Electromagnetic Locks: Approved, Listed, Recognized & Certified

Maglocks are relatively inexpensive, work many door and gate types, have no moving parts and are reliable and cost effective.

By Tim O’Leary

A n electromagnetic lock is a locking device that consists of an electromagnet and armature plate. By attaching the electromagnet to the door frame and the armature plate to the door, a current passing through the electromagnet attracts the armature plate holding the door shut.

Unlike an electric strike, a magnetic lock is a non-latching type of device, and it also has no integral mechanical means of unlocking it. This limits the possible applications for electromagnetic locks to those situations not requiring a positive latching device and where a direct non-electronic but mechanical means of unlocking is required (such as in a Fire-Rated opening).

It is almost a universal requirement that the opening always provide free egress, although certain notable exceptions (generally referred to as special locking arrangements) have made their way into the building codes and are seen far more frequently these days.

Typically the same requirement for mechanical means of unlocking also includes that the means to unlock is on the door, requires a single hand/arm motion; and is universally recognized as how a person would open a door (such as a lever or an exit bar). Also typically required are that the lock be fail secure (will remain locked if power is removed).

Electromagnetic locks are always intrinsically fail-safe. When the power to them is removed, the magnetic field collapses, and they no longer are securing the door. This feature creates two secondary consequences. For certain security applications, removal of power to the lock creates a security breach, and in the interests of life safety, the possibility that the means to remove the power might be compromised creates an unacceptable hazard to building occupants.

Building Codes and Fire Marshals favor positive latching locking devices because over time they have proven to save lives. By remaining latched, positive latching doors mitigate the spread of smoke and fire, therefore allowing occupants more time to escape. Positive latching doors also protect first responders from premise fire induced explosions creating flying projectiles out of perimeter structure doors.

Despite these constraints, maglocks represent an important product group to electronic security and access controls.

Of the terms used in electronic security and electromagnetic locks, “APPROVED, LISTED, RECOGNIZED and CERTIFIED” are among the most important, and most mis-used and misunderstood.

UL (Underwriter’s Laboratories) is an independent, not for profit, testing laboratory. They perform tests on devices. Once a device has been tested and passes UL testing it will either be UL Listed, UL Recognized or UL Certified.

UL Listed means that the product has passed testing. The UL label will show the category that UL has employed for testing. A panic bar might be labeled “Listed Exit Device.” A magnetic lock might be labeled “Listed Auxiliary Lock.”

The label will also include a four letter code, for example “GWXT,” which is assigned based on the product category and type of tests. It is important that a device is listed for the application in which it is used.

Securitron’s Model 62 Magnalock® became the first electromagnetic lock to pass a battery of UL tests and achieve the status of UL Listing in 1984. UL created a new code (FWAX2) for this device.

This fact that Securitron was first to achieve UL Listing is interesting when you realize that Irv Sapirstein, the founder of Locknetics, had built the first magnetic lock in 1969 and in 1983, there were three major players in the electromagnetic lock market; Securitron, Locknetics and Security Engineering.
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UL Recognized is the status UL grants to a component which needs to be combined with other components to create a finished product. UL Certified means a product that has been successfully tested by UL to a non-UL standard, most often an ANSI standard.

ANSI (American National Standards Institute) presides over the creation of product specific standards. The ANSI magnetic lock standard was published around 1991 and it included some performance grades based on variables such as holding force.

Most domestic magnetic lock manufacturers are members of BHMA (Builder’s Hardware Materials Association).

The Local Authority Having Jurisdiction (LAHJ) has the final word as to approval of a locking system. The LAHJ may be a building Inspector Fire Marshal or other code official. Sometimes a premises will be under multiple LAHJ jurisdictions.

Since the LAHJ is the last person you will have to get an OK from, it stands to reason that he be the first entity you contact when planning and proposing a project.

Securitron has published a manual for AHJs which is also very useful to locksmiths and access control dealers, downloadable at http://www.securitron.com/Other/Securitron/Documents/AHJ-Handbook.pdf.

Egress Doors
An Egress door is an exit designed to allow the occupants of a building to evacuate safely during an emergency. Egress doors are regulated by local building codes, which stipulate how many doors are required and the requirements for each exit.

