess the buildings to make sure all door hardware and barrier systems are functioning properly.

Unsealed penetrations may be the greatest challenge of all to maintaining the integrity of smoke and fire barriers. When not sealed with appropriate FRR material, penetrations represent a breach in the barrier, making the fundamental strategy of defending in place far less reliable and effective.
Effective inspection programs, use of above-the-ceiling permits, and strong management of internal staff as well as outside contractors is crucial to maintaining fire/smoke barriers.

If you have any questions or need further guidance regarding developing sound fire response plans please contact TSIG Consulting Inc. at (212) 420-8724

From Our CEO

We wish to announce our new National Account Executive

Steven Dooley, National Account Executive

Mr. Dooley brings a broad range of industry experience within the healthcare technology and professional services segment, including SaaS based CMMS solutions, CAFM, and RFID systems. TSIG clients greatly benefit from his unique mix of Sales Engineering and National Account experience to best formulate ongoing compliance management strategies. Steven leads the National Account efforts for the TSIGWorks Drawing Management Solution and related compliance consulting engagements. He most recently served as National Director of Sales and Operations for SiteFM, an Austin Texas based CMMS solution provider. Previous to SiteFM, Steven held several positions as regional business development for various CMMS and CAFM based solution providers.

Steve can be reached at DooleyS@tsigconsulting.com or 512-592-2659

Minimizing Pathogenic Biological Agents in Water Systems

By Don Metcalfe, CIH, CHFM

Along with all living things people need water to live. Unfortunately, some of the organisms sharing the water with us can be harmful. For patients, especially those with compromised immune systems, exposure to opportunistic waterborne pathogens can result in serious life threatening complications. There are a variety of organisms that have been associated with hospital acquired infections (HAIs) due to exposure to contaminated water. Legionella is probably the most notorious microbe, but other less publicized bacteria and fungi have been involved as well.

Waterborne pathogens have some interesting characteristics that allow them to survive under the conditions present in building water systems, even when we are trying to get rid of them. These organisms tend to be able to grow in low oxygen and low organic carbon environments. Some microbes are able to enter an inactive state that allows them to wait out conditions that would otherwise kill them such as the application of disinfectants or environmental changes. The “slime” that forms on the inside surface of pipes and fixtures is actually a defensive structure (biofilm) created by bacteria to anchor them to the surface and insulate them from direct contact with the environment while still allowing them to multiply.

Exposure to waterborne pathogens can occur in a variety of ways. Direct contact and/or inhalation of aerosols can occur during bathing or from exposure to water droplets from cooling towers or decorative water features. Indirect contact can occur from the use of equipment that has been rinsed with contaminated water. Exposure through ingestion or aspiration of contaminated water, including ice, is also possible.

Potentially pathogenic organisms are naturally occurring and will always be present in water systems so it is important to develop a program to reduce the risk of amplification and exposure as much as possible. The challenge is to overcome the organism’s natural defenses and survival tactics without creating conditions that damage the systems or injure people. For an infection to occur the pathogen must be present in a reservoir, leave its reservoir, and be transmitted to a susceptible host. A program for prevention and control of HAIs caused by waterborne pathogens should address all points of this process. The recently published ANSI/ASHRAE Standard 188-2015, ‘Legionellosis: Risk Management for Building Water Systems’ & ASHRAE Guideline 12-2000, ‘Minimizing the Risk of Legionellosis Associated with Building Water Systems’ give guidance for establishing a proactive program to reduce the risk of Legionellosis specifically, but the principles presented would be applicable to other potentially pathogenic waterborne organisms as well.

A good program should be developed and supported by a multidisciplinary team to ensure that both clinical and engineering aspects of the risk are adequately addressed. The facility water systems should be evaluated to determine potential locations for amplification and transmission of potentially pathogenic microbes. Areas of high vulnerability should be identified based on the population and specific features of the water system. Potable water systems, ice machines, shower heads and hoses, aerators, cooling towers and evaporative condensers, whirlpool spas, infrequently used equipment including eyewash stations and showers, ornamental fountains and other water features, and aerosol-generating misters, atomizers, air washers, humidifiers, other equipment identified by the program team should all be included in the program. Control measures should be established which may include temperature monitoring, chemical treatment or disinfection, temperature variation, periodic cleaning, and microbial sampling. Corrective actions should be established to respond to deficiencies detected by monitoring or when an HAI is detected that could be associated with waterborne pathogens. A system should be established to ensure that all elements of the program are functional. The program should also address water supply interruptions including repairs or proposed changes and additions to the water systems.

