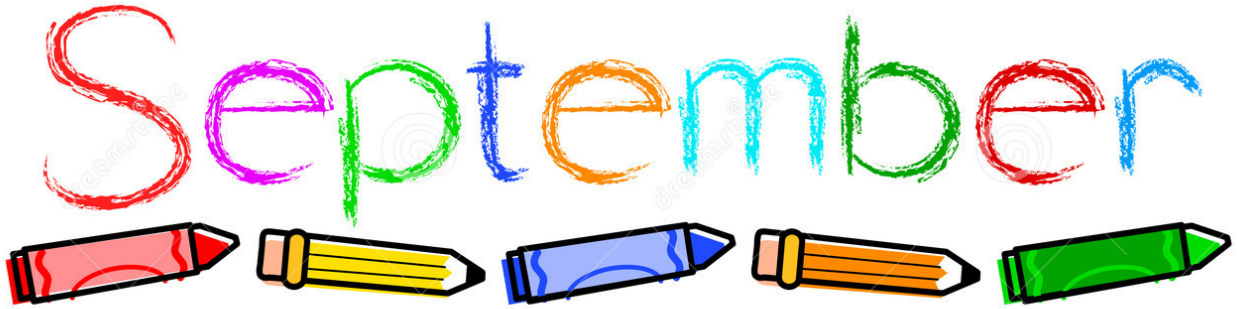
SPECWORK

CSI® LITTLE ROCK CHAPTER

Little Rock Chapter - Chartered November 1965 September 2025



In This Issue

President's Thoughts

By: Billy J. Mathis, FCSI, CDT, Little Rock Chapter President

Here we are, fast approaching the Holidays again. Didn't we just do all of these? Time flies and the older we get, the faster it seems to fly. I have learned over the years that we cannot put off things we want to accomplish. Call it a Bucket List, Goals and Milestones, or whatever you like, but there are things that you want to accomplish before moving on to retirement. One of these should be to become the best employee or employer out there. Learning Time Management, Leadership, Mentorship, and many associated tasks and responsibilities takes time and it takes a team approach. To learn these things, you need someone or some group who will help you acquire the basic skills and knowledge to move forward. Well, CSI is such a group. Two of the main pillars of the organization are Education and Certification. Another is Leadership. Education is essential to growth. A great mind once said that we should strive to learn something new every day of our lives. This is so true. How do you learn, well that is a very personal experience. Some learn through reading, some through rote learning, and others by watching and emulating someone. However you learn, there is a path for you to become a better employee or boss. A way for you to become an asset to the Company. All you need to do is find it and begin the Journey. Getting involved with CSI is one path you can take.

CSI offers many educational opportunities, many of which culminate in Certification. It really does not matter what you do in the Construction Industry. Contractor, Architect, Engineer, Owner, Manufacturer, Product Representative, etc. There is a path to certification out there. Let's start with the basics:

1. The Construction Document Technologist (CDT®): This certification provides a comprehensive program of study for anyone seeking to enhance and demonstrate knowledge of writing, interpreting, enforcing and managing construction documents.

    a. Who should sit for the CDT®? Project architects, contractors, contract administrators, material suppliers, and manufacturers' representatives are all realizing the advantages of being Construction Documents Technologists.
    b. What does it mean for me? Pass the Construction Documents Technologist exam (CDT®), and you'll join an elite group of professionals known in the industry for their comprehensive knowledge of the writing and management of construction documents.

2. Certified Construction Contract Administrator (CCCA®): This Certification which is a next tier from the CDT® demonstrates you have a high level of knowledge for preparing and executing construction contracts. A key team player that ensures the project is insurable, constructible, complies with the contract, and meets the owner's project requirements.

    a. Passing the CCCA exam means you've proven your abilities throughout these key phases:

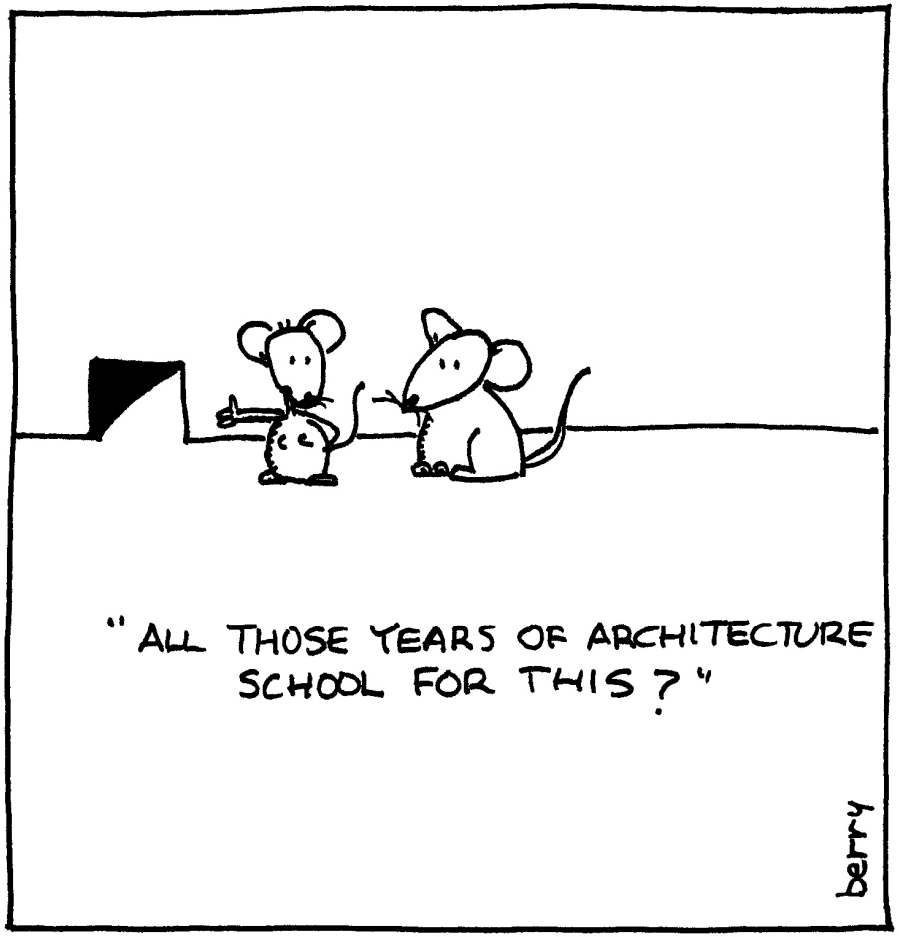
        1) Quality assurance and quality control.
        2) Bidding and negotiating procedures.
        3) Construction observation and inspection.
        4) Division 01, General and Supplemental Conditions, agreements, and all other documents related to the project.
        5) Enforcement and liability.

3. Certified Construction Product Representative (CCPR®): This Certification is the 3rd tier and a candidate must pass both the CDT® and CCPR® exams.
    a. This demonstrates you have foundational knowledge about the project delivery process, team members' roles, and construction documents AND specialty expertise in your role and responsibilities as a product representative.
    b. Earning this combination of certifications will immediately establish your credibility with specifiers. They will know you have what it takes to get the job done right.
4. Certified Construction Specifier (CCS®): This is the final Certification offered and shows that the person with this certification s a skilled product researcher who knows how to investigate and identify cost-effective, efficient solutions, and then communicate those solutions through the specifications. Achieving your CCS means:
    a. Developing an in-depth understanding of agreements, conditions of the contract, Division 01, and their relationships to specifications.
    b. Having advanced skills in specification development, enabling you to use spec-writing software more effectively.
    c. Understanding how to research and source products.

Working along with Certifications, there is a continuing education portion that helps the Certified individual maintain their knowledge level to the upmost level. While these continuing education courses are not dependent exclusively through CSI courses and presentations, there are certain courses that you can take to earn credits through CSI. In addition, when you participate in the volunteer pool, you can also gain credits good towards you certification(s). Couple that with the availability of numerous AIA / USGBC / IDCEC Accredited Programs and Presentations, getting your education should be easy.

Finally, there is the invaluable leadership training offered by CSI. At the Chapter, Region and Institute levels there are leadership opportunities as well as many paths to receive leadership training. There are a plethora of mentors out there just waiting for someone to ask for assistance.

So you can see, there is a bounty of benefits from membership and participation in CSI. I look forward to talking with each of you about membership and your individual benefits.


