

STUDY MATERIAL FOR THE
CERTIFICATE OF FITNESS EXAM
FOR

E-21
USING POWDER
ACTUATED
TOOLS

INSIDE THIS BOOKLET YOU WILL FIND
THE FOLLOWING:

NOTICE OF EXAMINATION (NOE)

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NOTICE OF EXAMINATION

Title: Examination for Certificate of Fitness for Powder Actuated Tools (E-21)

Date of Exam: Written exams are conducted Monday through Friday (except legal holidays) 8:00 AM to 2:30 PM.

REQUIREMENTS FOR WRITTEN EXAM

Applicants who need to take the exam must apply in person and bring the following documents:

1. Applicants must be at least 18 years of age.
2. Applicants must have a reasonable understanding of the English language.
3. Applicant must provide two forms of identifications; at least one identification must be government issued photo identification, such as a State-issued Driver's License or Non Driver's License or a passport.
4. Applicants must present a letter of recommendation from his/her employer. The letter must be on official letterhead, and must state the applicant's full name, experience and the address where the applicant will work. If the applicants are self-employed or the principal of the company, they must submit a notarized letter attesting to their qualifications. For more info:

http://www.nyc.gov/html/fdny/html/c_of_f/cof_requirements.shtml

5. Applicants must present a completed application for certificate of fitness (A-20 Form). <http://www.nyc.gov/html/fdny/pdf/a20.pdf>

6. Special requirements for E-21 exam:

Applicants must present a letter on official letterhead or a certificate issued by the manufacturer stating he/she has received and completed the training program covering operation, maintenance and recommended practices for the powder activated tools that will be used.

APPLICATION FEES:

The \$25 application fee for the exam can be paid by one of the following methods:

- Cash
- Credit card (*American Express, Discover, MasterCard, or Visa*)
- Debit card (*MasterCard or Visa*)
- Personal or company check or money order (*made payable to the New York City Fire Department*)

For fee waivers submit: (*Only government employees who will use their C of F for their work-related responsibilities are eligible for fee waivers.*)

A letter requesting fee waiver on the Agency's official letterhead stating applicant full name, exam type and address of premises; **AND** Copy of identification card issued by the agency.

A convenience fee of 2.49% will be applied to all credit card payments.

EXAM INFORMATION

The E-21 exam will consist of **20** multiple-choice questions, administered on a “touch screen” computer monitor. It is a time-limit exam. A passing score of at least 70% is required in order to secure a Certificate of Fitness. Call (718) 999-1988 for additional information and forms.

Please always check for the latest revised booklet at FDNY website before you take the exam.

http://www.nyc.gov/html/fdny/pdf/cof_study_material/e_21_st_mat.pdf

If all the requirements are met and pass the exam a certificate will be issued the same day. Applicant who fails the exam will receive a failure report. To retake the exam applicants will need to submit a new application and payment.

ALTERNATIVE ISSUANCE PROCEDURE (AIP)

This certificate of fitness can be obtained by qualifying for an exemption from an exam on the basis of education and experience. Applicants who qualify for AIP must apply online. For more detail information applicants must review the E-21 AIP information.

http://www.nyc.gov/html/fdny/pdf/cof_study_material/e_21_aip_info.pdf

RENEWAL REQUIREMENTS

This Certificate of Fitness must be renewed every **THREE YEARS**. The renewal fee is \$15. FDNY also reserves the right to require the applicants to take a re-examination upon submission of renewal applications.

You will receive a courtesy notice of renewal 90 days before the expiration date. However, it is your responsibility to renew your Certificate. It is very important to renew your C of F before it expires. Renewals submitted 90 days (up to one year) after the expiration date will incur a \$25 penalty in addition to the renewal fee. Certificates expired over one year past expiration date will not be renewed. New exams will be required.

To change a mailing address:

Submit a letter requesting the change of mailing address and a copy of your C of F and a \$5.00 fee.

To change a work location,

Submit a letter from your current employer (on company letterhead) confirming that you are an employee and stating your new work location with a copy of your C of F and a \$5.00 fee.

To request a replacement certificate:

Submit a driver's license or passport, social security number and mailing address and a \$5.00 fee.

The certificate can be renewed On-line, by Mail or in Person.

Renewal online

If you are an individual, make sure you have your 12 digit Certificate of Fitness Access ID. This can be found on your Renewal Notice. If you do not have your Renewal Notice, your Access ID is your 8 digit Certificate of Fitness number and the last four digits of your social security number. If you are submitting renewals on behalf of a company's employees, the company must be approved by FDNY and have an 8 digit Company Code. To request approval, email pubrenew@fdny.nyc.gov.

Renewal fee can be paid by one of the following methods:

- Credit card (American Express, Discover, MasterCard, or Visa)
- Debit card (MasterCard or Visa)
- E-check

A fee exempted applicants cannot renew online only by mail or in person.

If all the requirements are met, the certificate of fitness will be mailed out within 10 days.