Various studies indicate that the number of HAIs associated, or potentially associated with, waterborne pathogens are significant. Establishing a thorough, proactive program to minimize pathogenic biological agents in water systems is a great tool to reduce the number of HAIs and improve patient outcomes.

CALCULATING OCCUPANT LOADS

By Lori Dinney, MS CHSP PE

When performing life safety surveys, one of the many determinations surveyors have to make is whether the calculated exit capacity (the total exit width) can accommodate the calculated occupant load. As another article in this newsletter addresses calculating exit capacities, this article will address calculating occupant loads.

The occupant load for each floor must be calculated based on the occupancy and the area of that occupancy. Since calculating occupant loads is more restrictive than using the actual number of occupants, this is the method that is used. Once the occupancy is determined, an occupant load factor is chosen from Table 7.3.1.2 in NFPA 101, 2000 edition. There are many occupant load factors in this table, but the most common factors in health care occupancies are as follows:

USE	OCCUPANT LOAD FACTOR (FT^2/PERSON)
Inpatient sleeping departments	**120**
Inpatient treatment departments	**240**
Business use	**100**
Assembly use (without fixed seating)	**15**

As an example, the 10th Floor of a hospital contains patient sleeping and is measured at 12,000 sq. ft. What is the calculated occupant load? Obviously, the entire floor does not consist of patient sleeping since there will be offices, storage rooms, and waiting areas. Does this mean each area has to be calculated separately to determine the total calculated occupant load for the floor? The answer is no. The occupant load factor of 120 ft^2/person for inpatient sleeping areas takes all these extraneous areas into account. Therefore, the answer is: 12,000 sq. ft. / 120 ft^2/person = **100 people** As another example, the 1st Floor of the West Wing contains a kitchen with a dining area located adjacent to it. The kitchen area measures 3,000 sq. ft., and the dining area measures 900 sq. ft. What is the calculated occupant load? In this case, since the areas are not extraneous to each other, the loads would have to be determined separately and added together.

For the kitchen (classified as a business occupancy):
3,000 sq. ft. / 100 ft^2/person = **30 people**

For the dining area:

900 sq. ft. / 15 ft^2/person = **60 people**

Total occupant load for the floor = 30 + 60 = **90 people**

As a final example, the 1st Floor of the East Wing contains the radiology department for inpatients. The wing measures 3,000 sq. ft. What is the calculated occupant load?

3,000 sq. ft. / 240 ft^2/person = **12.5 people**

Should the number be rounded up or down? When working with the codes, the most restrictive requirements always apply. For calculating occupant loads, that means the number should always be rounded up, so for this example, the answer is: **13 people**

If the calculated occupant load is 12.01, the answer is still 13.In summation, it is extremely important that the calculated exit capacity is capable of accommodating the calculated occupant load as this could lead to a dangerous situation in the event of an emergency.

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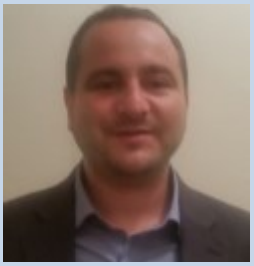

CALCULATING EGRESS CAPACITY

By Jeremy Maltz

Commuters all over the world travel to work during the stressful hours of the morning rush. Many of us sit in traffic on a jam packed freeway each morning while millions of others are squashed together like sardines on a crowded subway. When the train pulls into the station and passengers are running frantic in hopes of catching their connecting train across the platform, it makes you wonder what would happen if this was a real emergency! Are the means of egress capable of bringing all of the people to safety? What if we took this situation and applied it to the health care industry where we may have hundreds of patients in a medical facility? Are there a sufficient number of exits in my building and if so, are the egress components in compliance with *NFPA 101 2000 edition*?