"ALL THOSE YEARS OF ARCHITECTURE SCHOOL FOR THIS?"
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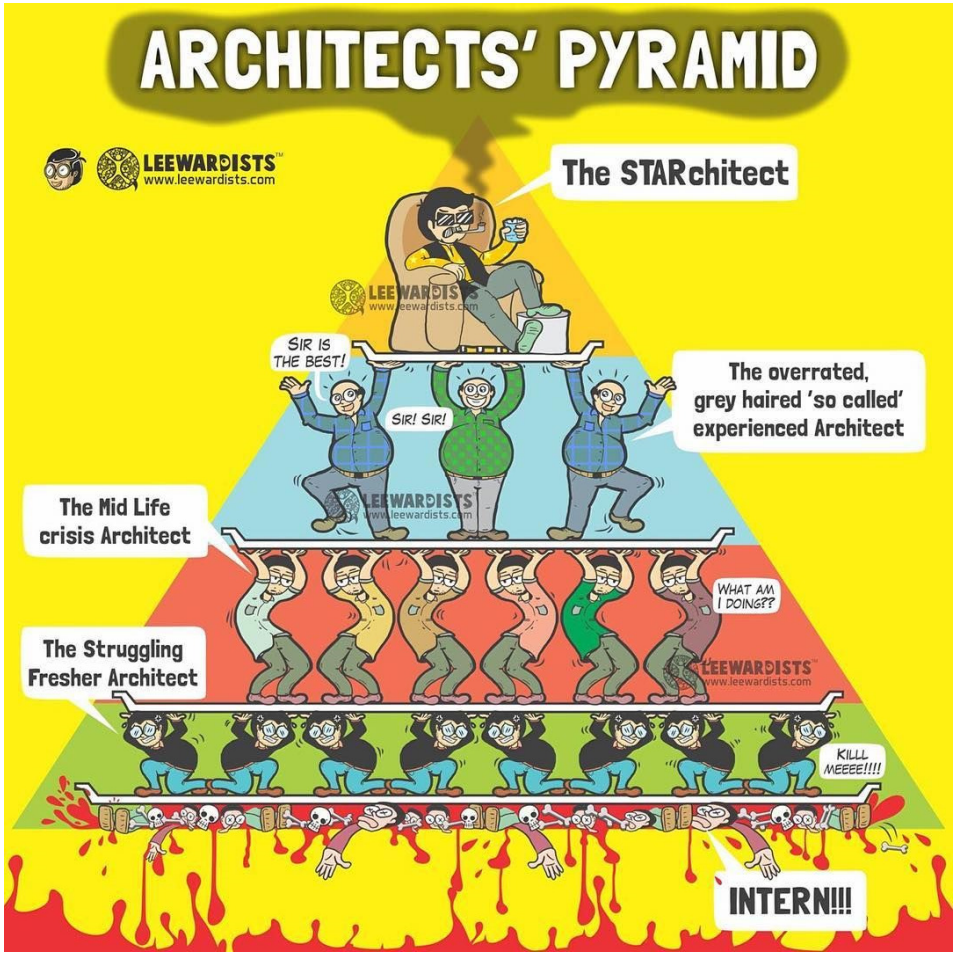
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The Struggling Fresher Architect
KILLL MEEEE!!!!
INTERN!!!

CALENDAR

SEPTEMBER 16, 2025: Roofing Systems Overview

Speaker: Tyler Newton, Garland Company

Topic: An informative session covering the pros and cons of various commercial roofing systems - built-up, modified bitumen, metal, single-ply, and fluid-applied - along with their construction methods and applications.

Lunch Sponsor: Garland Company

CEU: 1 LU/HSW Credit

OCTOBER 14, 2025: Millwork Shop Tour

Topic: Get a behind-the-scenes look at custom millwork fabrication and best practices.

Location: Custom Millwork (Maumelle)

Tour Host: Donnie Green, CDI Contractors

Presenter/Lunch Sponsor: Solid Surfacing, presented by Mike Perkowski, BPI.

CEU: 1 LU Credit

NOVEMBER (Date TBD), 2025: Panel Discussion – All Things Flooring

Format: Evening Event (Tentative: 4:00 PM) - A candid, expert-led panel tackling common (and uncommon) flooring issues.

Speakers:

- Schluter: Expansion joints & waterproofing
- Bostik: Adhesives & floor prep
- JGP: Lessons from the field
- Mannington: Product-specific insights (carpet/LVT)
- BPI: Moderator & best practices

Topics: Moisture mitigation, incompatible materials, warranty conflicts, coordination gaps, and everything in between – the good, the bad, and the ugly!

DECEMBER (TBD), 2025: Holiday Social + Mini Trade Show

Details coming soon! Expect a festive evening of networking, fun, and industry connection.

CSI LITTLE ROCK CHAPTER

LUNCH AND LEARN

TOPIC: **"Roof Systems Overview"**

WHEN: **Tuesday, September 16**
12:00 - 1:00 pm
Doors open at 11:30 am

WHERE: **Cromwell "Mixing Room"**
1306 East 6th Street
Little Rock, AR 72202

CEU: **1 AIA LU/HSW Credit**

RSVP: Email Mindy Burton at **mburton@cromwell.com** to register by **Fri, Sep 12**

Open to all industry professionals and emerging professionals!

Garland Industries, Inc.

This course explores today's leading commercial roofing systems — built-up, modified bitumen, metal, single-ply, and fluid-applied. Learn the pros, cons, and construction methods of each, with practical insight to guide smarter project decisions.

Tyler Newton has represented The Garland Company in Arkansas since 2014, providing expertise in new construction, roof replacements, restoration, and repair.

Wordless Wednesday: All Aboard! (if you can get out)

Posted by Lori Greene, July 2nd, 2025

William Rudd sent me today's Wordless Wednesday photos, taken in a train station. As shown in the first photo, both doors are marked as exits, but it looks like one has been taken out of service.

Wordless Wednesday: Lift in Case of Emergency

Posted by Lori Greene, July 2nd, 2025

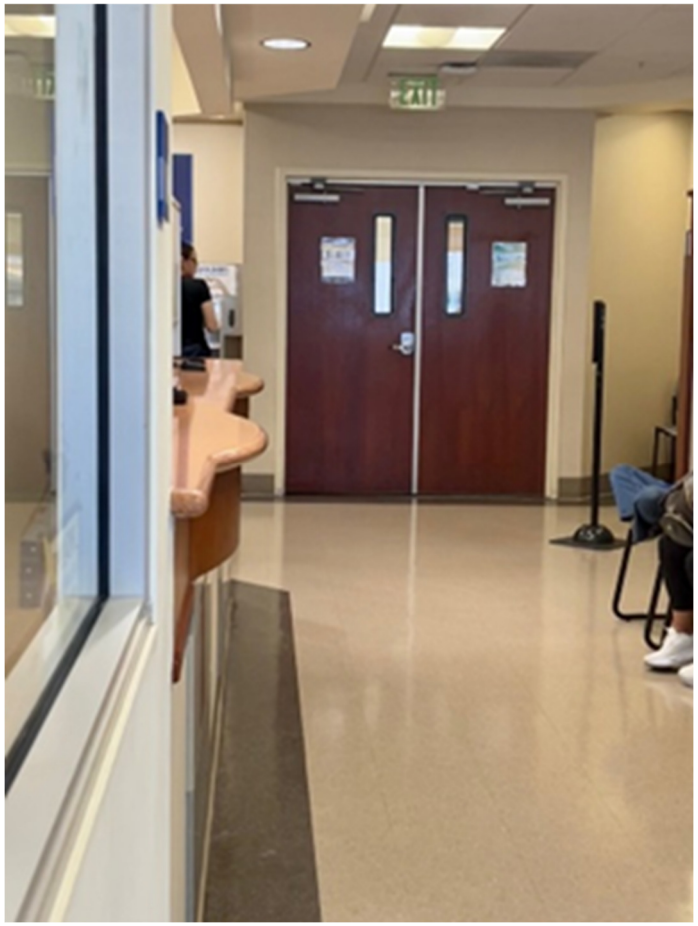
Eddie Welch of Wesche Company sent me today's Wordless Wednesday photos, which were taken in a convention center. I always recommend rim panics and a removable mullion for exterior doors with panic hardware, to avoid situations like this.

Fixed-It Friday: Another Indicator in the Wild

By: Lori Greene, I Dig Hardware Blog

In yesterday's post, I wrote about whether lock indicators are "special knowledge" or "common knowledge"…in my opinion, locks with visual indicators do not require special knowledge, they are common knowledge. Building occupants intuitively know how to exit using a door with a lever handle or panic hardware. Although the model codes don't mention indicators specifically (yet), the hardware is code-compliant for egress, fire protection, and accessibility.

We're already starting to see locks with indicators installed in the field, and they will become even more common in the coming months and years. The other day I was at a children's hospital in California, and I took today's Fixed-it Friday photos. This indicator lock is installed on the waiting room door for the vision center. Based on the other hardware in the building, it looks like the new lock was retrofitted to an existing door, to help staff ensure the lock status during a lockdown.



Fixed-It Friday: “Mid-Rail”

By: Lori Greene, I Dig Hardware Blog

Michael Nicasio sent me today’s Fixed-it Friday photos and I have to say…I have never seen a mid-rail constructed this way. How about you?