Most U.S. building codes relating to egress doors are based on standards developed by the National Fire Protection Association (NFPA). NFPA Standard 101 stipulates have an egress door should be operated, installed and controlled. The NFPA guidelines are based on the building’s function and occupant load, as well as on the presence of hazardous or combustible materials.

According to NFPA 101, an egress door is not limited to simply exit door that leads outside. Instead, every door along the building’s egress path is considered an egress door. This includes doors that lead from various rooms to the exit, such as office or hallway doors located throughout the building. It also includes doors leading to an exit, which often includes stairwell or lobby doors. Finally the exit door itself, which allows occupants to move from the building to a public space, is also considered an egress door.

Once standards are incorporated into a building code they become legally binding for architects, contractors, building managers and locksmiths.

An egress door must meet specific requirements before the building is approved by the local fire marshal or building inspector. All egress doors must be at least 32 inches (81 cm) wide in new buildings, or at least 28 inches (71 cm) wide in existing structures. No single exit door can be wider than 48 inches (121 cm) because the size and weight of the door may slow evacuation. The door must also swing in the direction of egress if the building has more than 50 occupants, or if the building is at a high risk for fire emergencies.

All locks must be unlockable using a single motion from inside the room. This means that a separate deadbolt and a separate latching lockset are not acceptable, as they would require more than one action to unlock.

Double-sided deadbolts are also unacceptable because they cannot be unlocked from inside the space at all times. All locking devices must permit re-entry into the building from a stairwell.

No chains, bolts or bars may be placed on an egress door when the building is occupied. In many cases an exit device, or “panic bar” is the best type of hardware for securing an egress door, especially in heavily occupied spaces.

An egress door is not the same as a fire door. A fire-rated opening is designed to reduce the spread of flames and smoke during a fire. It is equipped with a fire-resistant core and specialty hardware to ensure it stays closed and latched during a fire. Egress doors are designed to allow for quick and safe egress during any type of emergency. They may or may not be fire-rated, and are used to allow as many people as possible to exit without panic or injury.

The term Access Controlled Egress Door is frequently used, and it describes a door which falls under the above definitions, with the addition of being equipped with some form of access control. This will usually include a card reader on the outside, and some type of electrically actuated or controlled locking device. When access control is specified, it is sometimes also required that traffic be controlled in both directions through the door.

Another commonly implemented feature involves the automatic locking and unlocking of perimeter doors of a structure. Sometimes a way of gaining access into the building during those times the doors are locked is provided.

In all these situations, the means of egress become a pivotal issue, and the subject of scrutiny by equipment manufacturers, system designers and code officials.

Found in all years of IBC and IFC, Access Controlled Egress Doors is a carry-over from the legacy codes of the 1980s and 1990s. Originally submitted as an alternative code for use with maglocks and all-glass doors, it provides an egress alternative for maglocks used with existing door hardware.

Electrification of door hardware and its control by computers and software resulted in additional concerns about egress safety. During the first few years of IBC/IFC, this was the only arrangement accepted by IBC for the release of maglocks. Because of security tie-in with the fire alarm system, and “sensor” unlocking doors when people are near, it
limited an electromagnetically locked door from providing security and protection. Also, due to non-specific wording regarding the type of lock it referenced, it has led to creative and sometimes expensive interpretation.

**IBC 2006**

**IBC 1008.1.4.4 Access-controlled egress doors**
The entrance doors in a means of egress in buildings with an occupancy in Group A, B, E, I-2, M, R-1 or R-2 and entrance doors to tenant spaces in occupancies in Groups A, B, E, I-2, R-1 or R-2 are permitted to be equipped with an approved entrance and egress access control system which shall be installed in accordance with all of the following criteria:

1. A sensor shall be provided on the egress side arranged to detect an occupant approaching the doors. The doors shall be arranged to unlock by a signal from or loss of power to the sensor.
2. Loss of power to that part of the access control system which unlocks the doors shall automatically unlock the doors.
3. The doors shall be arranged to unlock from a manual unlocking device located 40 inches to 48 inches (1016mm to 1219mm) vertically above the floor and within 5 feet (1524mm) of the secured doors. Ready access shall be provided to the manual unlocking device and the device shall be clearly identified by a sign that reads "PUSH TO EXIT." When operated, the manual unlocking device shall result in direct interruption of power to the lock—indeed dependent of the access control system electronics—and the doors shall remain unlocked for a minimum of 30 seconds.
4. Activation of the building fire alarm system, if provided, shall automatically unlock the doors, and the doors shall remain unlocked until the fire alarm system has been reset.
5. Activation of the building automatic sprinkler or fire detection system, if provided, shall automatically unlock the doors. The doors shall remain unlocked until the fire alarm system has been reset.
6. Entrance doors in buildings with an occupancy in Group A, B, E or M shall not be secured from the egress side during periods that the building is open to the general public.