Ensuring the safety and security of patients in the event of an emergency is the primary focus when we develop Life Safety plans. It is not often that patients are evacuated from a hospital but in the event of a fire, occupants may be directed to the nearest exit or exit stairwell rather than seeking refuge in the adjacent smoke compartment.

To understand if the egress system in our building is code compliant, we first have to calculate the occupant load per floor to determine if we have a sufficient number of exits. Calculating the occupant load is covered in a separate article of this issue.

Let us now apply the occupant load calculation to a hypothetical situation and then we will be able to determine the minimum number of exits required for this floor. For example, on the 4th Floor of a fully sprinkled medical facility, there are two smoke compartments that are both designated for "Patient Sleeping" (see illustration 1). Smoke Compartment A is 10,000 square feet and Smoke Compartment B is 12,000 square feet.

Smoke Compartment A occupant load = 84.

Smoke Compartment B occupant load = 100.

The sum of the occupant loads for the entire floor is 184 and therefore; we will need a minimum of two exits in accordance with Section 7.4.1.1. We can now calculate the egress capacity for each exit component in order to determine the most limiting factor; either the clear width of the egress door or the clear width of the exit stair. Per Section *7.3.2: the width of means of egress shall be measured in the clear at the narrowest point of the exit component under consideration* (see illustration 1A). First we will determine the number of inches we will need to accommodate the 184 people we calculated as the occupant load. As per Table 7.3.3.1 Capacity Factors, we will multiply 0.2 inches per person for the *Level Components*, and 0.3 inches per person for the *Stairways.*

In order to determine the clear width of the exit door: we multiply the occupant load by the capacity factor (184 x .2 in.= 37 in.). Therefore, the clear width of the exit door would need to be 37 inches in order to accommodate the 184 occupants. Since we are required to have two exits on this floor, the occupant load should be distributed equally among the two stairs which means the clear width of each exit door will need to be a minimum of 18.5 in. (19 in. when we round up) in order to accommodate 92 people per stair.

To find the minimum width required for the exit stair, we will follow the same procedure but we will substitute the egress capacity factor with 0.3 inches per person:

184 x .03 in. = 55.2 in., which equates to 56 inches when we round up.

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Since we are required to have a minimum of two exit stairs on this floor, we will need 28" inches in clear width per exit stair (56 in. ÷ 2 = 28 in.). In accordance with Section 7.2 Means of Egress Components:

- Doors: Door openings in means of egress shall be not less than 32 in. (81 cm) in clear width.
- Stairs: 44 in. minimum width clear of all obstructions except projections not more than 3 ½ in.

The two exits on the 4th Floor will require a minimum of 32 in. and the width of the stair is required to be 44 inches. Our calculations prove that we meet the minimum requirements:

32 in. is >19 in. and 44 in. is >28 in. The two sets of stairs can accommodate 184 people.

Now for instance, if we have three sets of stairs on the 4th Floor and the exit doors are 42 inches each and the width of each stair is 50 inches, how many people can each egress component accommodate if we apply the formula in accordance with Table 7.3.3.1? If the occupant load is 184 and we have three sets of stairs, can the egress components accommodate 61 people per stair? To help us determine if the egress components are code compliant, we created an Egress Capacity Chart:

Egress Capacity Chart Per Component – Fully Sprinkled Healthcare Occupancy- 4th Floor

STAIR ID	STAIRWAYS (44" MINIMUM)	DOORS (32" MINIMUM IN CLEAR WIDTH)	EGRESS CAPACITY	OCCUPANT LOAD PER STAIR
Stair A	50" ÷ .3" = 166	42" ÷ .2" = 210	166	61
Stair B	50" ÷ .3" = 166	42" ÷ .2" = 210	166	61
Stair C	50" ÷ .3" = 166	42" ÷ .2" = 210	166	61

The next step is to compare the egress capacity of the most limiting factor with the occupant load per stair listed in the chart above to assure that the egress capacity is always greater than or equal to the occupant load.