Wordless Wednesday: Supermarket Deterrent

By: Lori Greene, I Dig Hardware Blog

Sometimes when I'm working on a code question/problem with someone, I use the phrase "it won't keep me up at night," meaning that maybe it's not 100% perfectly code compliant but it's not so problematic that I will lose sleep worrying about it.

That's kind of how I feel about this supermarket's attempt to guide traffic at closing time – the adopted codes would not allow the store entrance to be blocked, but at least the employees didn't engage the lock on the door. On the other hand, it's hard to know where to draw the line. If this is permitted, maybe the next method used to deter egress will be more egregious.

What do you think? Would this keep you up at night? Is there a better way for supermarkets to handle this?

Decoded: Applications for Electromagnetic Locks

By: Lori Greene, I Dig Hardware Blog

Electromagnetic locks installed in a means of egress require the release methods specified in the adopted codes.

Although the code requirements that typically apply to electromagnetic locks in a means of egress have been pretty stable for the past few editions of the model codes, questions still arise. This Decoded article will answer some of the frequently asked questions related to these applications.

If you're not familiar with electromagnetic locks, they are a type of electrified lock that features an electromagnet in a housing mounted on the door frame, and a steel armature mounted on the door. When power is applied to the electromagnet, it bonds to the steel armature and locks the door.

These locks differ from other types of electrified and mechanical hardware, because without the release methods mandated by code, an electromagnetic lock would not allow egress. Other types of electrified locks – such as power bolts – could be used in the systems discussed in this article, but electromagnetic locks are by far the most common type of hardware for both of these applications.

Which model code sections address doors with electromagnetic locks?

There are two code sections in each of the model codes addressing access control systems incorporating mag-locks. The difference between these two sections is that one requires a switch in the door-mounted hardware (panic hardware, sensor bar, or lever handle) to unlock the electromagnetic lock for egress. The other option is a sensor on the egress side to detect a building occupant approaching the door, unlocking the door to allow the person to exit.

In the 2024 editions of the model codes, the applicable sections are:

IBC/IFC:

1010.2.10 – Door hardware release of electrically locked egress doors

1010.2.11 – Sensor release of electrically locked egress doors

NFPA 101:

7.2.1.6.2 – Sensor-Release of Electrical Locking Systems

7.2.1.6.3 – Door Hardware Release of Electrically Locked Egress Door Assemblies

In other editions of the model codes, the section numbers and titles may vary from what is included in the 2024 edition.

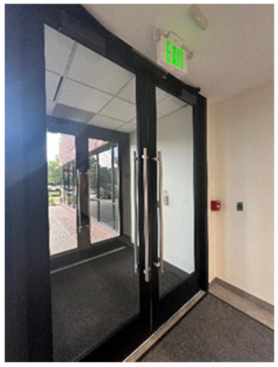
Are there limitations on the use groups where mag-locks can be installed?

In previous editions of the model codes, there were some limitations on the types of facilities where electromagnetic locks were permitted. However, in recent editions of the I-Codes, the only use group where mag-locks may not be installed is in Group H – High Hazard occupancies.

In NFPA 101, Life Safety Code, there are no restrictions on the occupancy classifications where electromagnetic locks released by a switch in the door-mounted hardware are permitted. NFPA 101 allows sensor release mag-locks where permitted by the occupancy chapters (Chapters 11-43). There are limitations in the occupancy chapters for assembly and mercantile occupancies:

Chapters 12 and 13, addressing new and existing assembly occupancies, state: *Doors in the means of egress shall be permitted to be equipped with an approved access control system complying with 7.2.1.6.2, and such doors shall not be locked from the egress side when the assembly occupancy is occupied.*

Chapters 36 and 37, addressing new and existing mercantile occupancies, state: *Sensor-release of electrical locking systems complying with 7.2.1.6.2 shall be permitted in buildings protected throughout by an approved, supervised fire detection system in accordance with Section 9.6 or an approved automatic sprinkler system in accordance with 9.7.1.1(1).*



This entry door on an office building has electromagnetic locks mounted at the top of the door, a sensor near the exit sign, and an auxiliary push button on the wall.

The other occupancy chapters specifically permit applications complying with Section 7.2.1.6.2 without limitations, except that this section is not specifically mentioned in Chapter 26 which applies to Lodging or Rooming Houses.

Do both the sensor release and door hardware release sections require the auxiliary push button and fire alarm release?

The short answer is no – these release methods are not required for both types of systems. In addition to the sensor, the sensor release sections of the model codes state that the electrified lock must unlock upon loss of power and upon activation of the fire alarm system or sprinkler system (if present). In addition, mag-locks released by a sensor must unlock via an auxiliary switch/manual push button beside the door. The switch must be readily available and marked "Push to Exit". When activated, it must result in a direct interruption of power to the electric lock, independent of the other electronics, and the lock must remain unlocked for at least 30 seconds. The model codes do not state which type of switch is required; for example, the timer could be electronic, pneumatic, or another type.

In contrast, the sections addressing electrified locks released by a switch in the door-mounted hardware only require the hardware to be unlocked by the switch in the panic hardware, sensor bar, lever handle, or other hardware mounted on the door, and by loss of power. The sections do not require the locks to be unlocked by fire alarm/sprinkler system activation, and no auxiliary push button is mandated by the model codes. With that said, the codes are a minimum and it would be acceptable to add these extra release methods; some local jurisdictions may require it.

Beginning with the 2024 I-Codes, electromagnetic locks installed on doors required to have panic hardware must be released via a switch in the door mounted hardware. Sensor release mag-locks will no longer be permitted on doors required to have panic hardware.

Are mag-locks allowed on doors that are required to have panic hardware?

Prior to the 2024 editions of the I-Codes, both sensor release and door hardware release applications were permitted on doors required to have panic hardware. A change was made to the 2024 editions that limits doors with panic hardware to the door hardware release application. The switch in the panic hardware must unlock the electromagnetic lock, and the sensor release options will no longer be permitted on doors that are required to have panic hardware.

Do electromagnetic locks require special listings if they are used in a means of egress?

Beginning with the 2009 editions, the model codes have required most special locking arrangements – including those that apply to mag -locks – to be listed to UL 294 – Standard for Safety for Access Control System Units. There has been a lot of confusion regarding which systems require the listing, and which specific components of the system need to be listed. This has been clarified in the 2024 model codes – both the I-Codes and the NFPA codes.

The 2024 editions of the model codes require certain types of systems to be listed but have allowed a second listing as an alternative: UL 1034 – Standard for Safety for Burglary-Resistant Electric Locking Mechanisms. The codes have been clarified to apply the listing requirement to the electrified locking device, and not to every system component (readers, power supplies, conductors, etc.). It's important to note that electrified access control systems that limit ingress but are readily operable for egress are not required to be listed to either UL 294 or UL 1034 (refer to IBC-2024 Section 1010.2.9 for these systems).

Conclusion

When working with electromagnetic locks, it's important to know which code has been adopted for a project's jurisdiction, as there may be variations from one edition to the next. There could also be state or local modifications to the model codes. The next consideration is which code section applies – is it a sensor-release lock or a door-hardware release lock? Refer to the adopted for code for more specifics on these applications, and consult with the Authority Having Jurisdiction (AHJ) if there are questions or concerns.


WONDERS
OF
EARTHSCAPE
VENICE STANDS ON MILLIONS OF WOODEN PILES DRIVEN INTO THE LAGOON'S CLAY, SOME OVER 1,500 YEARS OLD AND NOW AS HARD AS STONE.
WONDERS OF EARTHSCAPE

Decoded: Key-Operated Locking Devices

Posted by Lori Greene, I Dig Hardware Blog

Although most doors in a means of egress must allow free egress at all times, there are a few exceptions. One of these exceptions is found in both the I-Codes and the NFPA codes, and applies to key-operated locks, which have a key cylinder on the egress side of the door. The idea is that a double-cylinder deadbolt installed on a main entrance door will have to be unlocked in order for the building to be occupied, and the door will allow egress for the occupants inside. If employees are present in the building when main door is locked, they will have access to other exits and to the key for the main door.

Typically, the codes would not allow hardware that requires a key, tool, special knowledge, or effort for egress, but key-operated locks are permitted by the model codes under limited conditions. A 2015 change to the International Building Code (IBC) and International Fire Code (IFC) caused some confusion regarding the use of these locks, but the problem has been resolved in the 2024 editions. This leads us to this month's Decoded question:

On which types of buildings or spaces are double cylinder deadbolts allowed, and what are the conditions for their use?

While previous editions of the I-Codes specifically allowed these locks at the "main exterior door or doors" of certain use groups, the word "exterior" was removed during the 2015 code development cycle. This led some to believe that these locks could be used on the main door or doors serving any spaces within a building, which was not the intent of the codes. The use of double-cylinder deadbolts is strictly controlled – with good reason.

