A Complete Guide To Electric Strikes

SECTION I

Taking Access Control into the Next Century

As the access control industry continues to grow, so does the use of related products such as electric strikes. The access control professional's ability to select, install, and service electric strikes is extremely important to the future success of his/her business.

Selecting the correct access control electric locking device does not have to be a task for a specialist. This comprehensive guide provides the necessary information to understanding electric strikes.

Figure 1.1

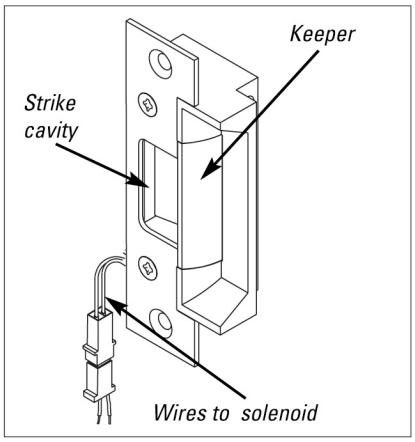
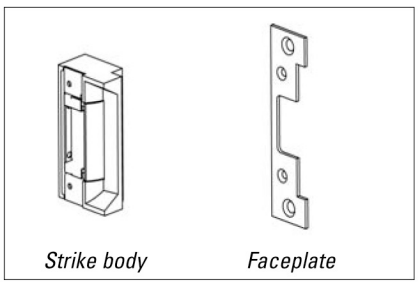


Figure 1.2



What are Electric Strikes?

Electric strikes are electromechanical door locking devices for use with various latch bolt locksets that are installed in place of the conventional lock strike plate. They are used in conjunction with various locksets and various access control devices to provide additional security, traffic control, and convenience of remote operation.

Electric strikes are generally low voltage devices that use a solenoid to control a movable keeper (or gate). The keeper interacts with the latch bolt of the lockset on the door and allows the door to be opened upon activation even though the latch bolt of the lockset is in the extended position.

Electric strikes can be used for many types of applications including interior control, perimeter control, stairwell control, elevator control, and fire exits.

Every year around the world, more businesses and homeowners find peace of mind through the installation of security systems. They depend on their alarm systems to function properly… Don't let the electric strike be the weak link in your system. (See Figures 1.1 and 1.2)

The Complete Guide to Electric Strikes is divided into the following five sections:

I. Specifying the appropriate electric strike to meet your customer's needs.

II. Basic tools used in the installation of an electric strike.

III. Electric strike installations.

IV. Understanding basic electronics.

V. Troubleshooting.

Specifying the Proper Electric Strike to Meet Your Customer's Needs

There are over one hundred types of electric strikes available on the market designed to accommodate many types of locksets. Couple this with other factors that must be considered when selecting the appropriate electric strike and the task can seem overwhelming.

Follow these five steps to help determine which electric strike is appropriate for your application.

The access control professional's ability to select, install and service electric strikes is extremely important to the success of his/her business.

1: Identify the customer's needs for security

When it comes to making a decision about electric strikes, you have a choice. The prices range from about $30 to over $300. It is imperative that you choose an electric strike based on your customer's needs rather than on price alone.

Frequently, a tremendous amount of money is put into the access control system, but when it comes to the electric strike, corners are cut.

Don't install an electric strike just because it is the cheapest product on the market.

What happens if that product fails soon after it is installed? You may only have to spend $30 or $40 to replace the electric strike, but how much time will you spend going back to the site? How much is your time worth?

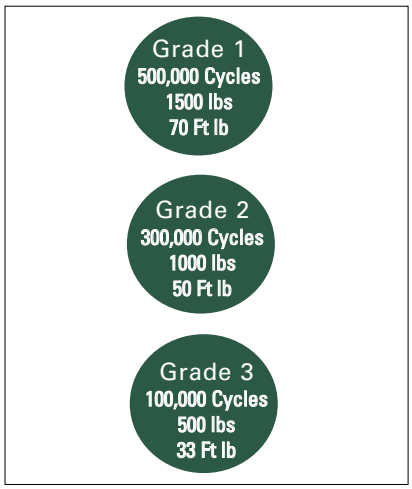
Performance tests have been established to ensure safety, security, and stability to which the public is entitled.

Performance and durability levels are governed by industry standards established by organizations such as the American National Standards Institute (ANSI), Builder's Hardware Manufacturers Association (BHMA), and Underwriters Laboratories Inc. (UL).

These written descriptions and criteria precisely define the appropriate operation, performance characteristics, physical properties, test values, usage parameters, safety criteria, and other factors of builder's hardware products. BHMA is the only U.S. organization accredited by ANSI to develop and maintain performance standards for builder's hardware.

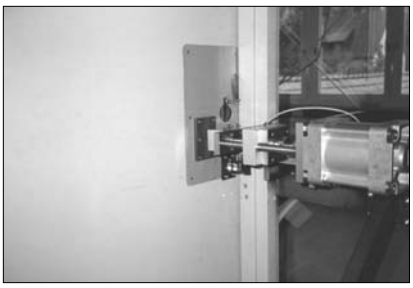
Lockset hardware and electric strikes fall under the same ANSI/BHMA product grading. Performance level benchmarks are defined by ANSI/BHMA standards and are assigned Grades 1, 2, or 3 - with Grade 1 being the highest.