For online renewal go to: <https://paydirect.link2gov.com/FDNYCOF/ItemSearch>

Renewal by mail

Mail your Renewal Notice (if you did not receive a Renewal Notice, a copy of your certificate), along with your fee payment Personal or company check or money order (made payable to the NYC Fire Department)

For fee waivers submit: *(Only government employees who will use their C of F for their work- related responsibilities are eligible for fee waivers.)*

- A letter requesting fee waiver on the Agency's official letterhead stating applicant full name, exam type and address of premises; *AND*
- Copy of identification card issued by the agency and if applicable, supporting documents to:

NYC Fire Department (FDNY)
Cashier's Unit
9 MetroTech Center, 1st Floor
Brooklyn, NY 11201

If all the requirements are met, the certificate of fitness will be mailed out within four to six weeks.

Renewal in person

Submit your Renewal Notice (or if you did not receive a Renewal Notice, a copy of your certificate), along with your fee payment by one of the following methods:

- Cash
- Credit card (*American Express, Discover, MasterCard, or Visa*)
- Debit card (*MasterCard or Visa*)
- Personal or company check or money order (*made payable to the New York City Fire Department*)

For fee waivers submit: (*Only government employees who will use their C of F for their work- related responsibilities are eligible for fee waivers.*)

- A letter requesting fee waiver on the Agency’s official letterhead stating applicant full name, exam type and address of premises; *AND*
- Copy of identification card issued by the agency and if applicable, your supporting documents to:

NYC Fire Department (FDNY)
Cashier's Unit
9 MetroTech Center, 1st Floor
Brooklyn, NY 11201

If all the requirements are met, the certificate of fitness will be issued the same day.

A convenience fee of 2.49% will be applied to all credit card payments for original or renewal certificates.

EXAM SITE: FDNY Headquarters, 9 Metro Tech Center, Brooklyn, NY. Enter through the Flatbush Avenue entrance (between Myrtle Avenue and Tech Place).



About the Study Material

This study material will help you prepare for the examination for the Certificate of Fitness for Using Powder (Ammunition) Activated Tools. The study material includes information taken from the New York City Fire Code Chapter 14 (1418) and 33 (3306) and the Fire Prevention Directives of the Bureau of Fire Prevention, FDNY. The study material does not contain all of the information you need to know in order to work with powder activated tools at your work location. It is your responsibility to learn whatever else you need to know to do your job. You must also become familiar with all applicable rules and regulations of the City of New York, even if they are not covered in this material.

All questions on the Certificate of Fitness examination are multiple choice, with four alternative answers to each question. Only one answer is correct for each question. If you do not answer a question or mark more than one alternative your answer will be scored as incorrect. A score of 70% correct is required on the examination in order to qualify for the Certificate of Fitness. Read each question carefully before marking your answer. There is no penalty for guessing.

Sample Questions

1. Who was the first president of the United States?

- (A) George Washington.
- (B) Winston Churchill.
- (C) Abraham Lincoln.
- (D) Barack Obama.

The correct answer is "**A**". You would mark "**A**" on your touch-screen terminal.

2. What sports team plays at Madison Square Garden?

- (A) Yankees.
- (B) Nets
- (C) Cardinals.
- (D) Knicks.

The correct answer is "**D**". You would mark "**D**" on your touch-screen terminal.

1. INTRODUCTION

A powder (or ammunition) actuated fastening system is an acceptable method of making instantaneous forced entry fastenings into various construction materials. The tools are used to make fastenings to very hard materials such as concrete or steel. Although this system is simple to use, there are precautions and safeguards that must be observed. *Powder-actuated tools shall only be used and handled by a qualified operator and Certificate of Fitness holder.* To become a qualified operator, additional training covering operation, maintenance and recommended practices for each manufacturer's tool is necessary. A qualified operator should also read and be familiar with any local and state regulations applicable to this system. Any powder actuated tools using ammunition must have a label stating that it has been approved by the Board of Standards and Appeals.

2. DEFINITIONS

BASE MATERIAL. The base into which the fastener is driven (e.g. structural steel or bar joist).

CERTIFICATE OF FITNESS. A written statement issued by the commissioner certifying that the person to whom it is issued has passed an examination as to his or her qualifications or is otherwise deemed qualified to perform one or more of the following duties, for which such certificate is required by this code or the rules: supervise a facility; conduct or supervise an operation; supervise the storage, handling and/or use of a material; or conduct or supervise emergency planning and preparedness activities.

DAY BOX. Small locked metal box used to store ammunition in quantities used for a day's work.

DRIVE PIN. A special fastener designed to permanently attach one material to another such as wood to concrete or steel.

GANG BOX. Large locked metal box used to store ammunition in large quantities.

GENERAL SUPERVISION. Except as otherwise provided in this code, supervision by the holder of any department certificate who is responsible for performing the duties set forth in FC113.2 but need not be personally present on the premises at all times.