What if we were to remove Stair B as an exit stair? Can Stair A and Stair C accommodate the occupant load of Stair B? We have to take into consideration that if the building only has two exits, then each exit will have to handle 50% or more of the occupant load. If we remove one means of egress then we need to be sure that we are not diminishing the egress capacity by 50%. If we remove Stair B as an exit then 184 occupants will be evenly distributed among Stair A and Stair C. This brings us back to our initial equation where we multiplied the egress capacity factor in order to determine the clear width. We can be sure that we meet the minimum requirements for each of the egress components since each of the stair doors are 42 inches and the stair itself is 50" wide. We will then have to repeat the second step but instead of three exits we will divide the OL by two: 184 ÷ 2 = 92 people per stair. If we refer to the Egress Capacity Chart we created and compare the 92 people exiting per stair with the 166 egress capacity per stair, we see that we are well within the limits of the most stringent factor and we meet the minimum requirements.

However, another aspect needs to be considered. If we eliminate Stair B from the equation, can we still meet the travel distance requirements from the most remote point in the compartment to the exit stair in accordance with 7.6? In this case the answer is Yes. We will be able to reach an exit stair within 200 feet since the facility in our example is fully sprinkled (see Illustration1).

However, if the facility was not fully sprinkled, we would not be able to reach Stair A or Stair C within 150 foot travel distance and therefore, Stair B will be required as a means of egress in our building (see Illustration2).

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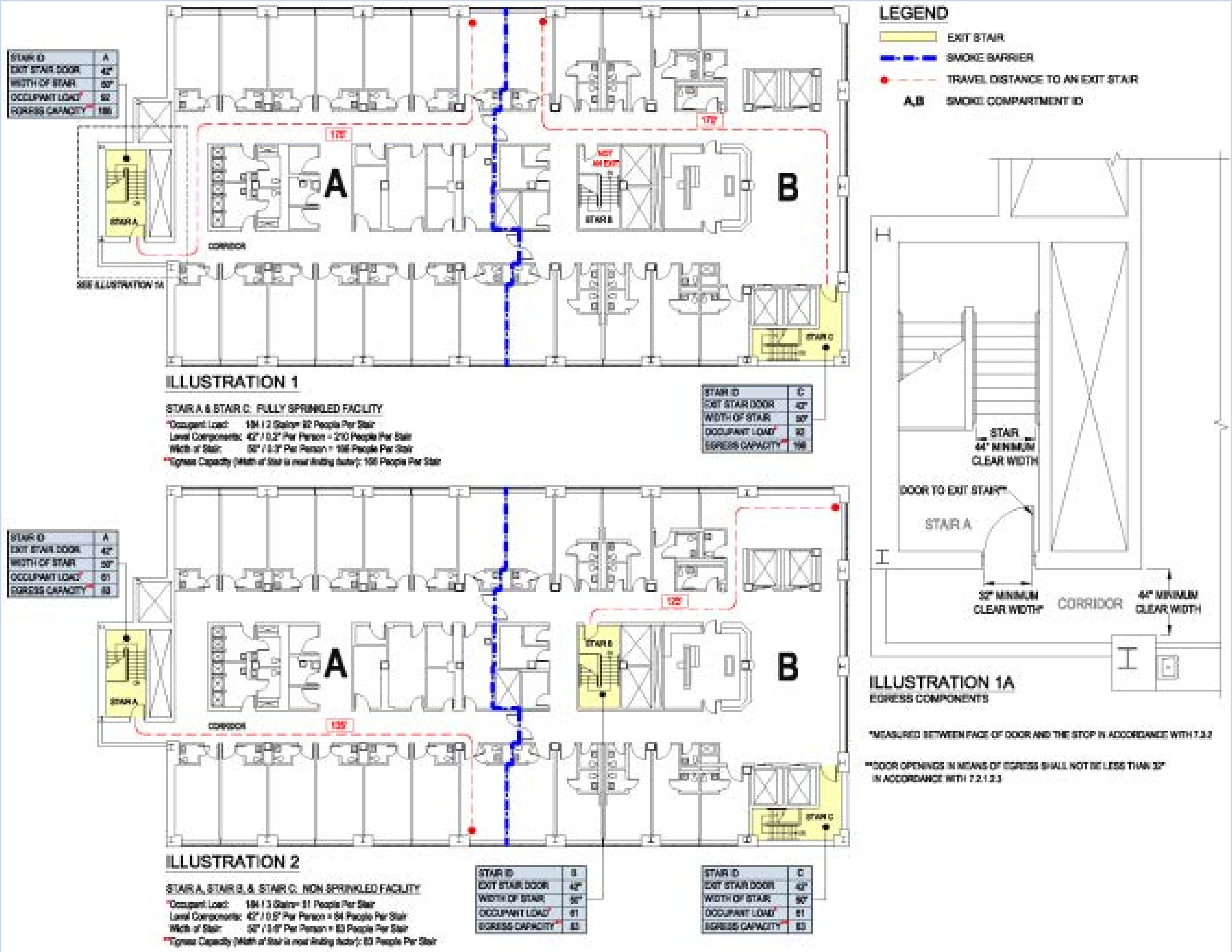