Figure 1.3



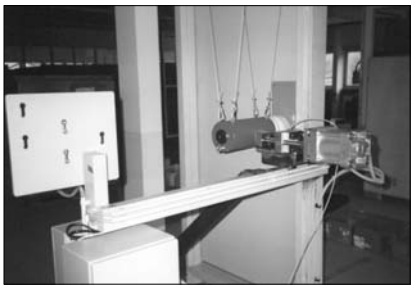
BHMA Grading

Figure 1.4



Static strength testing

Figure 1.5



Dynamic strength testing

Grading criteria for electric strikes and locksets include:

- Cycle testing - electric strike is cycled with compatible hardware at a rate not to exceed 30 cycles per minute (See figure1.3)

- Static strength testing - with the electric strike in the locked position, continuous force is applied to a specified point on a door at a rate not slower than 10 pounds-force (44N) nor faster than 20 pounds-force (90 N) per second until the rated static strength is reached and held for 1 minute prior to separation (See figure 1.4)

- Dynamic strength testing - a ram is used to deliver 5 impacts at a specified point on a door at the rated dynamic strength (See figure 1.5)

When selecting an electric strike for an opening be aware of the grading being used on all of the door hardware, it must be consistent or meet required specifications. For an opening to meet a particular grading all the associated products must meet the same grading. Other wise, the opening takes on the rating of the product with the lowest grading. The amount of usage an opening receives can help determine the grading an opening requires.* (HES offers a variety of grade 1 solutions, see page 16)

The electric strike is the pivotal piece of locking hardware for an opening. However much may be spent on the access control system, the door, or the frame; the electric strike is the physical control that keeps the opening secure.

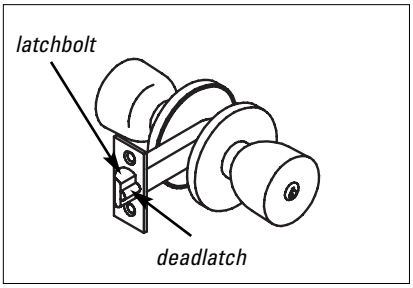
In addition to these issues, think about how your customer will perceive your services. Isn't it important for your customer to think of you as the one who will get it right the first time? Provide quality products and service so that your customer, your greatest marketing resource, will refer you to others.

2: Determine the type of lockset that the electric strike will interact with: Cylindrical, Mortise, or Exit Device?

An understanding of the basic relationship between the lockset and electric strike is the next essential step in determining what type of electric strike to use.

There are three main types of locksets: cylindrical, mortise, and exit devices. Knowing what type of lockset is being used is important when selecting an electric strike.

Figure 1.6

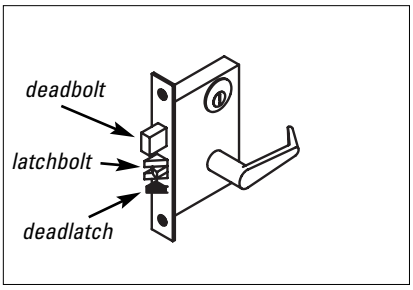


Cylindrical lockset

A **cylindrical lockset** is a bored lockset is designed to fit in a cylindrical hole. Cylindrical is the most common lockset and it is used in the largest variety of applications from residential to commercial. (See Figure 1.6)

TIP: An easy way to recognize a cylindrical lockset is by verifying the height of the faceplate on the edge of the door to be 2 ¼"

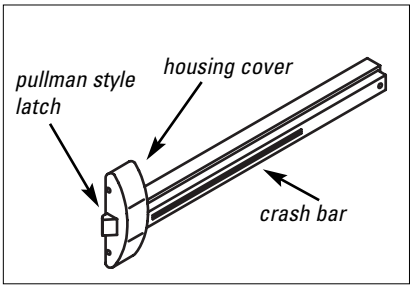
Figure 1.7



Mortise lockset

A **mortise lockset** is a lockset the case of which is designed to fit in a mortise in the edge of a door. The term "mortise" is a wood worker's term referring to a rectangle cavity cut into a piece of wood to receive a mating tenon (as in a mortise joint). This is a heavy duty lockset used often in commercial or industrial applications. This lockset may have multiple bolts to interact with. Tip: an easy way to recognize a mortise lockset is by verifying the height of the faceplate on the edge of the door to be around 8". (See Figure 1.7)

Figure 1.8



Exit device

An **exit device** is a lockset whose latch mechanism releases in the direction of egress via a bar or panel extending across the major width of the door. This lockset often uses Pullman style latches which are types of latches which pivot like a hinge and whose locking side is rounded. Exit devices are used mainly in commercial or industrial applications to meet Life Safety or Fire Protection codes. (See Figure 1.8)

When you are dealing with existing door hardware, you should choose an electric strike that will perform the same function as the strike plate supplied with the lock. (After all an electric strike without electricity is nothing more than an expensive strike plate). To properly match the two, you only need to know five basic principles.

1) Understand the type of bolt or bolts on the lock.

There are as many as three components to some locksets, the latch bolt, deadlatch and deadbolt. Remember, the electric strike will need to provide the same function as the strike plate provided with the lockset. Therefore, a basic understanding of the lock is an important requirement when choosing an electric strike.

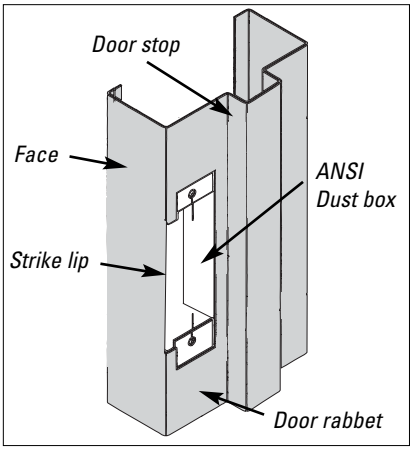
- A **latch bolt** is a spring loaded bolt that is ramped on the closing side to enable it to be depressed upon the closing of the door. The bolt then will spring outward when positioned over the strike cavity to secure the door.

- A **deadbolt** is a bolt that must be manually extended into the strike cavity to secure and lock a door. The deadbolt must similarly be manually retracted from the strike cavity to unlock a door.

- A **deadlatch** is designed to work in conjunction with the latch bolt. When the deadlatch is depressed, it locks the latch bolt in the extended position. If the deadlatch is not depressed, the latch bolt can be retracted with a credit card.