113.2 Duties. In addition to any other responsibilities specified in this code or the rules, a certificate holder shall be responsible for:

1. the safe storage and/or supervision of the material, operation or facility, and emergency preparedness, for which the certificate is required, in accordance

with the Fire Code, the rules, and any other applicable laws, rules and regulations.

2. notifying the department of any fire, explosion, reportable leak or other release of hazardous material, or other emergency related to the duties of his or her certificate.

3. keeping such certificate upon his or her person or otherwise readily available on the premises for inspection by any representative of the department, at all times while conducting or supervising the material, operation, facility or emergency preparedness for which the certificate is required.

FASTENING. The combination of fastener, fastened material and base material (after the fastener has been driven).

INHABITED BUILDING. A building regularly occupied in whole or in part as a habitation for human beings, or any house of worship, school building, railroad station, store or other structure where people are accustomed to assemble.

MAGAZINE STRIP. Collated cartridges in strips of 10 (or 40) offer greater safety because the plastic strip helps protect the cartridge cases from impacts and ensures separation between the cartridges.

PERMIT. A written statement issued by the commissioner authorizing the manufacture, storage, handling, use or transportation of a hazardous material, or other material, or to conduct an operation or to maintain a facility, for which a permit is required by the Fire Code.

POWDER ACTUATED TOOL. A tool that utilizes expanding gases from a powder load to drive a fastener.

SMALL ARMS AMMUNITION. A shotgun, rifle or pistol cartridge, and any cartridge for propellant-actuated devices, excluding ammunition containing bursting charges or incendiary, trace, spotting or pyrotechnic projectiles.

THREADED STUD. A fastener comprised of a shank portion which is driven into the base material and a threaded portion to which an object can be attached with a nut.

3. PERMITS AND INSURANCE

In order to store, handle, and use power loads at construction sites and mercantile establishments it is necessary to obtain a permit from the FDNY. Permits are required to store or sell 200 or more shells of power actuated magazine strips or cartridges.

To qualify for a permit the following requirements must be met:

- Any employee storing, handling and using power loads must hold a valid E-21 Certificate of Fitness
- Contractor must submit a copy of their liability insurance in the minimum sum of \$100,000
- A Site inspection by the FDNY Explosives Unit must take place to determine feasibility.

4. TYPES AND CLASSES OF TOOLS

The illustration below shows a commonly used tool for drive pin and threaded stud fastenings. Although there are many different models, in all cases a fastener is forced rapidly down the barrel of the tool by an explosive charge.



A Commonly Used Power Actuated Tool

Powder actuated tools are divided into types according to the principle of operation.

A tool uses the high velocity principle is when a fastener is shot down a barrel as a projectile to penetrate the work surface.

Indirect Contact

Tools which operate using indirect contact, the expanding gases of the ignited powder load act directly on a captive piston which is housed within the barrel of the tool. The piston drives the fastener into the base material providing better control over the penetration of the fastener. In a tool of this type, most of the energy developed by the powder load is retained by the piston. Penetration of the fastener into the base material is controlled by the design of the piston, the load

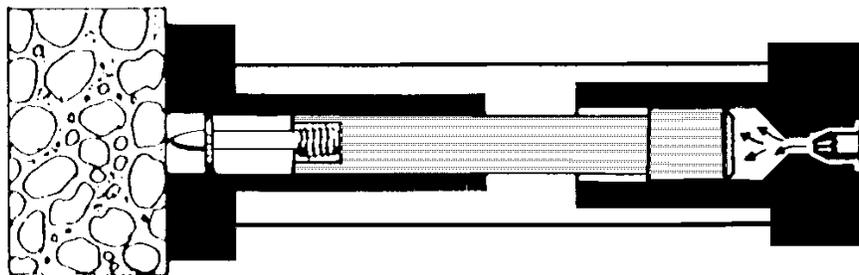
level selected, and the density of the base material. Tools using indirect contact principles (listed below) are classified as low velocity.

The **coacting principle** is when the piston and the fastener are pushed up the guide so that the piston is in contact with the fastener, but the fastener has a stand off from the work surface.

A tool using the **impact principle** has the piston pushed back in the guide of the tool but the fastener is against the work surface.

The **contact principle** tool has the piston in contact with the fastener and the fastener in contact with the work surface.

The illustration in the figure below is that of a tool using the contact principle.



Power Actuated Tool Using the Contact Principle

Powder activated tools are also divided into classes according to the velocity with which the fastener travels. A low velocity class tool is one in which the average test velocity does not exceed 328 feet per second. A medium velocity class tool produces an average test velocity greater than 328 feet per second but not exceeding 492 feet per second. A high velocity class tool produces an average test velocity over 492 feet per second.