When we are determining the egress capacity for more than one floor, each floor will be calculated separately and the egress capacity per floor will not be added together except when there are two floors converging on the level of discharge. For example, let's say that the level of discharge is on the 1st Floor and our building also has a Basement. On the level of discharge, the ascending occupants of the Basement will converge with the descending occupants of the 2nd Floor. In this case, we will add the occupant loads of the Basement and 2nd Floors in order to determine the clear width of the egress components on the 1st Floor:

2nd Floor Occupant Load: **184** + Basement Occupant Load: **250** = **434 (217 people per stair)**

The occupant load of the two floors combined is 434 and therefore; the exit stair doors on the 1st Floor will need a minimum of 87" in clear width: 434 X .2 in. per person = 87 inches. If each of our two exit stairs has a 48" exit door, then the egress capacity will be 240 people per stair: 48 in. ÷ 0.2 in. = 240. We are in compliance with the code since each stair can accommodate a maximum of 240 people, and therefore the egress capacity is greater than the occupant load per stair: 240 > 217.

In summary, it is extremely important for one to calculate the egress capacity for each exit component in their facility. Having this information on hand can save a countless number of lives in the event of an emergency. Once the egress capacity is calculated and the numbers prove that the occupant load exceeds the egress capacity, proper measurements can be taken ahead of time to ensure that patients, visitors, and hospital staff can safely evacuate the facility in the event of a fire.

Fire Extinguisher Availability Basics

By John Taylor

Fire Extinguishers are one of the items that we take for granted. All facilities are required to have at least one fire extinguisher (FE). Having at least the one FE in the facility, what are some of the basics of FE presentation?

Let's start with a couple of general requirements.

- NFPA 10(1998*) 1-6.2 states "Portable FEs shall be maintained in a fully charged and operable condition and kept in their designated places at all times when they are not being used."
- Following this requirement is 1-6.3, "FEs shall be conspicuously located where they will be readily accessible and immediately available in the event of fire. Preferably they shall be located along normal paths of travel, including exits from areas."
- Further clarification is provided in 1-6.6 which states "FEs shall not be obstructed or obscured." The physical environment in which FEs may be placed may present obscuration challenges which the code recognizes and addresses by permitting a "means" indicating the location. Signs <u>may</u> be used to direct personnel to a FE if its location is not obvious.

A fire extinguisher mounted behind a locked door is not accessible at all times. The FE may provide hazard specific protection behind the locked door but does not meet the intent of general structural fire fighting use.

It is imperative that personnel know the location of FEs and once they arrive at the location, the FE is "immediately" available, no obstruction including movable carts, materials or supplies.

FEs should be mounted in the normal means of egress from a space. A FE mounted on the wall opposite the space's exit is not recommended. Having to pass a fire to retrieve a FE in a dead end space is an extremely hazard condition.