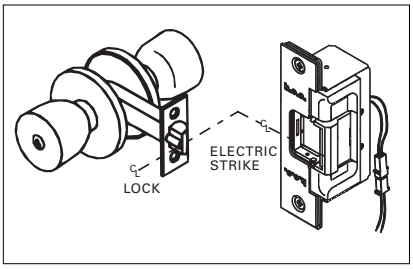
ANSI specifications dictate the dimensions for the body of a mortise lock and its components, but they don't state how the latch bolt, deadlatch and deadbolt are to be arranged on the lock. Therefore, most of the manufacturers design their mortise locks in slightly different configurations. This makes it important to know which lockset manufacturer you are using when choosing an electric strike to accommodate these locks.

Figure 1.9



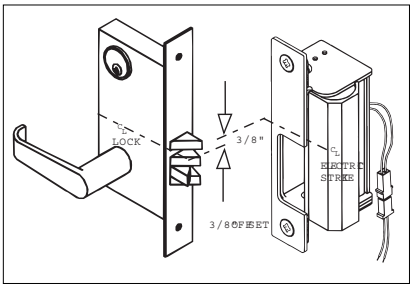
Door jamb description

Figure 1.10



Cylindrical lock aligned with its centerline equal to the centerline of the electric strike

Figure 1.11



Mortise lock aligned with its centerline 3/8" below the centerline of the electric strike

2) Whether to use a mortised electric strike or a surface mounted electric strike should be based on the type of hardware on the door.

The term "mortise lock" stems from the rectangle shape of the lock body and the rectangle cavity required in the edge of the door for installation.

Similarly, when an electric strike is installed in a door frame so that the face plate is "flush" with the rabbet of the frame, it is referred to as a mortise installation. Mortise electric strikes are used to accommodate most types of locksets, including mortise locks, cylindrical locks, cylindrical deadbolts and unit locks.

A "surface mounted" electric strike is mounted on the surface or soffit of the door frame. These electric strikes are used to accommodate "rim" (or surface) mounted exit devices and surface mounted latch bolts and deadbolts. Oftentimes these electric strikes are not completely surface mounted. The faceplate will be surface mounted, but the body of the electric strike will still need to be mortised into the frame.
(See Figure 1.9)

3) The electric strike must have correct cavity depth to accommodate the lock.

Latch bolts have various lengths (or projections) so it is important to choose an electric strike with the correct cavity depth to accommodate the latch bolt. Any electric strike selected should have the cavity positioned to match up with the bolt of the lockset.

4) The center lines of the lock and electric strike should line up properly based on the type of lock.

It is important to evaluate whether or not the type of lockset used is on center with the electric strike cavity. For example, the center line of a cylindrical lock should match up with the center line of the electric strike cavity, whereas the center line of the mortise lock is positioned 3/8" below the center line of the electric strike. Some electric strikes require the proper handing to line up properly, but many now are non-handed.

Figures 1.10 and 1.11 show the difference in the placement of a cylindrical lock vs. a mortise lock with an electric strike.

5) Align the electric strike to properly depress the deadlatch.

Many locksets also have deadlatches. A deadlatch is a latch in which the latch bolt is positively held in the projected position by an auxiliary mechanism. This latch functions as an "anti-pick" device to prevent tampering. Accommodating a lockset with a latch bolt and a deadlatch, the electric strike must be designed to properly depress the deadlatch. Failure to do so will compromise the security of the lockset.

3: Determine the type of frame the electric strike will be installed into: Hollow-metal, Aluminum, or Wood

There are basically three types of frames that will be encountered in the field - hollow metal (steel), aluminum, and wood.

Hollow metal frames are the most common type of frame. If the electric strike is being installed into a hollow-metal frame, almost any electric strike will work. However, there is an old adage about "hollow-metal" frames and that is: "hollow-metal rarely is." What this means is, "hollow-metal" door frames are usually not hollow - they are often filled with concrete or other materials. This is required to stabilize the door frame.

Have you ever tried to install an electric strike with a solenoid protruding from it? It is not difficult to do if the door frame is truly "hollow." It becomes very difficult if the frame is not "hollow." Many electric strikes today have an internal solenoid making them easy to install. In many applications, building codes prevent the installation of an electric strike designed

Figure 1.12

Internal vs. external solenoid

with an external solenoid, when the installation penetrates the drywall. **Aluminum frames** usually encase glass, both in the door itself and in the adjoining walls. Many times the glass is encased within 1-1/4" of the surface of the frame, making the overall depth of the electric strike important. Selecting an electric strike that is compact enough to be installed in these frames without cutting into the glass can save you money and time in the field.

Wood frame installations present many of the same concerns as you might find with concrete filled metal frames. Using an electric strike that is compact or has an internal solenoid can help with the ease of installation.

4: Assess the voltage requirements

Electric strikes come in a variety of voltages with 12 and 24 being the most common. If no system is present, you can choose the voltage and design your system around it.

Many people choose 12 volts because of the easy access to batteries to back-up the system. A good reason to choose 24 volts is due to a lower current draw to allow multiple strikes with one power source. (See Section IV, Understanding Basic Electronics.)

5: Identify the codes and requirements for the place of installation

Local building codes and requirements are always an important consideration when specifying an electric strike.

Codes regarding Life Safety or Fire Protection will dictate how the electric strike must function, such as fail secure or fail safe.

Fail secure means when the power fails the opening remains secure. In other words, the electric strike requires power to unlock.

Fail safe is when the power fails, the unlocked opening is safe to enter and exit, the electric strike requires power to lock.

Different applications will require either fail secure or fail safe electric strikes. If the door is "fire fated," a fail secure electric strike is necessary. This type of door is a barrier door. If the door is classified as a "life safety" door, the operation of the electric strike must be fail safe to allow free egress.