The intent of the change removing the word exterior was to allow doors serving tenant spaces, such as retail stores within a mall building, to be equipped with key-operated locks if the other criteria stated in the code were met. Because these doors might be on the interior of the mall, the code language prior to the 2015 edition would not permit this type of lock for those interior retail spaces.

As the 2015 editions of the model codes began to be adopted at the state level, I started to receive questions about installing double-cylinder deadbolts in locations other than the main door to the building. For example, imagine a multi-stall restroom, where it could be helpful to custodial or maintenance staff to be able to lock the door from the inside with a key while they were working in the restroom. The intent of the model codes was not to allow double-cylinder deadbolts for this application, as there would be no other means of egress from the restroom. Someone accidentally locked inside would have no way to exit.

Based only on the text of the code, it was unclear that this application would not be permitted in the restroom example. Unfortunately, it wasn't until the 2021 code development cycle, which began in 2018, that a clarification could be proposed. The 2021 proposal was disapproved by the technical committee due to a concern related to buildings with a single exit, and the I-Codes were finally clarified in the 2024 editions.

The 2024 clarification and the other requirements of the I-Codes are included in section 1010.2.4, Locks and Latches:

I-Codes Text	Interpretation
1010.2.4 (3) In buildings in occupancy Group A having an occupant load of 300 or less, Groups B, F, M and S, and in places of religious worship, the main door or doors are permitted to be equipped with key-operated locking devices from the egress side provided that:	Locks requiring a key on the egress side may be installed on the main door(s) serving assembly occupancies with a calculated occupant load of 300 people or less. For these buildings, the double-cylinder deadbolt is permitted as an alternative to panic hardware. Key-operated locks are also permitted on business, factory and industrial, and mercantile buildings, and places of religious worship (no occupant load limit is stated for these occupancies).
3.1. The doors are the main exterior doors to the building, or the doors are the main doors to the tenant space.	This is the 2024 clarification to resolve the 2015 issue – the doors with double-cylinder locks must be the main exterior doors to the building, or the main doors to the tenant space.
3.2. The locking device is readily distinguishable as locked.	Most AHJs prefer to see a key-operated lock with an indicator, showing whether the door is locked, or whether it can be used for egress (typically stating “open” or “unlocked”).
3.3. A readily visible durable sign is posted on the egress side on or adjacent to the door stating: THIS DOOR TO REMAIN UNLOCKED WHEN THIS SPACE IS OCCUPIED. The sign shall be in letters 1 inch (25 mm) high on a contrasting background.	The text of the required signage was modified during the 2015 code change. It must now state that the door must be unlocked “when this space is occupied” rather than referencing occupancy of the building as a whole. The requirements for the visual signage are stated here, along with the location of the sign – on or adjacent to the door on the egress side.
3.4. The use of the key-operated locking device is revocable by the building official for due cause.	The Authority Having Jurisdiction (AHJ) may revoke permission to use a key-operated lock. This sometimes happens when the door is found locked during operation of the space – with building occupants inside.

A similar change to the NFPA codes was successful in the 2021 editions. The section entitled Locks and Latches now states: *Exterior door assemblies and interior door assemblies to an individual tenant space or to a single tenant space shall be permitted to have key-operated locks from the egress side, provided that all of the following criteria are met.*

The NFPA codes, such as NFPA 101 – Life Safety Code, allow a key-operated lock when permitted by the occupancy chapters. The doors must remain unlocked when the building or space is occupied.* As with the I-Codes, signage is required, with letters not less than 1 inch high on a contrasting background. The signage must read: THIS DOOR TO REMAIN UNLOCKED WHEN THIS SPACE IS OCCUPIED, or THIS DOOR TO REMAIN UNLOCKED WHEN THE BUILDING IS OCCUPIED, as applicable. The lock must be readily distinguishable as locked, and when the building or tenant space is locked, a key must be immediately available to any occupant inside. The AHJ may revoke these provisions for cause.

Note that a separate deadbolt with a thumbturn instead of a key cylinder on the egress side of the door is not subject to the same criteria that apply to key-operated locks. If a door with a thumbturn deadbolt meets the requirements of the code, it may be installed on a door in a means of egress. For example:

- The door would have to be one where panic hardware is not required.
- The deadbolt would have to be the only locking/latching device on the door, unless it's in a location where two releasing motions are permitted.
- The door could not be a fire door assembly, unless it is in a location where two releasing motions are permitted (ex. dwelling unit entry door).
- The thumbturn and cylinder or electronic reader would have to be installed between 34 inches and 48 inches above the floor, or as further limited by state codes and standards.

The thumbturn would have to be operable without tight grasping, pinching, or twisting of the wrist.

A thumbturn deadbolt meeting the above requirements would be permitted by the model codes, and would not require the signage that is mandated for a key-operated deadbolt. As always, local code requirements may vary from the model codes referenced here, and the AHJ has the final say. Consult the adopted codes for information specific to a project's jurisdiction.

**NFPA 101 considers a building occupied when it meets any of the following: a) it is open for general occupancy, b) it is open to the public, c) it is occupied by more than 10 people.*

FS65-24: Fire Doors Without Closers

By: Lori Greene, I Dig Hardware Blog

Last year I wrote about a code change proposal for the 2027 International Building Code (IBC) that was making its way through the ICC code development process. The proposal, submitted by the ICC Committee on Health Care, would allow non-self-closing fire doors on unit entries for assisted living units as well as some other residential treatment facilities. (Original Article follows this one)

When I wrote the post in 2024, I really didn't think that the proposal would be approved. Given the frequency of fires in residential buildings vs. the protection provided during a fire by a closed and latched fire door, it wouldn't make sense to have those doors standing open. Past fires in assisted living facilities and other apartment buildings have shown how an open fire door can compromise the means of egress and lead to fatalities.

Unfortunately, the proposal FS65-24 has been approved, with a modification from the committee. The following section will be included in the 2027 IBC, unless someone successfully intervenes:

716.2.6.1 Door closing. Fire doors shall be latching and self- or automatic-closing in accordance with this section.

Exceptions:

1. Fire doors located in common walls separating dwelling units or sleeping units in Group R-1 shall be permitted without automatic- or self-closing devices.

2. In Group I-1, Condition 2, fire doors located in corridors and serving sleeping units that do not include a cooktop or range shall be permitted without automatic- or self-closing devices.

3. The elevator car doors and the associated elevator hoistway doors at the floor level designated for recall in accordance with Section 3003.2 shall be permitted to remain open during Phase I emergency recall operation.

4. Fire doors required solely for compliance with ICC 500 shall not be required to be self-closing or automatic-closing.

The change in question is Exception 2, which applies to Group I-1, Condition 2 buildings. Examples of Group I-1 facilities are alcohol and drug centers, assisted living facilities, congregate care facilities, group homes, halfway houses, residential board and care facilities, and social rehabilitation facilities. Condition 2 applies to buildings where residents receiving custodial care are able to evacuate with limited verbal or physical assistance.

The modification limits the exception to dwelling units in these occupancies that do not have a cooktop or range – the doors to the units, typically 20-minute fire doors, will no longer be required to be self-closing or automatic-closing. In my opinion, we will see the negative impacts of this change sooner rather than later. Just two weeks ago a fire occurred in an assisted living facility in Massachusetts, resulting in 10 fatalities. Investigations have shown that this fire was not caused by cooking equipment in the unit, but was likely related to smoking materials or an oxygen concentrator.

The only positive thing I can say here is that codes are a minimum. These doors can still be self-closing or automatic-closing, although the cost savings of omitting this hardware will be tempting. We'll have to wait and see how it all plays out, but I for one am really disappointed in this code change.

Do assisted living units need fire protection?

By: Lori Greene, I Dig Hardware Blog

I know that many people think the code development process is as exciting as watching paint dry, but I spend many hours with the BHMA Codes, Government and Industry Affairs Committee proposing and monitoring code changes. I am on the edge of my seat during the hearings where these proposals are discussed and voted on.

We are now in the code development cycle for the 2027 model codes – approved proposals will become part of the 2027 editions of the International Building Code (IBC), International Fire Code (IFC), NFPA 101 – Life Safety Code, etc. One proposal caught my eye, and in truth, a little tear leaked out. The proposal is called FS65-24, and you can read it here.

In the 2024 edition of the IBC (and prior editions), Section 716 – Opening Protectives, includes the requirements for fire door assemblies. One of the most important requirements for a fire door is that the door is closed and latched during a fire – this helps to deter the spread of smoke and flames that could pass through an open door. Currently, the IBC states: 716.2.6.1 Door closing. Fire doors shall be latching and self- or automatic-closing in accordance with this section. There are exceptions for communicating doors between hotel rooms, storm shelter doors, and one related to certain elevator hoistway doors.

Proposal FS65-24 would add another exception: Fire doors located in corridors and serving sleeping rooms in Group I-1, Condition 2 shall be permitted without automatic- or self-closing devices.