Now that the location of the FE is known, it is accessible and in the exit travel path, let's looks at installation requirements:

- NFPA 10(1998*) 1-6.7 requires the FE to be "securely installed" on; a hanger, a bracket, in a cabinet or in a wall recess. The hanger or bracket shall be securely attached to the mounting surface as per manufacturer's instruction.
- NFPA 10(1998*) 1-6.8 directs us to install FEs subject to "dislodgement" to be installed in brackets designed to keep the FE in place against the dislodgement force or activity.
- NFPA 10(1998*) 1-6.9 addresses adequately protecting FEs from physical damage.

Each FE installation environment is unique and needs careful consideration of protective measures. Mounting in a recessed wall cabinet (no locks permitted) or wall recess may provide the best protection from dislodgement by personnel, carts and equipment. Cabinets and recesses are not always possible or practical thus we look at surface mounting.

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Hooks are the simplest but provide the least protection. If hooks are used, look for places that provide additional protection; corners, fixed counters, spaces that are too small for other stuff, etc. If no infrastructure protection is available, consider using a bracket that holds the FE in place. The bracket will not protect from physical impact but does keep the FE in place from light dislodgement forces.

Whenever a FE is mounted outside of a cabinet, the mount must be securely attached to the mounting surface. When mounting a FE in a corridor, ensure the corridor intrusion dimension are not exceeded.

NFPA 10 (1998*) 1-6.10 addresses the mounting height of FEs. FEs under 40 pounds gross weight shall be mounted at or below 60” above the finished floor to the top of the FE. FEs more than 40 pounds gross weight shall be mounted at a maximum of 42” above the finished floor to the top of the FE. All non-wheeled FEs shall be mounted at least 4” above the finished floor.

NFPA 10(1998*) 1-6.13 & 14 the temperature ranges for FE mounts. Water-type FE shall be mounted in areas where the temperature range is between 40°F and 120°F. Non-water FE types are permitted to be mounted in temperature ranging from -40°F to 120°F. If the temperature range is expected to be outside these ranges, specific FE designed for the anticipated temperature range shall be used. Special cabinets with ventilation or conditioned cabinets may be used as long as they meet the readily accessible conditions of FE mounting.

Now that the FE is mounted within the correct height range, conspicuously, securely mounted or installed and ready for service, the operating instructions labeling and charge gauge come into play. NFPA 10 (1998*) 1-6.12 requires the operating instruction to face outward. Hanger or bracket mounted FEs will generally not permit mounting without directions facing outward. Cabinet and alcove installed FE can be turned any direction, so turn them with the operating instructions facing outward.

The required information on the tag or label on a FE include: identification of the listing and labeling organization, the fire test, the performance standard, content product name, listing of hazardous materials identification, listing of hazardous materials >1% of contents, list of each chemical >5% of contents, information on what is hazardous about the agent, manufacturer’s or service agency’s name, mailing address and phone number. That is a lot of information to be on one small FE’s front. Class(es) of fires the FE will effectively handle and operating instructions are the most critical. NFPA 10(1998*) 4-1.5 states that tags or labels shall not be placed on the front of a FE except those indicated FE use or classification. This means the inspection tag shall not cover the operating instructions or readiness indicator (gauge) of the FE.

This article addresses location, accessibility, mounting and labeling of fire extinguishers. FEs play a crucial role in early containment of fires. Having the right fire extinguisher in the right place and readily accessible will make the difference between a minor incident and major loss. Hopefully this provides clarity to fire extinguisher basics for most healthcare applications.

**CMS, TJC and DNV mandate compliance with NFPA 101(2000) which references NFAP 10(1998)*

Complex Reporting Relationships

By Ode Keil

The world of facilities management is evolving as the consolidation of hospitals into health systems continues. Many health systems are centralizing facilities management administration. A common practice is regionalization of facilities management departments. The total number of directors is reduced. This results in a very complex set of issues including communications with each local administration, each local shop and the centralized administration structure.

The communications can be characterized as two distinct categories. The communications within the facilities management administrative structure from the front line technicians to the highest administrative level can be described as professional / technical. These communications include but are not limited to:

- Development of standardized maintenance and operations processes. This is important as standardized processes are generally more efficient than one off approaches, the results are measurable and comparable and changes can be made in a planned way. Standardization often has additional benefits such as reduced requirements for training, inventory of parts and supplies and selection of specific equipment types.