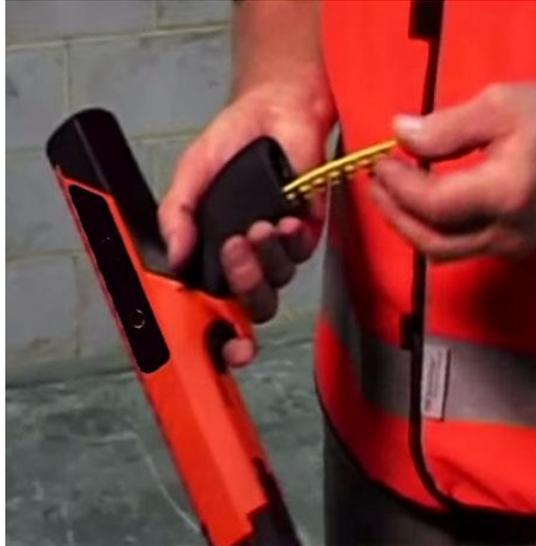
5. POWER LOADS

The power load is a unique, portable, self contained energy source used in powder actuated tools. The power loads may come in cartridges in throw away magazines, as shown in the illustration below. Other power loads are provided only in single cartridges.



Ten Cartridge Magazine

The method of loading the tool will vary with the particular model being used. The kind of magazine shown above is often inserted into the base of the grip, as shown in the illustration below.



Loading a Power Actuated Tool

Regardless of the type, caliber, size or shape, there is a standard number and color code used to identify the power level or strength of all power loads.

Cased power loads used in all types and classes of tools cover a range of 12 power load levels. The power load levels are numbered 1 through 12, with #1 being the lightest load and #12 being the heaviest load.

Power loads #1 through #6 are in brass colored cases. Power loads #7 through #12 are in nickel colored cases. To further identify power load levels a basic six color code of gray, brown, green, yellow, red, and purple is used twice. The color codes for all of the power load levels are given in the Power Load Identification Chart.

Selecting a Power Load

Every tool has a recommended range of power levels. When selecting the proper power load to use in a particular application, it is important to start with the lightest power level recommended for the tool being used. Using the lightest load, if the first test fastener does not penetrate to the desired depth, the next higher power load should be tried. If necessary, continue increasing power levels by single steps until proper penetration is obtained.

For example, assume the tool for your job used power levels #1 through #4. Your first test fastening should be made with the #1 gray load (brass case). If the fastener is not fully driven, your next test fastening should be with a #2 brown load, and so forth. If your tool used power levels #3 through #6, you would start with the #3 power level.

POWDER LOAD IDENTIFICATION (Brass)		
1	GRAY	LOWER POWER  HIGHER POWER
2	BROWN	
3	GREEN	
4	YELLOW	
5	RED	
6	PURPLE	

POWDER LOAD IDENTIFICATION (Nickel)		
7	GRAY	LOWER POWER  HIGHER POWER
8	BROWN	
9	GREEN	
10	YELLOW	
11	RED	
12	PURPLE	

Storage of Power Loads

The main supply of ammunition shall be kept in a locked metal box. **Storage** of powder-actual tools must be under the **general supervision** of a Certificate of Fitness holder. They must keep the key to the storage box in their possession.

The ammunition storage box must be kept away from heat and must not be stored in the same compartment or shanty in which compressed gases, or flammable liquids are kept.

The compartment, shanty, and/or locked metal box shall bear a permanent sign with the words "DANGER - AMMUNITION" in 2" white letters on a red background.



Shields and Special Fixtures

Shields and special fixtures are important parts of the powder actuated fastening system. The shields and fixtures are used for safety and to adapt the tool for a particular job. Low velocity class tools are supplied with a shield to confine flying particles. The shield should be used whenever fastening directly into a base material such as driving threaded studs or eye pins into steel or concrete. In addition to confining flying particles, the shield also helps hold the tool perpendicular to the work.

Medium and high velocity class tools are designed so that the tool cannot fire unless a shield or fixture is attached. Some standard shields are adjustable for fastening close to any obstruction. It is essential that these adjustable shields be used in their off center position only where the work provides safety equal to the full shield position. For other special applications, special fixtures should be used in place of the standard shield, for the purpose of additional safety and positive fastener location.

There are many other special tool accessories available for use with all tools. Examples of these are adapters which hold various types of clips, brackets or washers at the muzzle end of the tool. Power boosters are available for some tools. Special accessories and power boosters should be used only according to specific instructions by the tool manufacturer.

6. BASE MATERIALS

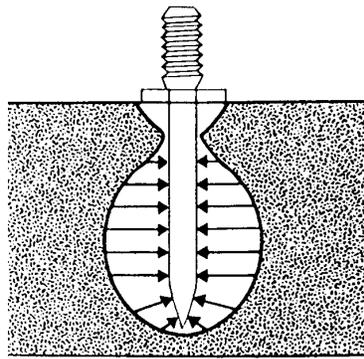
In general, powder actuated tools are designed to be used in concrete and structural steel only. If the material is too hard, the fastener will not be able to penetrate and could possibly deflect or break. Some examples of materials that are too hard would be hardened tool steel, granite, spring steel, or natural rock. Other materials are too brittle, and will shatter or break. Examples of too brittle materials would be glass, glazed tile, brick or slate. Other base materials are too soft. Some examples of base materials that are too soft are wood, plaster, drywall or composition board.