In the I-Codes, Group I-1 includes alcohol and drug centers, assisted living facilities, congregate care facilities, group homes, halfway houses, residential board and care facilities and social rehabilitation facilities, and here's how the code defines Group I-1, Condition 2: This occupancy condition shall include buildings in which there are any persons receiving custodial care who require limited verbal or physical assistance while responding to an emergency situation to complete building evacuation.

The most common example of Group I-1, Condition 2 is an assisted living facility. Although the types of living units and services may vary from one facility to the next, my grandmother lived in assisted living and I have visited assisted living apartments in other facilities as well. The buildings I visited were basically multifamily apartment buildings for seniors, typically one-bedroom or studio apartments with kitchenettes. Residents were able to request assistance from staff members for certain tasks – typically non-medical needs like bathing or getting dressed.

According to the IBC, residents of Group I-1, Condition 2 facilities are able to evacuate with limited assistance. Although they may have some physical limitations, they are expected to get themselves out of the building during a fire. For the most part, they are living independently, with some support when they need it.

Currently, the IBC requires doors serving residential dwelling and sleeping units, including assisted living units, to be self-closing, self-latching fire door assemblies. These are typically 20-minute fire doors, which will help to deter the spread of smoke and flames for at least 20 minutes. The proposed change would allow the closing devices to be omitted from assisted living unit entry doors, so the doors will be easier to open. The doors could also be left open for prolonged periods of time, as a resident or staff member would have to close the door manually.

I understand the reason this change has been proposed. Opening a fire door with a door closer can be difficult for someone with limited strength or who has a disability. BUT – these residents need the protection provided by a closed and latched fire door. In past apartment fires, unit entry doors and other fire doors that were open during the fire contributed to the fire's spread, sometimes leading to fatalities. A 2004 fire at the Rosepark Care Home in Uddington, Scotland resulted in the deaths of 14 elderly residents. An inquiry found that door closers on many of the unit entry doors had been deactivated or removed at the request of the residents or their families.

As I shared in a 2022 Decoded article, the NFPA reported that in 2020 there were 86,000 apartment fires in the U.S. – an average of 236 apartment fires PER DAY. This total applies to apartments of all types – not just to assisted living units. But the most common causes of home fires reported by the NFPA could apply to assisted living apartments: cooking, heating, electrical distribution and lighting equipment, intentional fire setting, and smoking materials.

Years ago, patient rooms in hospitals and nursing homes were required to have self-closing or automatic-closing doors. This requirement was removed from the model codes with the addition of increased requirements for automatic sprinkler systems in health care occupancies and the expectation that staff would be trained to close patient room doors if a fire occurred. The model codes no longer mandate 20-minute fire doors for these rooms in hospitals and nursing homes, but positive-latching hardware is required.

Although current codes require assisted living facilities to have sprinkler systems, the staffing levels in assisted living are much lower than in health care facilities. Staffing levels, particularly at night, could impact the process of manually closing any open fire doors in an assisted living facility. For example:

Health Care Facilities – Staff-to-Patient Ratio: A Critical KPI for Your Healthcare Practice: The ideal staff-to-patient ratio will vary depending on the type of healthcare facility and the needs of the patients. However, in general, a ratio of 1:4 or better is considered to be a good benchmark.

Assisted Living – Staff to Resident Ratios for Assisted Living: The US Department of Health and Human Services released a study that found that one-quarter of assisted living communities had a ratio of 1 PCA for each 23 or more residents. (PCA=personal care assistant)

There are products available that will close the unit entry door to provide the necessary fire protection, while also meeting the needs of assisted living residents, and I will share those in a follow-up post. But I sincerely hope that the ICC Technical Committee will see the potential dangers that would arise from dwelling unit entry doors (that are supposed to provide fire protection), standing open and allowing smoke and flames to spread, compromising the means of egress.

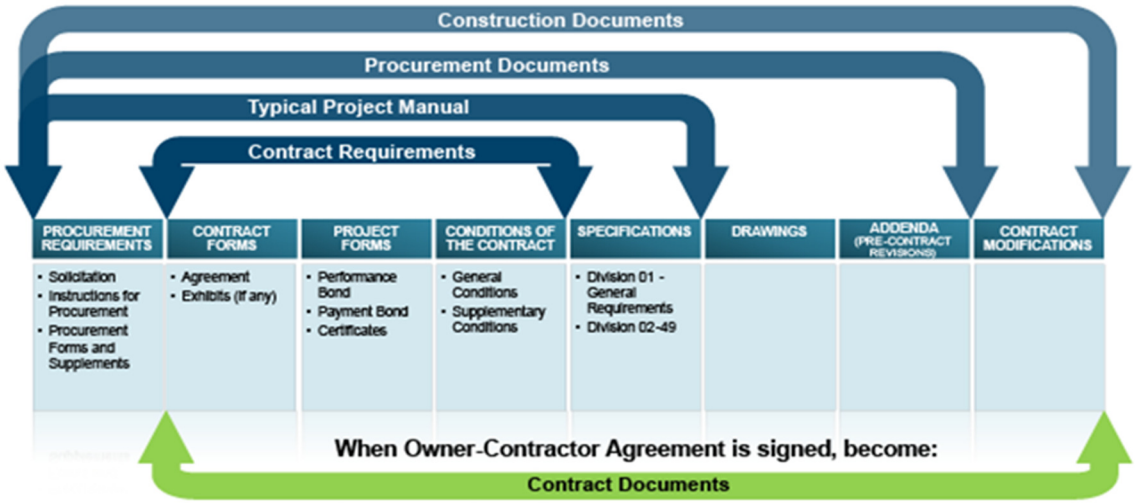
Interpretations and Clarifications Part 1 – Introduction to Resolving Conflicts, Ambiguities, and Discrepancies in Construction Documents

By: By Kevin O'Beirne, PE, FCSI, CCS®, CCCA®, CDT® .

This is the first in a three-part series on this blog addressing interpretations and clarifications of construction documents, comprised of: (a) Part 1 – Introduction to Resolving Conflicts, Ambiguities, and Discrepancies in Construction Documents; (b) Part 2 - Procurement and Construction Stages, and (c) Part 3 - "Order of Precedence" Clauses.

Few sets of construction documents are so perfect that they never need interpretation or clarification. Because construction documents are voluminous, complex, often involve multiple design disciplines, and are prepared by fallible individuals, they frequently contain conflicts, ambiguities, discrepancies, errors, omissions, or a combination thereof

While some owners, contractors, or other project stakeholders may sometimes unreasonably expect or demand perfection in construction documents, it is practically inevitable that one or more questions requiring interpretation or clarification will arise during the project's procurement and construction stages. As presented in the figure, below, a typical set of construction documents includes drawings, specifications, documents comprising "Division 00 – Procurement and Contracting Requirements", addenda, and contract modifications. The prevalence of the need for interpretations and clarifications implies that a reasonable number of garden-variety conflicts, ambiguities, and discrepancies in construction documents should be expected. Furthermore, the necessity for interpretations or clarifications likely falls within the design professionals' typical standard of care and should be anticipated by project participants. Fortunately, widely used standard construction contracts, as well as their associated standard form design professional services agreements, establish clear requirements for interpreting and clarifying construction documents.



“Information” or “Interpretation”?

This article addresses interpreting and clarifying the construction documents. Such requests are typically initiated via a written instrument commonly known as a “request for information,” “request for interpretation,” or “request for clarification.” Perhaps the most common of these terms is “request for information”. Regardless of whether it is a “request for information” or “request for interpretation”, such requests are often known as, “RFIs”.

Section 4.2.14 of AIA A201—2017, Standard General Conditions of the Contract for Construction, employs the term, “request for information”, although other, related provisions under Section 4.2 refer to the Architect rendering “interpretations”. The term, “request for information” is also employed in AIA A503—2017/2019, Guide for Supplementary Conditions, and AIA G716—2004, Request for Information (RFI). Interestingly, the term, “request for information” is not used in AIA B101—2017, Standard Form of Agreement Between Owner and Architect.

Both Paragraph 3.04.A of EJCDC C-700—2018, Standard General Conditions of the Construction Contract, as well as Exhibit A of EJCDC E-500—2020, Agreement Between Owner and Engineer for Professional Services, use the phrase, “requests for information or interpretation”. EJCDC does not publish a suggested RFI form.

The 2021 edition of the Construction Specifications Institute’s (CSI) construction contract administration forms includes, Form 13.2.A, “Request for Information”. CSI MasterFormat®—2020 assigns, “00 63 13 Requests for Information Form[,] Alternate Terms/ Abbreviations: RFI: request for interpretation, request for information”, and “01 26 13 Requests for Information”.