- Internal administrative communications such as planning and scheduling, staffing, HR activities, etc. These communications are often challenging as part of the change management process. Centralization of administration is a technical process of change management. It involves development of organization structures, mapping of staff from one organizational unit to the new structure and establishing new meeting schedules. Changing the focus of the individuals consolidated into the centralized structure is a relationship process. It is difficult as the staff is still stationed in the same hospital or other location, works with the same employee group and has years of experience dealing with a local administration. The members of the local administrative team are accustomed to directing the facilities management operations. They are unaccustomed to reaching out to someone for permission to make changes in the day to day operations of the department.

- Development of operating and capital budgets. The shift from hospital developed and administered operating and capital budgets is a touchy subject. Local administration is no longer in control of the funds. They do not have the option of independently reducing or

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freezing expenditures for maintenance and operations during the budgeting process or when finances are challenging during a fiscal year.

The communications with local hospital administration teams and staff are relational. The primary objective is to maintain the strong working relationship that existed before centralization while delivering services in accordance with new or significantly revised maintenance and operations practices. These communications include:

- Clearly defined expectations for operations and communication— Many organizations develop Service Level Agreements (SLA) to define the expectations of the parties affected by centralization. It is important that the SLA is not a one way document. One very important part of the SLA is to address communications. The SLA is a framework. It is used to establish who is responsible, who is accountable, who is consulted and who is informed in the new administrative management and decision making structure.

- It is critical to understand that a hospital based CEO or other senior executive accustomed to making independent decisions will have to learn and work within this framework. This is a difficult. It requires frequent, on-going communication to reinforce the expectations. Failure to manage the new relationship effectively is likely to result in the local facilities management and administrative staffs will continue to work as if the centralized structure does not exist. If this occurs the technical/professional communications break down resulting in a breakdown of the centralized administration structure.

- Service quality and other performance—Part of the SLA should be a defined set of key performance indicators (KPI's). The KPI's should include measures of work quality, quantity, financial performance and compliance with accreditation and regulatory requirements. Regular reporting of performance is an important part of reinforcing the commitment to serve local needs. If the performance reports demonstrate meeting or exceeding the agreed to standards many of the issues of direct administrative control fade away over time. The key is consistent high performance demonstrated through use of objective measures.

Many facilities managers put into a centralized or regionalized structure struggle to manage the solid line and dotted line accountabilities. It is often easier to take direction from a local administration on a day to day basis than to engage with a centralized group in a distant location. Keeping the local administration happy may be effective over short periods of time. Over the long run failure to engage in and actively support the strategy developed through the centralized facilities management administrative structure will likely negatively impact the potential improvements in effectiveness and efficiency.

Drug-resistant Strains of Tuberculosis Still a Serious Threat to Healthcare Workers

by Dean Samet, CJCS, CHSP

In a recent *OSHA Safety and Health Topics: Tuberculosis*, the Occupational Safety and Health Administration updated instructions with the most currently available public health guidance related to worker exposures to tuberculosis in health care settings. It incorporates guidance from the Centers for Disease Control and Prevention (CDC) report, *Guidelines for Preventing the Transmission of Mycobacterium Tuberculosis in Health-Care Settings*, 2005. Drug-resistant strains of TB continue to pose serious threats to workers in health care settings.

According to the CDC in 2008, nearly one-third of the world's population was infected with Tuberculosis (TB), which kills almost 1.6 million people per year. TB is now the second most common cause of death from infectious disease in the world after human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS). In the mid-1980s, a resurgence of outbreaks in the United States brought renewed attention to TB. An increase in high risk, immuno-suppressed individuals, particularly those infected with HIV, lead to an increase in TB cases. Drug-resistant strains of this deadly disease also contributed to the problem. However, through a broad range of Federal and community initiatives, TB rates have declined steadily.