Masonry Materials

Masonry materials suitable for fastening consist of the following:

- Poured concrete
- Pre-cast concrete
- Pre-stressed concrete
- Concrete block
- Mortar joints (horizontal)

The tool user should never fasten closer than three inches from the edge of the masonry. It is important to understand what happens when a fastener is driven into any masonry material and why the fastener holds. The holding power of the fastener results primarily from a compression bond of the masonry to the fastener shank. The fastener, on penetration, displaces the masonry which tries to return to its original form and exerts a squeezing effect. Compression of the masonry around the fastener shank takes place with the amount of compression increasing in relation to the depth of penetration and the compressive strength of the masonry. The figure below illustrates the compression effect on a threaded stud driven into concrete.

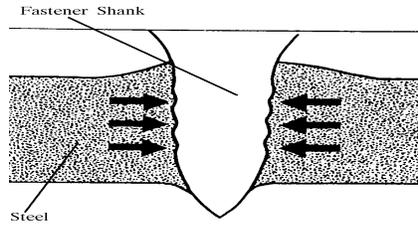


Threaded Driven Into Concrete

Steel

Practically all of the powder actuated fasteners driven into steel as the base material are driven into structural steel. Structural steel shapes in common usage include structural beams, angle iron, channel, tee, plate and strip. Where fasteners are to be driven into metal materials other than structural steel, it is necessary to determine the acceptability of the material for powder actuated fastenings either by consulting the supplier or by center punch testing for hardness.

A fastener driven into steel holds in the steel by the natural tendency of the steel to return to its original undisturbed condition. As the fastener is driven into steel it pushes the steel aside, compressing and displacing the steel. The tendency of the steel to flow back to its original position exerts a gripping or clamping force on the fastener shank. If the pointed portion of the shank does not extend through the steel, a part of the compressive force in the area of the point will act to force the fastener to back out. The illustration below shows the compressive effect on a fastener shank driven into steel.

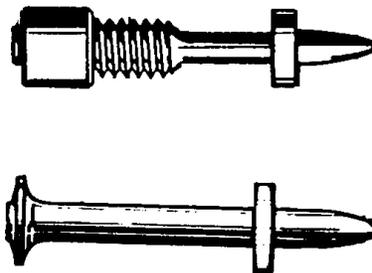


Drive Pin Driven Into Steel

Fasteners

The fasteners used in powder actuated tools are not common nails. They are manufactured from special steel and heat treated to produce a very hard, yet ductile fastener. These properties are necessary to permit the fastener to penetrate concrete or steel without breaking. The fastener is equipped with some type of tip, washer, eyelet or other guide member. This guide aligns the fastener in the tool as it is being driven and is usually used to retain the fastener in the tool. The more commonly used fasteners are drive pins and threaded studs.

The illustration below shows an example of each of these two kinds of fasteners (drive pins and threaded studs). Note the guide near the end of the fastener that aligns the fastener in the barrel of the tool.



Commonly Used Fasteners

Center Punch Test Procedure

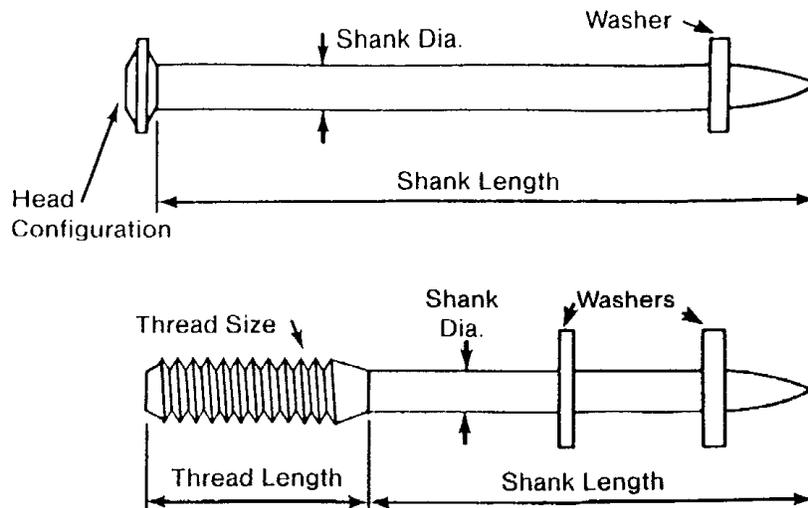
In all cases, the suitability of a base material may be tested by using the simple center punch test. This test procedure uses a fastener as punch. The fastener is struck with an average hammer blow.