Despite the evidence, presented above, regarding documents published by CSI, EJCDC, and AIA, this writer believes the most appropriate term for an RFI is, “request for interpretation”. Whereas a “request for interpretation” clearly communicates that an interpretation of the construction documents is being requested, the term, “request for information” implies that the requestor is merely seeking information, not necessarily an interpretation. For example, a “request for information” might legitimately ask for the design professional’s telephone number or the address where a construction meeting will be held, which might also, more properly, be requested through routine communication methods. In contrast, a request for interpretation is clearly seeking an interpretation of some portion of the construction documents, whether due to an apparent conflict, ambiguity, or discrepancy.

Occasionally, RFIs may be misused when other forms of communication are more appropriate. In practice, while some design professionals, construction managers as advisor (CMa), and owners may, perhaps, view a contractor’s overuse and misuse of RFIs as an irritation, such misuse should be professionally and effectively nipped in the bud. While overuse and misuse of RFIs likely often arises from ignorance of other, more-appropriate forms of project communication, it may also signal a strategic intent to create a project record purportedly demonstrating that the construction documents were exceptionally defective, thereby laying the groundwork for one or more claims under the Spearin Doctrine. For example, when a contractor asserts that the poor quality of the project’s construction documents required issuance of an inordinate number of RFIs, others might presume there is a rational basis for concluding that the construction documents were, in fact, defective. Referring to RFIs as, “requests for information” may encourage a contractor, seeking to build a case for submitting claims under the Spearin Doctrine, to submit a large number of RFIs. In contrast, referring to RFIs as “requests for interpretation” may provide a basis for rejecting RFIs that are frivolous or that do not directly address apparent conflicts, ambiguities, or discrepancies in the construction documents. Specifications language in “Division 01 – General Requirements” that might provide a contractual basis for limiting frivolous RFIs and curtailing the misuse of RFIs might include the following:

- The architect and engineer are expressly obligated to do so by the provisions of AIA A201—2017 and AIA B101—2017, as well as EJCDC C-700—2018 and EJCDC E-500—2020.

- Licensed design professionals are obligated to act ethically and truthfully in the conduct of their profession (see Ethics: Codes of Conduct for Design Professionals Part 2 – Common Ethics Requirements, as well as Ethics: Codes of Conduct for Design Professionals Part 1 – Introduction and Ethical Dilemmas, and Ethics: Codes of Conduct for Design Professionals Part 3 – Ethics and Business Practices, previously published on this writer's blog).

- In the event the design professional were to render interpretations, clarifications, and decisions on the acceptability of the work in a manner partial to the owner, the contractor may pursue recourse against the owner via contractual procedures regarding changes, claims, and disputes, which, in turn, could lead the owner to pursuing recourse against the design professional in a similar manner. If the matter were escalated beyond the day-to-day members of the project teams, there will be increased likelihood that decisions will be rendered impartially, with associated potential for embarrassment and added cost incurred by the design professional and, possibly, the owner.

Personnel interpreting and clarifying the construction documents must act under the supervision and control of the design professional in responsible charge (see Responsible Charge: An Essential Concept for Design Professionals, previously published on this writer's blog). Interpretations and clarifications addressing the drawings, specifications, or other technical matters included in the statutory definition of the practice of the subject design profession, should not be furnished by personnel acting independently of the design professional who sealed and signed the associated drawings, specifications, and other, relevant instruments of service. Whether it is necessary for the design professional in responsible charge to issue an interpretation or clarification under their signature may be debatable, but exercising appropriate supervision and control is necessary.

In some cases, especially when the design professional did not prepare the project's documents in "Division 00 – Procurement and Contracting Requirements", the design professional may be unable to render an appropriate interpretation or decision. In recognition of this, EJCDC C-700—2018, Paragraph 3.04.C, states in part:

"If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly notify Owner and Contractor in writing that Engineer is unable to provide a decision or interpretation."

AIA documents do not appear to include any language similar to C-700 Paragraph 3.04.C.

When the project includes a construction manager as advisor (CMa), the construction documents will typically require that written communications flow between the CMa and the contractor. When RFIs concern technical matters related to the design professional's instruments of service, including the drawings and specifications, the CMa will typically forward such RFIs to the design professional for a response. The design professional will issue their response to the CMa, who will then forward it to the entity issuing the RFI (i.e., the contractor or owner). While this process may appear somewhat cumbersome, it preserves and respects the appropriate lines of communication during construction. (For additional information on communications in projects involving a CMa, see Specifications for Projects with a Construction Manager as Advisor, previously published on this writer's blog.

Some non-standard construction contracts empower the owner to render interpretations and clarifications. When contracts include such a provision, the owner likely does not intend to interpret the design intent expressed in the drawings and specifications, but may desire to control communications between the design professional and contractor. When the contract includes such language, and the owner has retained the design professional to perform construction phase services, the owner will typically furnish the contractor's RFIs to the design professional, followed by reviewing the design professional's response prior to transmittal to the contractor. Owners incorporating such language into their construction contracts, and who either render their own interpretations or clarifications without the design professional, or who edit the design professional's interpretations or clarifications, may increase their risk by unintentionally sharing in the architect's or engineer's professional liability and, perhaps, opening themselves to contractor claims of partisan interpretations of the construction contract. Accordingly, owners who control the language and issuance of interpretations, clarifications, and decisions on the acceptability of the work, should do so with considerable care and judgment.

Artificial intelligence (AI) has become an extremely useful tool for teams implementing capital projects and may be useful in evaluating construction documents relative to rendering interpretations and clarifications. However, as with any new technology, AI should be used properly in accordance with the applicable standard of care, and in accordance with the design professional's own policies or guidelines on AI use. Regardless of the tools employed by the design professional or others for evaluating and interpreting the construction documents, the contractual and ethical requirements for impartiality, the need for professional competence, and the applicable standard of care should all play a role in any decision to use AI in connection with the interpretation or clarification of the construction documents.

AI may be employed in evaluating construction documents by uploading the specifications, drawings, and other elements of the construction documents into a free, commercially available AI model such as "CoPilot", on Microsoft Bing, "Gemini" by Google, "ChatGPT" by OpenAI, and others, together with typing into the AI an appropriate question, such as that posed in the submitted RFI. The principal advantage of using AI is greater efficiency and reduced time required for team members evaluating the construction documents and drafting the interpretation or clarification. Drawbacks of using AI for interpreting and clarifying construction documents, include:

- Potential, inappropriate use of others' intellectual property (i.e., copyright infringement).
- Potential incorrect information, often termed "hallucinations".
- Potential failure to comply with the applicable standard of care.
- Failure to meet client expectations and clients' perception of value.
- May promote tendency of personnel to rely on AI rather than in-house human expertise and personal, direct review of the construction documents.
- Sharing the firm's intellectual property with external AI large language models (LLM). In other words, uploading the construction documents to an AI LLM results in training someone else's AI.

Locations of Requirements in the Construction Documents

RFIs may be submitted during the bidding or procurement process, as addressed in the project's instructions to bidders, or during construction, as addressed in the contract documents.

Standardized instructions to bidders in widespread use in the United States typically address procurement stage requests for interpretation or clarification in the same article or provision governing issuance of addenda. AIA A701—2018, Instructions to Bidders,

Many construction documents include more-extensive requirements governing RFIs submitted after the construction contract is signed and effective. Basic requirements concerning interpreting and clarifying the construction contract documents are typically set forth in the general conditions, such as EJCDC C-700—2018 Paragraph 3.03 (“Reporting and Resolving Discrepancies”), Paragraph 3.04 (“Requirements of the Contract Documents”), and Paragraph 10.06 (“Decisions on Requirements of Contract Documents and Acceptability of Work”), and AIA A201—2017 Sections 4.2.11 through 4.2.14. Such provisions of the general conditions are often more detailed than their counterpart provisions in the associated instructions to bidders.

In addition, many sets of construction documents expand on the general conditions’ requirements concerning RFIs in the specifications of “Division 01 - General Requirements.” CSI MasterFormat—2020 assigns, “01 26 13 Requests for Information”, and “01 26 19 Clarification Notices”. Alternatively, some design professionals and owners may elect to include such requirements in a higher-level section assigned by MasterFormat, 01 26 00 Contract Modification Procedures, even though RFIs, interpretations, and clarification notices are not contract documents and do not modify the construction contract. MasterFormat also assigns, “00 63 13 Requests for Information Form”, and “00 63 19 Clarification Form.” However, despite MasterFormat assigning these numbers and titles, this author recommends binding proposed RFI and clarification notice forms into the construction documents as attachments to the associated Division 01 specifications, rather than as standalone documents under “00 63 ##”.