**In Plain English:**
- Use a motion detector (XMS), a button/timer (EEB), and connect the power to the fire and sprinkler system for release upon alarm. It cannot rearm until the fire and sprinkler systems are reset.
- Mount the button/timer within ADA guidelines not more than 5 feet from the door.
- Do not use in use and occupancy groups not scheduled in the code.

**IBC/IFC 2007 Supplement and 2009**

IBC 1008.1.8.7 Electromagnetically locked egress doors. Doors in the means of egress that are not otherwise required to have panic hardware in buildings with an occupancy in Group A, B, E, M, R-1, or R-2 and doors to tenant spaces in Group A, B, E, M, R-1 or R-2 shall be permitted to be electromagnetically locked if equipped with listed hardware that incorporates a built-in switch and meet the requirements below:

1. The listed hardware that is affixed to the door has an obvious method of operation that is readily operated under all lighting conditions.
2. The listed hardware is capable of being operated with one hand.
3. Operation of the listed hardware directly interrupts the power to the electromagnetic lock and unlocks the door immediately.
4. Loss of power to the listed hardware automatically unlocks the door.
5. Where panic or fire exit hardware is required by section 1008.1.10, operation of the listed panic or fire exit hardware also releases the electromagnetic lock.

**In Plain English:**
- Use of scheduled hardware that incorporates a built-in switch can release an electromagnetic lock as long as it can be operated with one hand and its method of operation is common knowledge.
- Opening is within the use and occupancy limitations of the code.
- There are no tie-in requirements with the fire and sprinkler systems.
- There are no button or sensor requirements.

**Securitron Q &A**

Locksmith Ledger asked Dick Kreidel, vice president, strategic initiatives, ASSA ABLOY EMS and OEM Group, these specific questions about the code and its impact on the locksmith industry.

**What building codes are currently used in the U.S.A.?**

Currently there are only two building
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codes in common use in the U.S.; NFPA 5000 and IBC. NFPA 5000 is used in only a couple of States, but the Means of Egress section, NFPA 101, is in common use in federal government facilities and is referenced in most state and local codes. The International Building Code (IBC) is by far more prevalent, but IBC is a Model Code and there are a great many variations, both in the date of the code (i.e., IBC 2006, IBC 2009, etc.) and in State and local enhancements, or "amendments" as they are more commonly known. These amended building codes are most often referred to by their state or local version, such as California Building Code (CBC) or Florida Building Code (FBC).

How does the installer determine which building code is followed?
The installer should contact the Building Department of the jurisdiction where the jobsite is located and ask what model code is used, the year, and any changes made by the local jurisdiction. This is the only reliable way to ensure the installer will be compliant with local regulations, and avoid misunderstandings with the local AHJ.

How do regulations for Access Controlled Egress Doors and Delayed Egress differ from code to code?
The best answer to this is found in the Code Inspector's Handbook for Understanding Electric Locking Hardware pages 17-20. Ledger readers interested in this handout can contact Securitron's literature dept.

How do recent code revisions impact how the installer designs and installs electromagnetic locks?
Adoption of the 2009 IBC returns the release of an electromagnetic lock back to the user by releasing the door "only" when an attempt is made to exit. This is done by using a listed and approved switch mounted in a bar. Although NFPA has always allowed this, when IBC was formed in 2000 from the legacy codes this option was left out. Bars with switches require no other devices and do not have to be connected to the fire system. Under IBC 2009, doors requiring panic hardware cannot have maglocks, but recently approved IBC 2012 will allow this.

Which Securitron products help the installer achieve code-compliant installations?
The Securitron DSB which combines mechanical switches as the primary release mechanism with the familiar Touch Sense technology for added reliability and speed. Securitron offers Delayed Egress in both positive initiation and door movement initiation; it is available for both rated and non-rated door assemblies. Securitron also offers standard Touch Sense exit devices along with PIR exit sensors and 30 second timed release buttons to meet most every code.

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