If ADA (Americans with Disabilities Act) laws apply to the door, an audible (buzzer) or visual (LED) indication of the door status may also be necessary. **Always verify local codes and regulations that must be met when selecting an electric strike.**

SECTION II

Basic Tools Used in Electric Strike Installation

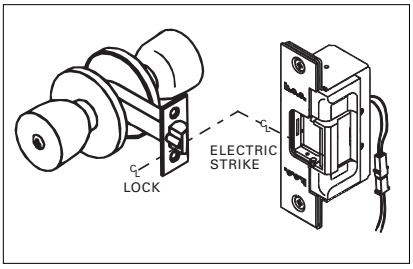
Various tools are used in the installation of an electric strike. Your choice of tools will depend on your personal preference and the type of installation you are doing.

The following is a list of the most commonly used tools and some points of interest about them. All of these tools require varying degrees of skill or practice and can be used with a variety of tool bits depending on the application and kind of cut. Always wear a protective shield or glasses when using these tools.

Reciprocating Saw (Sawzall) - a portable power saw with a reciprocating blade, (a blade that moves alternately backward and forward)
- Moderate cutting speed and accuracy.
- Good for hollow metal and aluminum frame.

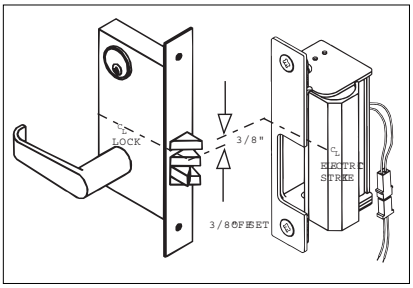
Die Grinder - heavy duty rotary tool
- Ideal for hollow metal and concrete filled metal frames.
- Easy to over-cut installation.
- Leaves a slight burn mark around the cutout (approximately 1/16" to 1/8").

Figure 3.1



Cylindrical lock aligned with its centerline equal to the centerline of the electric strike

Figure 3.2



Mortise lock aligned with its centerline 3/8" below the centerline of the electric strike

Dremel Tool - lightweight rotary tool
- Very slow but provides a clean cutout.
- Best to use for small repetitive surface cuts.
- Ideal for hollow metal or concrete filled metal frames.
- Ideal for fine or small cutting areas (i.e. cutting out the dust box in a metal frame).

Jig Saw - a sawing machine with a narrow, vertically reciprocating saw, used to cut curved and irregular lines, or ornamental patterns in openwork
- Moderate cutting speed and accuracy.
- Good for hollow metal and aluminum frames.

Router - a machine with a revolving vertical spindle and cutter for milling out the surface of wood or metal
- Easy to over-cut installation.
- Ideal for wood and aluminum frames.

*Note: Installation jigs are available through specialty companies to aid in routing aluminum frame installations.
- Very messy - the router will spread debris over a large area.

SECTION III
Electric Strike Installation

Before you begin any type of installation, it is important to become familiar with the specific electric strike that you will be installing. Therefore, review the manufacturer's installation instructions and template.

Make sure the electric strike selected is the right one for the application.

By taking the time to answer these five simple questions, you will be able to choose the best electric strike for your application.

Q: Will the electric strike stand up to the usage frequency and durability requirements of the application?
Q: Will the electric strike fully accommodate the lockset?
Q: Will the electric strike fit into the door frame or the inactive door in a double door application?
Q: Is the electric strike the correct function, fail secure or fail safe, to meet the codes and the application?
Q: Is the electric strike the correct voltage for the system?

Most electric strike manufactures provide templates to aid in the installation of their electric strikes. By investing a little time getting to know the product before you begin cutting the door frame, you can avoid many hidden surprises.

Installing an electric strike

1) Mark the centerline of the lockset on the frame where the strike will be installed.
This will allow you to properly align the electric strike with the lockset.
(See Figures 3.1 and 3.2)

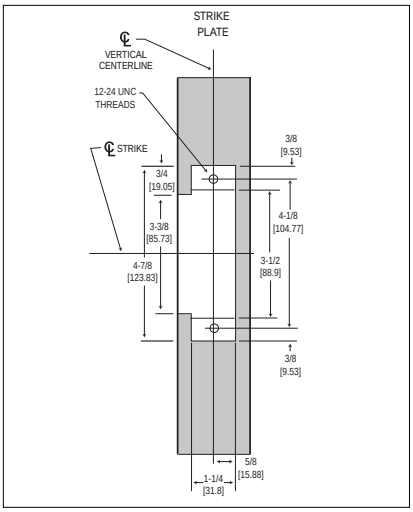
2). Use the manufacturer's instructions (supplied with the electric strike) to measure and mark the appropriate dimensions on the door frame as specified.

INSTALLER'S TIP: It is often beneficial to first put masking tape on the door frame where you will be installing the electric strike. This serves two important functions: 1) You can mark dimensions directly on the masking tape, which makes them easier to see in low-light conditions, 2) The masking tape protects the frame surface from being scratched during the installation process.

3) Using one of the tools described in Section II, carefully cut out the required section or sections of the frame, as noted in the manufacturer's electric strike installation instructions.