The content of Division 01 specifications addressing RFIs and clarification notices will depend on the general conditions incorporated in the construction documents. Topics relevant to RFIs and clarification notices that may be addressed in Division 01 include:

- Requirements regarding where and to whom RFIs should be delivered.
- Requirements for the contractor to maintain, whether at the site or at another, reasonably accessible location, copies of interpretations and clarifications issued.
- Clear distinction should be made in the construction documents concerning the differences between RFIs and clarification notices. RFIs typically originate with the owner, contractor, a subcontractor, or supplier, and are transmitted to the design professional (or CMa, if any) for a response. In contrast, clarification notices, when issued, originate with the design professional or CMa and are issued to the contractor and owner without an associated RFI. Clarification notices may be issued when the design professional or CMa becomes aware, without an associated RFI, of the need for an interpretation or clarification.
- Requirements for preparing RFIs.
- Procedures for submitting and responding to RFIs, including requirements when the RFI lacks sufficient clarity for the design professional or CMa to furnish a response.
- Requirements for preparing and issuing clarification notices.
- Procedures for transmitting clarification notices.
- The parties’ recourse when they believe an RFI response or clarification notice will result in a change in the contract price, contract times, or both, or if a recipient does not understand or disagrees with the RFI response or clarification notice.
- Required forms, if any, for RFIs and clarification notices. Alternatively, the associated Division 01 specifications may require use of widely-used standard forms by expressly indicating the forms designation and title, such as AIA G716—2004, Request for Information (RFI), CSI Form 13.2.A, “Request for Information”, and CSI Form 13.3A, “Clarification Notice”, rather than by binding the forms into the specifications. When widely-used forms are expressly required by name, the Contractor should obtain their own, duly licensed copy of such forms, rather than seek to obtain them from the design professional, CMa, or Owner.

Conclusions

Interpretations and clarifications are an inevitable part of procurement and construction of capital projects. Although such requests are often termed, “request for information”, only requests for **interpretation** should be allowed under the construction contract, to reduce the potential for the contractor building a case for a claim under the Spearin Doctrine. In the design-bid-build project delivery method, the design professional, bound by the applicable standard of care, is typically the entity rendering interpretations and clarifications of the drawings, specifications, and related modifications. However, when a CMa is involved, transmittal of interpretations and clarifications will typically be through the CMa, who will often forward RFIs to the design professional when they relate to the design professional’s instruments of service. Basic requirements for RFIs arising during the bidding or procurement stage should appear in the instructions to bidders, whereas more detailed requirements for construction stage interpretations and clarifications are set forth in the general conditions and are often augmented by requirements in the Division 01 specifications.

Forthcoming installments in this series will address interpretations and clarifications during a project’s procurement and construction stages, and “order of precedence” clauses used in construction documents.

Acknowledgements: The author gratefully acknowledges the assistance of James K. Lowe, Jr., Esq., who kindly reviewed and commented on drafts of this article. Mr. Lowe is an attorney and licensed professional engineer (VA, emeritus), who has more than 45 years’ experience in the A/E industry. The author is solely responsible for the content of this article.

Kevin O’Beirne, PE, FCSI, CCS®, CCCA®, is a professional engineer licensed in NY and PA with over 35 years of experience designing and constructing water and wastewater infrastructure for public and private clients. He is the engineering specifications manager for a global engineering and architecture design firm. He has been a member of various CSI national committees and is the certification chair of CSI’s Buffalo-Western New York Chapter. He is an ACEC voting delegate in the Engineers Joint Contract Documents Committee (EJCDC) and lives and works in the Buffalo, NY, area. Kevin O’Beirne’s LinkedIn page.

Concrete

Jon Belkowitz, PhD, PE *• Chief Technical Officer*

Have you noticed concrete surfaces becoming softer and more vulnerable? You're not alone. Contractors and asset owners alike have been increasingly facing this challenge.

But what's behind this troubling trend?

It all comes down to the science of concrete surface integrity—specifically, the migration of bleedwater, coalesced air and salts.

When fresh concrete settles, bleedwater migrates upward, bringing with it dissolved salts and minerals.

As the water evaporates, these salts concentrate at or just beneath the surface, forming a weakened, porous zone. This compromised layer significantly reduces the surface's resistance to physical abrasion and chemical attacks, especially from deicing salts and environmental contaminants.

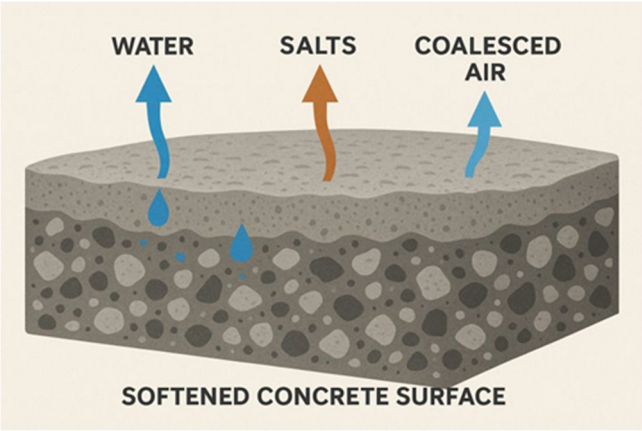
The result? Surfaces that prematurely degrade, crack, and spall—leading to higher repair costs and shorter infrastructure life.

Understanding the underlying mechanisms of bleedwater and salt migration can empower contractors and asset owners to make better decisions—from optimized mix designs to improved curing practices—to prevent surface softening before it becomes an expensive problem.

+ Admixture Incompatibility Evaluation: Certain chemical admixtures, when combined, can cause unintended reactions, increasing bleeding, segregation, or delayed set times, all of which may contribute to a weakened surface. Evaluating the compatibility of admixtures through trial batches and observing interactions helps prevent these problems.

+ Binder Manipulation for Greater Cohesion: Adjusting the binder composition (e.g., incorporating supplementary cementitious materials like fly ash, slag, silica fume, or colloidal silica) enhances paste cohesion and reduces bleedwater migration. This results in a denser and more durable concrete surface, minimizing susceptibility to physical abrasion and chemical attacks.

+ Lower Water Content: Reducing the water-to-cementitious materials (w/cm) ratio decreases bleeding, as there's less free water available to migrate upwards. A lower water content increases concrete strength, density, and durability, significantly improving the surface resistance to degradation and reducing permeability to harmful salts and chemicals.



Let us know if you have any concrete questions!!!

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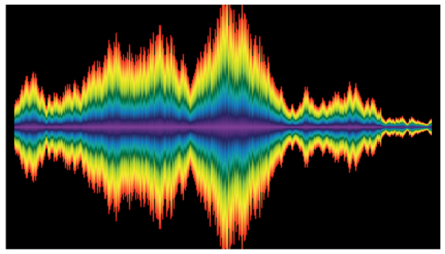
Sound Advice from an Old Firestop Guy – Part 2: What is Sound? And How is it Controlled?



By Tim Mattox / Senior Manager of Systems & Testing Development
Excerpted from “The Burn” STI Newsletter

In Part 1 of this series which appeared in the last issue of The Burn, we learned how ASTM E90 is used to measure sound transmission loss across a barrier and how the range of data gathered from testing is converted to a single number rating we call Sound Transmission Class (STC) which represents the sound transmission performance of a barrier. But have you ever stopped and contemplated what sound is? Are you curious how sound is affected by different barriers? Have you ever considered the answer to that philosophical question, does a tree falling in the woods make a sound if nobody is there to hear it? Today is your lucky day because we are going to take a closer look at sound, what it is, what measures can be taken to reduce sound transmission across a barrier, and how proper firestopping plays a major role. We might even answer that question about the tree.

In the Art of War, Sun Tzu states “If you know the enemy and know yourself, you need not fear the result of a hundred battles. If you know yourself but not the enemy, for every victory gained you will also suffer a defeat. If you know neither the enemy nor yourself, you will succumb in every battle.” When we talk about reducing sound transmission, we should treat sound as the enemy we aim to defeat. We should know our enemy which is the purpose of this article. Hopefully, you already know yourself and, if what Sun Tzu says is true, we should be well on the way to defeating the enemy.

Sound is all around us. It always exists, and it affects us in many different ways. The textbook definition of sound is that it is a vibration that propagates as an acoustic wave through a transmission medium such as a gas, liquid, or solid. Acoustics is a very technical subject, but if you think about it, we all intuitively know quite a bit about sound. Sound can be soft or loud, high-pitched, low-pitched, annoying, or pleasant. Because sound is a series of pressure pulses, you sometimes can actually feel it. Ludwig Van Beethoven, who famously wrote his 9th and final symphony well after he was fully deaf, was said to sit at the piano holding a pencil in his teeth, touching the other end to the soundboard so he could feel the vibration of the note. Sound truly is a multi-sensual phenomenon.

Many descriptive terms are used to define unique sounds, including amplitude, frequency, pitch, tone, quality, color, and timbre, to name a few. We are going to focus on the first two of these terms, amplitude, and frequency, because these are the two characteristics we use when measuring sound transmission loss. The other terms address the uniqueness of a sound. For example, you can play the same note (frequency) on a trumpet and a saxophone at the same volume (amplitude), but they sound different, even though the frequency and amplitude are the same. That is because the instruments mold the sound differently and the shapes of the sound waves vary depending on the instrument, and even because of the person playing the instrument.