In 2014, a total of 9,412 new tuberculosis (TB) cases were reported in the United States, with an incidence rate of 3.0 cases per 100,000 persons, a decrease of 2.2% from 2013. Although overall numbers of TB cases and rates continue to decline, the percentage decrease in rate is the smallest decrease in over a decade. In their July 29, 2015 *Joint Commission Online* newsletter, TJC reported that in 2013 there were 9,582 TB cases reported in the United States, and approximately 383 of those cases were among health care workers.

TB is a disease caused by a bacterium called *Mycobacterium tuberculosis.* The bacteria usually attack the lungs, but TB bacteria can attack any part of the body such as the kidney, spine, and brain. If not treated properly, TB disease can be fatal. TB disease was once the leading cause of death in the United States.

TB is spread through the air from one person to another. The TB bacteria are put into the air when a person with TB disease of the lungs or throat coughs, sneezes, speaks, or sings. People nearby may breathe in these bacteria and become infected.

TB is NOT spread by:

- shaking someone's hand
- sharing food or drink
- touching bed linens or toilet seats
- sharing toothbrushes
- kissing

Not everyone infected with TB bacteria becomes sick. As a result, two TB-related conditions exist: latent TB bacteria can live in the body without making you sick.

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This is called latent TB infection. In most people who breathe in TB bacteria and become infected, the body is able to fight the bacteria to stop them from growing. People with latent TB infection do not feel sick and do not have any symptoms. People with latent TB infection are not infectious and cannot spread TB bacteria to others. However, if TB bacteria become active in the body and multiply, the person will go from having latent TB infection to being sick with TB disease. TB bacteria become active if the immune system can't stop them from growing. When TB bacteria are active (multiplying in your body), this is called TB disease. People with TB disease are sick. They may also be able to spread the bacteria to people they spend time with every day.

Many people who have latent TB infection never develop TB disease. Some people develop TB disease soon after becoming infected (within weeks) before their immune system can fight the TB bacteria. Other people may get sick years later when their immune system becomes weak for another reason.

For people whose immune systems are weak, especially those with HIV infection, the risk of developing TB disease is much higher than for people with normal immune systems.

Symptoms of TB disease include:

- a bad cough that lasts 3 weeks or longer
- pain in the chest
- coughing up blood or sputum
- weakness or fatigue
- weight loss
- no appetite
- chills
- fever
- sweating at night

There are two kinds of tests that are used to detect TB bacteria in the body: the TB skin test (TST) and TB blood tests. These tests can be given by a health care provider or local health department. If you have a positive reaction to either of the tests, you will be given other tests to see if you have latent TB infection or TB disease.

If you have latent TB infection but not TB disease, your health care provider may want you be treated to keep you from developing TB disease. Treatment of latent TB infection reduces the risk that TB infection will progress to TB disease. Treatment of latent TB infection is essential to controlling and eliminating TB in the United States. The decision about taking treatment for latent TB infection will be based on your chances of developing TB disease.

TB disease can be treated by taking several drugs, usually for 6 to 9 months. It is very important to finish the medicine, and take the drugs exactly as prescribed. If you stop taking the drugs too soon, you can become sick again. If you do not take the drugs correctly, the germs that are still alive may become resistant to those drugs. TB that is resistant to drugs is harder and more expensive to treat.

For additional information, visit OSHA's Tuberculosis Safety and Health Topics page at https://www.osha.gov/SLTC/tuberculosis/.

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TSIG News

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WHAT OUR CLIENTS SAY ABOUT TSIG:

I would like to thank all of you for the help you have given Dave and I for a successful TJC inspection.

- Lori, your knowledge on the Life Safety code has helped bring me to a higher understanding of the code and be able to talk with the surveyor on what they are seeing and be able to get out of issues because they are wrong.
- Bill, your questioning of every reading, note, mark, etc. on the reports to ensure we understand what the report is about and how the test is completed. Your help with the Air Pressure and the program we have helped get out of issues seen in the field.
- George, your persistence to ensure all of our policies are complete, define what we do, and cover all requirements of the code and the TJC EPS. Your help to ensure that we have closed the loop on issues identified in the reports.

Thank you
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