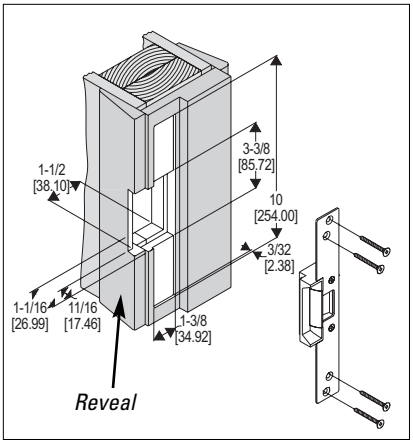
If the frame has already been equipped with a standard ANSI 4-7/8" strike prep, you will want to use an ANSI 4-7/8" electric strike. In this type of installation, you will need to cut out a small section of the face of the frame as specified in the manufacturer's instructions. This cutout is an extension of the 3-3/8" ANSI "Lip" of the

Figure 3.3



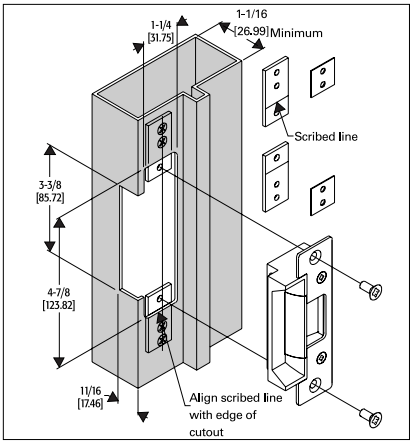
Standard ANSI 4-7/8" strike preparation

Figure 3.5



Typical Wood Frame Installation: A section of a wood door frame with a typical electric strike preparation

Figure 3.6



Typical Aluminum Frame Installation: A section of an aluminum frame with a typical electric strike preparation

frame, onto the frame face, which will be cut from 5/8" to 2-1/2", depending on the electric strike selected. (See Figure 3.3)

In most metal frame applications, a section of the ANSI dust box will also need to be removed to allow enough room (depth) for the electric strike to be installed. It is important to remove only the bottom section of the dust box, so that the welded mounting tab sections remain in place. If the metal frame was not equipped with an ANSI frame preparation or if the ANSI dust box is completely removed, then you will need to install mounting tabs in the frame for the electric strike.
If the frame is hollow, then the electric strike should be easy to insert into the frame preparation. However, if the frame is wood or has been filled with concrete or other materials, you will need to create a cavity large enough to install the electric strike. This can be accomplished with a hammer and chisel by simply chipping away the material. In more difficult cases you may find hardened concrete filling the frame. This type of installation may require the use of a "hammer drill" or other devices to remove the required material.

INSTALLER TIP: To obtain the best results, always cut well inside the lines and use a metal file to finish off the cutout.

In both of these situations it is easy to understand why you should select an electric strike with an internally mounted solenoid. An electric strike with a protruding solenoid would be very difficult to install in these frames.

An important difference between a metal frame and a wood frame is the reveal of the frame. This refers to the distance the electric strike is set back into the frame away from the frame face. Many wood frame installations require the addition of an extended lip to the front of the electric strike to accommodate the longer reveal. Additionally, many wood frames have a decorative wood trim, which extends the actual reveal even further.

The electric strike chosen for a wood frame installation will only be as strong as its ability to be secured to the wood. Therefore, you may want to select an electric strike with a longer face plate. This will allow you to place the mounting screws further away from the electric strike cutout, where they can be better secured into the wood. (See Figure 3.5)

INSTALLER TIP: To obtain the best results when preparing a wood frame for an electric strike installation; cut a 1/4" area around the inside of the template dimensions first with a wood chisel or router for a clean finished edge. The bulk of the material can then be removed quickly, using a power drill and auger bit. It can then be finished with a wood chisel.

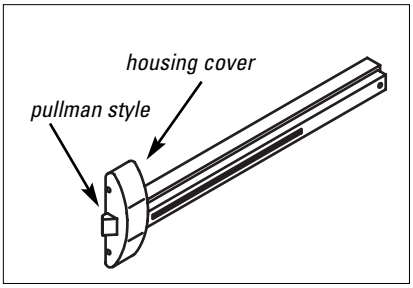
Aluminum frames are made in many different styles. The electric strike may be positioned close to the edge (the face) of the frame, similar to that of a metal frame installation. Or, the electric strike may be positioned a distance away from the edge of the frame, similar to that of a wood frame. These installations will also require that an extended lip be added to the front of the electric strike to accommodate the longer reveal. (See Figure 3.6)

Installing a surface mounted electric strike to accommodate a surface mounted exit device

INSTALLER TIP: Cutting a aluminum frame with a router or a jigsaw can be very messy and noisy. Spread out a drop cloth in front of your work area to capture the aluminum chips and bring a vacuum to clean up after your installation. Wear eye and ear protection when performing this installation.

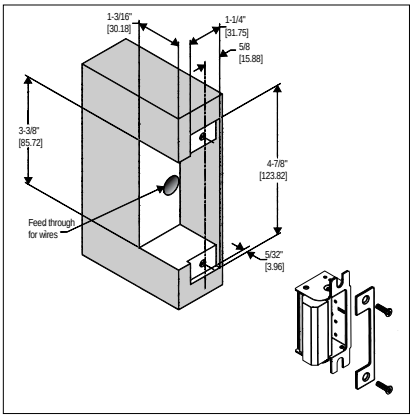
When trying to accommodate a surface mounted exit device, the electric strike must replace the existing strike plate to perform the same function. Be aware of the clearance between the housing cover of the exit device and the frame; these dimensions may vary between 7/8" (steel frame) and 5/8" (aluminum frame) depend-

Figure 3.7



Exit device

Figure 3.8



Typical Double Door Installation: An electric strike preparation in a standard 1 3/4" inactive door with a double door application

ing upon the backset of the exit device. Surface mounted electric strikes can accommodate the clearance with ¾" (steel frame) and/or ½" (aluminum frame) face plates. (See Figure 3.7)

Installing an electric strike in the inactive door of a double door application

Installing an electric strike in the inactive door of a pair of doors is very similar to installing the unit in a metal or wood frame. Typically the door thickness should be 1 3/4". Whether your door is metal or wood, the electric strike will be positioned the same. It will be installed in the edge of the door in a similar fashion to how it appears in an ANSI metal frame. This type of installation does require a little extra attention. There will only be about 1/8" remaining between the electric strike cutout and the outside of the door. However, this is a very typical electric strike installation and can be mastered with a little practice. (See Figure 3.8)

An electric strike installation in an inactive door requires the installer to bring the power to the electric strike. This is accomplished by installing a power transfer, such as an electrified hinge or a power cord, from the frame to the door. The installer must then drill a hole through the door (horizontally) and install power leads inside the door up to the electric strike cutout. **Note: If the door is a fire rated door, then you should check with your local fire marshal before you begin installing the electric strike.** Otherwise, you might void the door's rating and violate the building codes.