1. If the material shows a clear fastener point impression and the fastener point is not blunted, the material is suitable for power actuated fastening. You would now proceed with the first test fastening.

2. If the fastener point is blunted, the material is too hard.
3. If the material cracks or shatters, the material is too brittle.
4. If the fastener sinks into the material the material is too soft.

7. FASTENING PROCEDURES

The selection of the proper fastener depends upon the thickness and hardness of the material into which the fastener is to be driven and the intended use for the application. If a permanent, non-reusable fastening is desired, a drive pin should be used. If a reusable installation is desired, use a threaded stud. For a light duty application, select a small shank diameter. For a heavy duty application, select a large shank diameter. The illustration shows the dimensions that need to be considered.



Dimensions Needed to Select Fastener

Fastening into Masonry

It is important that the masonry be at least three (3) times as thick as the fastener penetration.

Shank Diameter - Penetration Rule. When fastening into average concrete, the fastener should penetrate 7 to 8 times the shank diameter. In hard concrete, 5 to 6 shank diameters penetration would normally be sufficient for proper holding power. In soft concrete, 9 to 10 shank diameters would be appropriate.

Drive Pins. In selecting the proper drive pin for concrete or masonry, determine the correct shank length by allowing for the thickness of the material through which the drive pin is to be driven, plus the depth of penetration required by using the shank diameter penetration rule.

Threaded Studs. The selection of the proper threaded stud shank length is determined by using the shank diameter penetration rule. Select a thread length to allow for the thickness of the material to be attached and a nut and washer.

An appearance problem that may occur when fastening into masonry is spall (breaking of the masonry on the surface) around the fastener shank. Spall is caused by the fastener's compression of the masonry and the initial impact. Spall does not greatly reduce holding power as it affects only the surface. If spall is an appearance problem, the appearance can be improved by fastening through a disc or by using a small reducing adapter. Surface spall may be reduced or eliminated as follows. Use a smaller shank diameter fastener which also permits a shorter shank length and less penetration. Since over penetration often causes excess spall, try a shorter shank length, a lighter power load, or both. Hold the tool perpendicular to the masonry surface. Any angular forces may cause spall. Utilize the tool shield for stability.

Fastening into Steel

As a general rule, remember that when fastening into steel the point of the fastener should fully penetrate the opposite side because any embedded part of the fastener point tends to back the fastener out of the steel. This factor should be considered when selecting shank lengths. Also remember, knurled shank fasteners hold better in steel compared to smooth shank fasteners.

Drive Pins. To select the proper shank length, determine the total thickness of the material to be fastened, the thickness of the steel into which the pin will be driven, plus the point length.

Threaded Studs. The proper shank length for threaded studs depends on the thickness of the steel plus the point length on the opposite side. Depending upon the thickness of the item to be fastened, different thread lengths are available. Generally, if the item to be fastened is sheet metal, a short thread length would be selected. If the item to be fastened is thick, a correspondingly long thread length should be chosen so that a nut and perhaps a washer can be applied.

Base Materials and Materials to be Fastened

Before fastening into any unidentified material, check it by using the center punch test. Always follow the rules for edge distance, fastener spacing and material thickness.

Do not attempt to install a fastener through an existing hole in steel or any other material unless a positive guide is used to assure accurate location. Doing so could cause the fastener to hit the edge of the hole and fish-hook or ricochet.

Never attempt to fasten into a spalled or cracked area in masonry or into any area where a previous fastener has failed. Doing so could cause the fastener to fish-hook or ricochet.

Never overdrive a fastener. **Do not** use a fastener to draw down a steel member. This could cause a springing action and over a period of time the fastener could be pulled loose. **Never** over tighten a nut on a threaded stud. This could cause the fastener to be backed ("jacked") out. **Do not** attempt to install fasteners into very hard or brittle materials.

Never fasten wood fiberboard, plaster or other soft materials unless backed by a material that will prevent the fastener from passing completely through. **Always** know the material you are fastening into, especially in older buildings where the base material may be concealed. **Check continually** to avoid fastening into unsuitable material. **Do not** fasten closer than 3" from the edge of masonry. **Do not** fasten closer than ½" from the edge of steel.

8. GENERAL SAFETY PRECAUTIONS

A safe zone must be established behind the work area where powder-actuated tools are being used by evacuating the area or placing a barrier constructed of ½ inch steel plate.

Powder Actuated tools should be tested every day before loading to see that they are in safe and proper working condition. The method of testing should always be in accordance with manufacturer's recommended procedures. Any tool that is found to be not in proper working order or one that begins to malfunction during use must be removed from use immediately, tagged out, and not used until properly repaired.

Powder actuated tools are designed to operate safely. Unfortunately, they do not think for the operator. Safe operation of powder actuated tools requires knowledge and constant alertness by the operator.

E-21 Certificate of Fitness holder (operator)

Operators and coworkers should always wear safety goggles. Use of ear protection is recommended when making fastenings in confined areas such as small rooms, tanks, vaults or ship compartments. Never let bystanders gather around when you are using the tool.