All waves, not just sound waves, have an amplitude and frequency. For sound waves, changes in amplitude register to us as a change in volume which is measured in decibels. A decibel is one tenth of a bel, named in honor of Alexander Graham Bell, and in sound measurement it is 10 times the logarithm of the measured sound pressure divided by a referenced sound pressure. In the case of sound pressure decibels, the reference sound pressure is 20 µPa which is the typical human limit for hearing a 1000 Hz frequency. When the measured sound pressure is the same as the reference sound pressure, the sound level is calculated to be 0 decibels. In other words, a 0 dB signal represents the quietest sound a human can detect. Frequencies register to us as pitch, so the lower the frequency the lower the pitch, and vice versa. Frequencies are measured in Hertz. Very simply, Hertz is an indication of how many full cycle pulses occur in 1 second of time. So, a 100 Hertz frequency indicates that 100 wave pulses occur in 1 second.

When looking at a visual image of a wave pattern, we are most familiar with a transverse wave which is the type of wave we visually see when we are at the beach watching the waves roll in until they break at the beachfront. However, sound waves do not travel as transverse waves but rather as longitudinal waves. To illustrate this, in a longitudinal wave, the motion of the wave is in the same direction the wave is traveling, whereas, in a transverse wave, the wave motion is perpendicular to the direction the wave is traveling. Within this article, we will use transverse waves to illustrate how sound waves behave when confronted by a barrier as they are easier to visualize.

Below are two charts to further explain what is happening to a wave when we talk about changes in amplitude and frequency. Figure 1 shows the difference in wave pattern when a change in amplitude occurs, but the frequency remains the same. You can see that the peaks and valleys occur at the same time, but there is a change to the wave vertically. The sound represented by the orange wave would have the same pitch as the blue wave but would register as a louder sound. In other words, the orange wave has a higher energy level than the blue wave. Figure 2 shows the difference in wave pattern when the amplitude stays the same, but the frequency changes. In this particular case, the frequency is doubled from the blue wave to the orange wave. As you can see, the orange wave has four full cycles that occur in the same time period where the blue wave has two full cycles. If the chart represents 1 second of time, the blue wave would have a frequency of 2 Hz and the orange wave would have a frequency of 4 Hz.

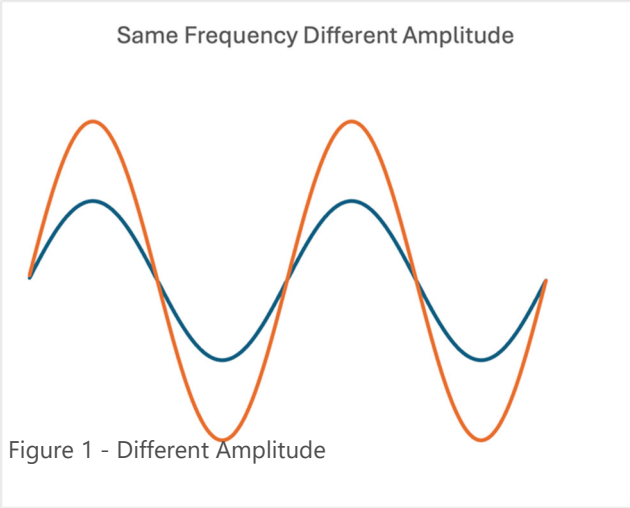


Figure 1 - Different Amplitude

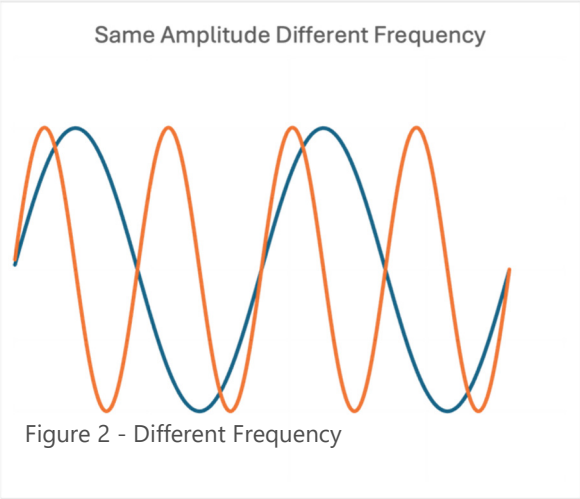


Figure 2 - Different Frequency

Sound waves initiate from a vibration, which can come from any source that produces vibrations, such as a speaker cone or vocal cords or maybe a vacuum cleaner or a car speeding down a street, for example. They can also come from something impacting a surface. However, when we are talking about STC performance, we are only addressing airborne sounds or those sounds that impact a surface after traveling through air. The vibration creates pressure pulses that travel until they reach an object that receives the wave, such as our ears, and the sound wave is interpreted as noise. As they travel, sound waves will lose energy through various means, producing a reduction in amplitude over distance traveled. This is especially impacted when there is a barrier, such as a wall or floor, where the wave will undergo changes in energy level in a significant way. That loss of energy from one side of a barrier to another is called sound transmission loss.

The image below shows what happens to sound waves when they reach a barrier, such as a wall. Earlier, I mentioned that sound waves lose energy as they travel, but actually, that is not really the case. What is actually occurring is an energy balance. Newton's First Law of Thermodynamics tells us that energy cannot be created nor destroyed, that it can only be converted from one form to another. So take a look at the image in Figure 3 while I explain. A sound wave with a known decibel level will travel freely in air with virtually no energy loss until it impacts something such as a sound barrier. The initial energy the wave has that impacts the barrier is called the Incident Energy, and is represented by the wave labeled Ei. Some of the wave energy will reflect off the wall and some energy will transfer through the wall. These energies are represented by the labels Er and Et respectfully. You will notice that the amplitude of the Et wave reduces as it penetrates through the wall, but we know from the 1stLaw that energy cannot be created nor destroyed, so where does the energy go? That energy is spent causing the vibration of the materials, and that vibration causes friction to occur. We know instinctively, when we rub our hands together on a cold day, that friction produces heat. It is no different here. The energy loss due to friction is actually energy that is transformed into heat energy which dissipates into the air. In actuality, the incident energy (Ei) equals the sum of the Reflected Energy (Er) plus the Energy Transmitted (Et) plus the Energy absorbed or transformed into heat (Ea). The energy is balanced. Sir Isaac Newton was correct.

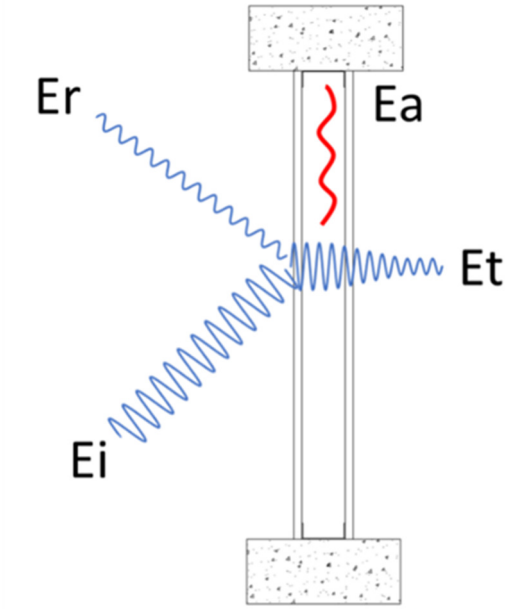


Figure 3 - Energy balance for sound waves impacting a wall

So why is all of this important? Because this is all part of knowing your enemy. If you know what causes your enemy to lose energy, you know what to concentrate on to defeat the enemy. Here is where firestopping emerges as a critical strategy for improving sound transmission loss. The first thing to realize is that where air freely travels from one compartment to the next, sound waves will also travel freely as there is nothing there to combat the sound wave and reduce the energy. Sealing against the free travel of air is the primary target on which to focus because it will have the greatest effect on the reduction of sound transmission, weakening the enemy. In proper firestopping, we install materials that effectively stop fire and smoke from moving from one compartment to another. From a sound transmission perspective, it is the smoke control that makes firestopping an excellent weapon used to defeat the enemy. So, if you have a fire-resistance -rated barrier that requires a firestop for joints and penetrations, look for systems that include low L ratings, as these will be the best choice, not only for smoke control but also for sound control.

Now for the big question, does a tree falling in the forest make a sound when nobody is there to hear it? Maybe you picked up on this earlier in the article, but a sound wave is just a sound wave until it is received by a listener and interpreted as noise. So as the tree falls and impacts the ground, it will produce a sound wave because the action of impacting the ground will create pressure pulses. Whether it produces a noise or not depends on the presence of someone there to interpret the sound.

To be continued…. Next topic, what firestop materials are the best sound performers.

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