SECTION IV
Understanding Basic Electronics

Every year, the access control industry brings a host of new electronic products to the marketplace. Electric strikes are one product in an array of electronic devices. Trying to keep up with the latest power supply, proximity reader, or biometrics systems can be very intimidating or confusing, but understanding the basic electronic layout of an access control system can remove the complexity of all the components involved.

It may often seem as if one needs to be an electrical engineer when faced with all of the electrical terminology associated with access control systems; but with a little electrical background and a basic understanding of an electric circuit the electronic side of access control can become simple.

In any type of electrical or electronic equipment or circuitry there are three primary and basic electrical quantities: **Voltage, Current,** and **Resistance**. Without going into all of the physics and atomic history behind these quantities they can be explained simply.

Voltage is the amount of energy available to move a certain number of electrons (negatively charged subatomic particles in everything) from one point to another in an electric circuit. Simply, voltage is the driving force in electric circuits and is what establishes current. The unit of voltage is the ***volt,*** symbolized by ***V*** or mathematically symbolized by E for electromotive force.

Current is the flow of electrons through an electrical conductor. In all conductive or semiconductive materials there are free electrons available that will flow if a voltage is placed across the material. The movement of the free electrons from the negative end of the material to the positive end is the electrical current. Essentially, voltage causes current. The unit of current is the ***ampere*** (or amp for short), symbolized by ***A*** or mathematically symbolized by I for intesity of current.

Resistance is the opposition to current (the flow of electrons). Simply, resistance is the property of a material that restricts the flow of electrons. The unit of resistance is the ***ohm,*** symbolized by the Greek letter omega (Ω) or mathematically symbolized by R for resistance.

Figure 4.1

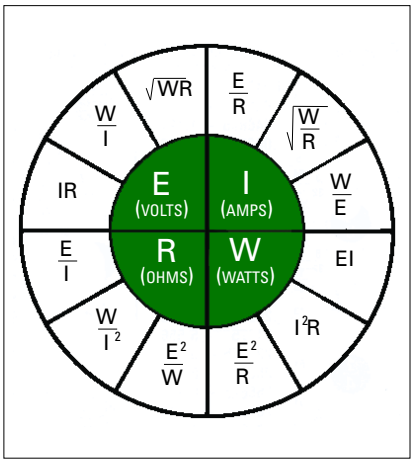
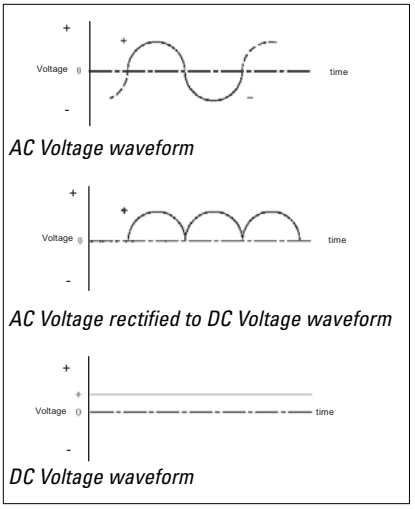


Diagram of Ohm's Law

Figure 4.2



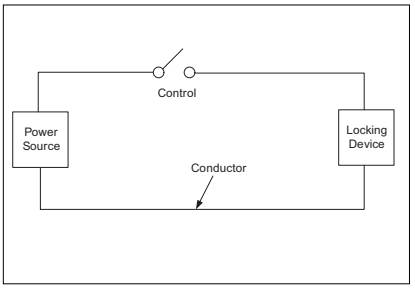
AC Voltage waveform

AC Voltage rectified to DC Voltage waveform

DC Voltage waveform

AC/DC voltage

Figure 4.3



Basic access control circuit

One of the most important and fundamental laws in the fields of electricity is the basic relationship between voltage, current, and resistance which can be expressed mathematically in Ohm's law. (See Figure 4.1)

Voltage is often referred to in respect to the type of current it causes. If the electrons move around a circuit in the same direction at all times, the current is said to be **Direct Current (DC)**. DC voltage is a steady and constant voltage. Batteries are the most common example of DC voltage power sources. If the electrons are continually changing direction from moment to moment from one way and then the opposite way, the voltage is alternating its polarity from negative to positive, the current is said to be **Alternating Current (AC)**. AC voltage is not a constant voltage as it continuously increases and decreases continuously changing its polarity from positive to negative thereby affecting the resulting current.

A cycle of AC voltage is the combined positive and negative alternation. Cycles are measured per second with the unit Hertz, symbolized by Hz. Typically AC voltage power sources are 50/60 Hz (cycles per second). Generators or power generating plants are the most common example of AC voltage power sources. Thus, every electrical wall outlet is AC voltage. (See Figure 4.2)

A basic electric circuit is an arrangement of components that use voltage, current and resistance to perform some function. An electric circuit can be represented by a schematic, a diagram that represents the interconnection of components.

The basic access control circuit is composed of the Locking Device, the Power Source, the Control, and the Conductor that interconnects all of the components. No matter how complex an access control system is, it can be broken down into these main components for simplification. (See Figure 4.3)

The **Locking Device** is the pivotal electrical component in the access control circuit, which can be a variety of items including electrified locksets, magnetic locks or electric strikes. An important electrical factor when considering the locking device is that every electric locking device is designed to operate at a specific voltage while drawing a specific current.