When working on ladders and scaffolds, maintain good balance and properly brace yourself at all times. Never load the tool until ready to make a fastening. Never carry a loaded tool from job to job. Always keep the tool pointed in a safe

direction. Never place your hand in front of the barrel of a loaded tool as shown in the illustration below.



Incorrect Handling of a Power Actuated Tool

No powder actuated tool utilizing ammunition shall be used unless the Certificate of Fitness holder establishes a safe zone behind the work area by the use of 1/2 inch steel back-up plate and/or maintenance of an area clear of all people.

Care and Servicing of Tools

All tools should be cleaned and maintained in accordance with the tool manufacturer's specific instructions. Always check all tools prior to each day's use to be sure they are in proper working condition. Defective tools must be removed from service until they are repaired.

Have the tools inspected and serviced at regular intervals by the manufacturer's authorized service personnel. Do not alter any powder actuated tool or attempt to repair it with anything but factory replacement parts. Such action could destroy its safety features. Tools should be stored unloaded in a locked container when not in use.

Use and Limitations of Tools

A tool should always be equipped with the proper shield or fixture for the job. Use special fixtures where the standard shield does not provide protection. Only use the off center positions of adjustable shields when fastening near obstructions, such as a wall, when the obstruction is utilized as a shield. Always operate a tool at right angles to the work surface. Always check the chamber for foreign matter before loading. Do not use the tool in an explosive or flammable atmosphere.

Power Loads

Always check the color of each power load before inserting it into the tool chamber. Always make your first fastening with the lightest power load recommended for the tool. Never attempt to force a power load into a tool chamber.

In the event of a misfire hold the tool firmly against the work surface for a period of thirty seconds. Then follow the explicit procedures set forth in the manufacturer's operating instructions. Unfired power loads must not be thrown into trash containers or carelessly discarded. Never carry fasteners or other metal objects in the same container, apron pocket or pants pocket with power loads.

Disposal

Failure to properly dispose of charges is a common OSHA safety violation as well as a potential fire (explosive) hazard. The proper disposal of cartridges that are spent or unspent is a safety concern and an environmental hazard. You should check with the manufacturer or supplier of the casings, as they may reuse the strips.

Never dispose unfired power loads into a trash can. Never, under any circumstances, should either spent casings or defective casings be put in a fire as this could result in release.

Spent Cartridges

Spent cartridges are those that have been "fired," the charge is spent and the fastener has been delivered from the casing. Typically, casing for fasteners used in powder actuated tools are made out of brass. The disposal of the spent casings is mainly an environmental concern, as these casings take a very long time (hundreds of years) to decompose, if ever. Frequently they are sold in strips which are bound by plastic, which does not decompose. Both the casing and plastic can be recycled, if separated.

Unspent cartridges

Always check with the manufacturer for proper disposal of the unspent rounds. As a professional, you must be able to handle disposal and release of defective faulty round(s).

Unspent cartridges must be treated in the same way as live ammunition rounds: ***potentially hazardous***. If a strip of cartridges has never been used, store it in a

secure, cool dry environment. If a round misfires or does not fire at all when actuated in the tool, remove the defective cartridge and try again with a new one. The defective unspent cartridges should be stored in bucket of water or similar type of container. After being placed in water, unspent cartridges should be treated the same as spent cartridges

SAFETY IN REVIEW

- Do not use a tool in an explosive or flammable atmosphere.
- Inspect the tool before using it to determine that it is clean, that all moving parts operate freely, and that the barrel is free from obstructions and has the proper shield, guard, and attachments recommended by the manufacturer.
- Do not load the tool unless it is to be used immediately.
- Do not leave a loaded tool unattended, especially where it would be available to unauthorized persons.
- Keep hands clear of the barrel end.
- Never point the tool at anyone.

9. FIRE SAFETY

Fire Extinguishers

At least one portable fire extinguisher with a minimum 2A rating must be provided where ammunition is stored. "No Smoking" signs must be posted in the area where ammunition is stored.

The fire guard must be familiar with the different types of fire extinguishers that are present. The fire guard must know how to operate the extinguishers in a safe and efficient manner. He/she must know the difference between the various types of fires and the extinguishers appropriate for use in that particular fire. The different classes of fires are described below.

Classes of Fire Extinguishers

CLASSES OF FIRES	TYPES OF FIRES	PICTURE SYMBOL
A	Wood, paper, cloth, trash & other ordinary materials.	
B	Gasoline, oil, paint and other flammable liquids.	
C	May be used on fires involving live electrical equipment without danger to the operator.	
D	Combustible metals and combustible metal alloys.	
K	Cooking media (Vegetable or Animal Oils and Fats)	

A **Multipurpose dry chemical** fire extinguisher may be used to extinguish Class A, B, or C fires.