The **Power Source** for an access control system can be a simple plug in the wall transformer to complex regulated power supplies with built-in logic circuitry. When choosing a power source for an access control system it is important to select one that can provide the correct type of voltage and amount of current at a specific voltage needed to operate any electrical devices being powered.

The **Control** for an access control system, like the power source, can range from the simple to the complex. You might find a simple switch, like a doorbell button, a complex biometrics system, like a retinal scanner with built-in timer functions, or something in between. Essentially, the control is a device that manipulates or controls the flow of electricity through the circuit. The important factor when choosing the control system in relation to an electric strike will be whether it is rated to handle the maximum voltage and current requirements of all the devices being controlled.

The **Conductor** for an access control system is the wiring that interconnects all of the components together to complete the circuit. There are various types of wires and cables, but the essential factor to consider is whether it can carry sufficient voltage and current from the power source over the distance required to all of the electrical components in the circuit. **Note: Always check with local code requirements regarding wire specifications.**

Locking devices will have a variety of voltage or current requirements. Most locking devices are considered low volt-

age devices working on AC or DC. Electric strikes are generally 12V or 24V. Some electric strikes are able to work with both voltages dependent upon wiring. The choice between AC and DC is generally dependent upon the locking device.

When electric strikes were first invented, almost all were exclusively AC to provide a buzzing sound; thus the phrase "buzz someone in" to an apartment was coined. AC voltage is commonly 60 Hz, so the buzzing sound is actually the mechanisms in the electric strike being energized and de-energized 120 times per second.

Although electric strikes are still available with AC voltage, the life expectancy is significantly shorter than an electric strike that runs off of DC voltage. When an electric strike is powered by DC voltage, the voltage is constant; therefore, the electric strike is silent. This is most beneficial with situations in which the electric strike is energized for extended periods of time, such as during business hours or with fail safe applications.

Power sources are available in AC or DC and will have a variety of voltage or current ratings. Most electrical devices will have voltage tolerances that must be met. Some power sources are not regulated, so the voltage provided will not be the same as stated. It is common for transformers to exceed the voltage stated by 4-5 volts.

Electric strikes generally have at most +/- 10% voltage tolerances. The amps or amperage required by electrical devices will also have to be met by the power source. Electrical devices will only draw the amount of current required; any excess will be available for any other electrical devices in the circuit. Providing a power source that exceeds total current requirements of a circuit by at least 20-25% allows for any voltage or current loss due to wiring.

Controls for an access system, despite any complex extras they might have, should be thought of primarily as a simple switch. No matter how complex the control may be, there will always be a switch, or relay, that is the control point for any of the electrical devices it controls.

The relay will have a normally open or normally closed contact, or it may have both with which to connect the electrical devices to. The function of the electric strike will determine which contact is used. If the electric strike is fail secure, it is usually connected with a normally open switch. Since the electric strike is locked without power, once the circuit is closed, the electric strike will unlock. This is the most common configuration for electric strikes.

The fail safe electric strike is usually connected with a normally closed switch. Since the electric strike is unlocked without power, the strike is energized constantly to stay locked, and once the circuit is opened, the electric strike is unlocked. This is not a common application, but it is used where life safety codes must be followed and free egress is required.

Conductors or wires are available in various types and sizes. Stranded wire is the accepted standard wire type for connecting electrical system components.

Stranded wire is a group of multiple conductors braided together to create one larger stronger conductor. The size of wire is determined by the diameter of the wire. American Wire Gauge (AWG) is a common system of numerical designation of wire size. The lower the wire gauge number, the larger the wire diameter.

18 and 16 gauge wires are very common wire sizes for low voltage wiring. Wires with larger diameters offer less resistance and make it easier for current to flow. A power loss can occur if the wire is too small or the distance too great for a particular application resulting in lower voltage and current. Generally, as wire runs get longer, wire size must be increased to prevent voltage drops.

There are various electrical accessories that can be used for access control systems. The following are some commonly used accessories:

- Rectifier - converts AC voltage to DC
- Buzzer - provides audible indication
- LED - provides visual indication
- Surge Suppressor - protects electrical devices from power surges

SECTION V
Trouble Shooting Guide

Problem: If the electric strike does not operate properly

If the electric strike does not operate properly, open the door and re-energize the electric strike. If the electric strike operates properly with the door held open, the lockset may be pre-loading or binding the keeper of the electric strike.

Solution: "Pre-load" is any pressure applied to the keeper of the electric strike that causes it to bind. The horizontal relationship between the lockset and the electric strike will have to be adjusted to eliminate the binding between the bolt of the lock and the electric strike keeper.

Problem: If the electric strike does not operate with the door open

If the electric strike does not operate with the door open, remove the electric strike from the frame, leaving the wiring connected, and re-energize the electric strike. If the electric strike operates properly outside of the frame, then the problem may be from a tight-fitting frame cutout pinching the sides of the electric strike together.

Solution: The electric strike cutout in the door frame needs to be slightly enlarged.

Other Solutions: If all mechanical problems have been eliminated without successful electric strike operation, check the following electrical problems:

a. Examine the power supply or transformer to verify that the output voltage is at the listed rating.

b. Verify that the power source can handle the current draw of all electrical components in line with the power source

c. Verify that the power wires leading to the electric strike are of a large enough gauge to handle the current requirements. Note: Recall that some voltage may be lost when using smaller gauge wires over long distances.

d. Using a multimeter, verify that the input voltage is within the recommended lim its (+-10%).

e. Confirm that the input voltage at the installation site is DC or properly rectified AC.

f. Verify that all peripheral devices such as bridge rectifiers, SMART-Pacs, buzzers, L.E.D.s etc... are properly connected.

g. Check that the switch, key pad, etc., meet the voltage requirements for the system.

INSTALLER TIP: To quickly determine whether an electric strike is defective, install it in a site where an electric strike was previously installed and worked properly. Use an alternative power source to test the electrick strike such as a DC battery pack.

INSTALLER TIP: If the voltage is too low to operate the electric strike, a 35 volt, 220 micro-farad capacitor may be installed across the bridge rectifier (positive to positive, negative to negative) to provide an initial boost of power to the unit. This is also helpful to overcome slight preloading conditions.

If you have any questions after reading this guide, call the HES technical service line: 1-800-626-7590

The 1006 series is the strongest and most versatile electric strike available. It meets or exceeds every standard developed for electric strikes. With 27 faceplate options, the 1006 can accommodate virtually every type of lockset on the market. The 1006 features an innovative dual interlocking plunger design and heavy-duty, all stainless steel construction. The 1006 is in a class of its own. Now available in both fail secure and fail safe models.

The 9500 and 9600 Genesis™ series are heavy-duty, completely surface mounted electric strikes designed to accommodate rim mounted panic exit devices in metal or wood jambs. Two stainless steel locking mechanisms operate independently to provide a truly tamper resistant electric strike. The 9500 Genesis II™: is the completely surface mounted, fire-rated version of the 9600.

The 4500 series is the only low profile electric strike designed to fit 2" fire rated frames. The 4500 is a 3 hour rated, heavy-duty electric strike for use with cylindrical and mortise locksets. Accommodates up to a 3/4" throw.

The 2505 Power Punch™ is the only power supply designed to improve the performance and extend the life of electric strikes and other solenoid actuated devices. The Power Punch™is designed to administer a short, isolated 38 Volt spike to enhance the initial unlocking operation of an electric strike. The power is then reduced to 75% of the electric strike's nominal voltage, which reduce heat build-up and extends the life of the solenoid.

The low profile 5000 series is a compact, heavy-duty and high performance electric strike designed for low profile openings where there is limited space behind the jamb. This includes narrow style aluminum jambs and jambs with protruding glass inside. Easy to install, this field selectable fail secure/fail safe unit accommodates 1/2" latchbolts.

The 7000 preload series is ideal for many applications with pre-load conditions (door bind) which may be caused by a warped or misaligned door, weather stripping, a smoke seal, etc. Field selectable fail secure/fail safe with an internally mounted solenoid, the 7000, 7400, and 7500 are easy to install in hollow metal, concrete filled metal, wood and aluminum jambs.

The HES Hassle Free Guarantee

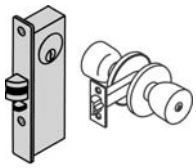
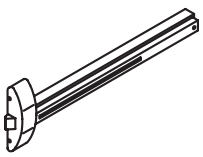
1 Year "No questions asked" Warranty
Includes all HES electric strikes, electric locks and electrical components.

3-5 Year Limited Warranty
Mechanical components: 3-5 years
Electrical components: 1 year

Extended Warranty- on electrical components
(Registration required)
The Smart-Pac II™ extends the 1-year warranty on electrical components (solenoid) to the full 3-5 year warranty of the electric strike.

6-10 Year Limited Warranty
(Registration required)
Any HES electric strike used in conjunction with the Model 2505 Power Punch™ is warranted to twice its original mechanical & electrical warranty.

Electric Strike/Lock Cross Reference Chart

ANSI LOCK	DESCRIPTION	MANUFACTURER	HES ELECTRIC STRIKES
	Cylindrical locksets. All locks with center lined latchbolts.	All manufacturers.	1006J- Up to 1" throw 4500 5000 - Up to 1/2" throw 5700 - Up to 1/2" throw 7001, 7002, 7501, 7505 Up to 5/8" throw
	Mortise locksets with a deadlatch positioned above the latchbolt.	Accurate, Arrow, Baldwin, Falcon (1991& earlier) Marks, Omnia, PDQ Best Sargent (7700 & 8100 series), Schlage, Yale	1006K 4500 1006KM 4500 1006KD
	Mortise lockset with a deadlatch positioned below the latchbolt.	Almet, Corbin/Russwin, Falcon (1992 "M" Series), Sargent (7800, 8200, & 9200)	1006KM 4500
	Mortise lockset with a 1" deadbolt without a deadlatch.	Accurate, Arrow, Baldwin, Best, Corbin, Falcon, Marks, Omnia, PDQ, Russwin Sargent (7700 & 8100 series), Schlage, Yale	1006N 1006A 1006H 1006ND 1006AD 1006HD
	Mortise lockset with a 1" deadbolt and a center positioned deadlatch.	Baldwin, PDQ Sargent Schlage Yale	1006T 1006HTD 1006TD
	Mortise lockset with a 1" deadbolt and a deadlatch positioned below latchbolt.	Accurate, Almet, Arrow, Baldwin, Best, Corbin, Falcon, Marks, Omnia, PDQ, Russin, Sargent (7800, 8200 & 9200 series)	1006NM 1006AM 1006HM
	Rim mounted exit device with up to a 3/4" throw.	Adams Rite, American Device, Arrow, Jackson Dormatic, Monarch, Precision, Sargent, Von Duprin, Yale	7000-83, 7000-786, 7000-789 9500 9600

- **Use this chart to identify ANSI locks and to select which HES electric strike will provide the correct alignment to release each lock, (in both new and retrofit ANSI 4-7/8" jamb preparations).**

- **Use this chart to determine which HES electric strike matches a specific manufacturer's lock.**

HES electric strikes are all non-handed and designed for installation in hollow metal, concrete filled metal, aluminum and wood jambs.

HES electric strikes are designed to be installed in accordance with the ANSI/BHMA A156.5 4-7/8" jam preparation. When accommodating a cylindrical lock, the electric strike is to be installed centerline to centerline. When accomodating a mortise lock,the centerline of the electric strike is to be installed 3/8" above the centerline of the mortise lock.

NOTE: This chart is offered as a convenience only. HES assumes no liability for the differences between items compared. When compatitibility is a concern, contact HES for application assistance.