Typical Symbols Painted on Fire Extinguishers

The symbol with the shaded background and the slash indicate when the extinguisher must not be used. Symbols may also be painted on the extinguisher. The symbols indicate what kind of fires the extinguishers may be used on. The C of F holder must understand these symbols. Examples of these symbols are shown below.

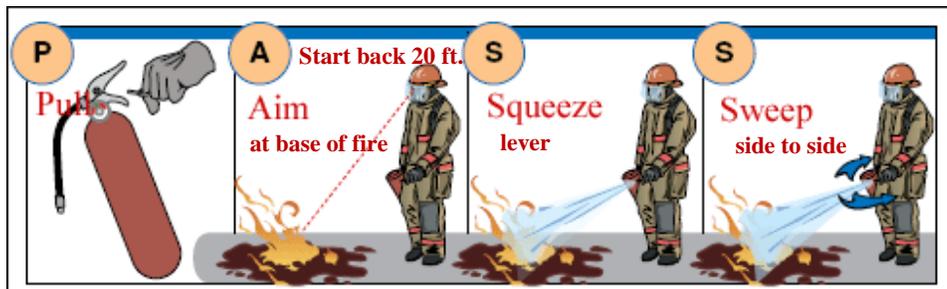
			Suitable for Class B and Class C fires but not Class A
			Suitable for Class A fires but not Class B or Class C
			Suitable for Class A and Class B fires but not Class C

Generally, operation instructions are clearly painted on the side of the fire extinguisher. They clearly describe how to use the extinguisher in case of an emergency. An example of these instructions is shown below.

In case of any fire, 911 must be called.

Fire extinguishers must be used in accordance with the instructions painted on the side of the extinguisher. They clearly describe how to use the extinguisher in case of an emergency. The Certificate of Fitness holder should be familiar with the use of portable fire extinguishers. When it comes to using a fire-extinguisher just remember the acronym P.A.S.S. to help make sure you use it properly.

P.A.S.S. stands for Pull, Aim, Squeeze, Sweep. An example of these instructions is depicted in the picture below.



Monthly Inspection-

is a "quick check" that a portable fire extinguisher is available and will operate. It is intended to give reasonable assurance that the portable fire extinguisher is fully charged and operable.

This is done by verifying that:



- Fire extinguishers are in their assigned place;
- Fire extinguishers are not blocked or hidden;
- Fire Extinguishers have not been actuated or tampered with;
- Fire extinguishers show no visual sign of damage or abuse that prevents its operation;
- Pressure gauge reading or indicator on the fire extinguisher are all in the operable range or position;
- Ensure that the fire extinguishers tags are current;
- Pin and seals are in place;
- Nozzles are free of blockage.

A basic inspection is a *visual examination* of the portable fire extinguisher.

Annual Inspection

In addition, fire extinguisher maintenance should be performed once per year. It is a "thorough check" of the extinguisher. It is intended to give maximum guarantee that an extinguisher will operate successfully and safely in the event of a fire. It includes a thorough examination, any necessary repair, recharging and/or replacement. This annual inspection must be performed by W-96

Certificate of Fitness holder employed by a FDNY approved portable fire extinguisher company.

Notifications:

The person responsible for the use of powder actuated tools should notify the site safety manager if an unsafe condition has been created. Any person who becomes aware of a fire or explosion or any other emergency shall immediately report such emergency to the Fire Department (Call 911). No owner or other person shall issue any directive or take any action to prevent or delay the reporting of a fire or other emergency to the Fire Department. After calling the Fire Department, the supervisor or the site safety manager or other designated person should also be notified.

The Certificate of Fitness holder must know the locations of and how to operate all fire extinguishing devices, control devices, and fire alarm stations installed at the facility. In case of a fire, explosion, or emergency, the Certificate of Fitness (C of F) holder must notify the Fire Department by phone immediately. The Certificate of Fitness holder must know the telephone number of the Fire Department Borough Communication Office. The borough phone numbers are listed as follows. These phone numbers must be posted near the phones most likely to be used in case of an emergency.

- Manhattan (212) 999-2222
- Bronx (718) 999-3333
- Brooklyn (718) 999-4444
- Queens (718) 999-5555
- Staten Island (718) 999-6666

After notification by phone, the local fire alarm must be sounded. In some cases, the activation of the fire alarm will transmit a signal to the Fire Department via a FDNY approved central station company. The C of F holder shall initiate an orderly evacuation when necessary following a hazardous incident, and take reasonable steps to isolate the hazard until the Fire Department arrives. The Certificate of Fitness holder must answer any questions asked by Firefighters and officers when they arrive. For example, he or she must indicate the location of the fire, describe the type of fire protection devices available, and describe the materials stored on the fire floor. The Bureau of Fire Prevention must be notified as soon as possible after an explosion or fire has occurred. The Bureau of Fire Prevention may require a detailed report on the causes and the consequences of the explosion or fire. Generally, this report must be filed within ten days after the incident.