

EXTINGUISHERS
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FIRE EXTINGUISHERS

Fire And Extinguisher Classification

Fire extinguishers are considered first aid fire fighting appliances. Portable fire extinguishers are designed to fight fires in their incipient phase and are a first line of defense. There are four basic methods of fire extinguishment: cooling, fuel removal, exclusion of oxygen, and interruption of the chemical chain reaction. All fire extinguishing agents work by one or more of these methods. A thorough understanding of extinguishing agents will help determine the most appropriate agent for any particular fire. In other words, choosing the agent that will effectively extinguish the fire with the least amount of damage.

Because the effectiveness of different extinguishing agents are not uniform on different fires, the NFPA extinguisher standard classifies fires into the following four types.

Class A: Fires in ordinary combustible materials (wood, cloth, paper, rubber, and many plastics) which require the heat absorbing (cooling) effects of water or water solutions, the coating effects of certain dry chemicals which retard combustion, or the interrupting of the chemical chain reaction by halogenated agents.

Class B: Fires in flammable or combustible liquids, flammable gases, greases, and similar materials, which must be put out by excluding air (oxygen), inhibiting the release of combustible vapors, or interrupting the chemical chain reaction.

Class C: Fires in live electrical equipment; safety to operator requires the use of electrically nonconductive extinguishing agents. (NOTE: When electrical equipment is de-energized, extinguishers for Class A or B fires may be used.)

Class D: Fires in certain combustible metals (magnesium, zirconium, sodium, potassium, etc.) which require a heat absorbing extinguishing medium that does not react with the burning metals.

Some portable extinguishers will put out only one class of fire, and some are suitable for two or three, but none are suitable for all four classes of fire. Most extinguishers are labeled so users can quickly identify the class of fire for which it is meant to be used on.

Rating numerals are also used on the labels of extinguishers for Class A and Class B fires. The rating numeral gives the relative effectiveness of the extinguisher. For example, an extinguisher rated 4-A; 20-B:C indicates three things: 1) It should

extinguish approximately twice as much Class A fire as a 2-A rated extinguisher; 2) It should extinguish approximately twenty times as much Class B fire as a 1-B rated extinguisher; and 3) It is suitable on energized electrical equipment. Class C and D extinguishers have no numeral ratings.

The most recently recommended marking system is one that combines pictographs of both uses and non-uses on a single label. Letter shaped symbol markings are recommended for use until full conversion to the newer pictographs is completed. Letter markings and pictographs follow.

			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

Figure 1

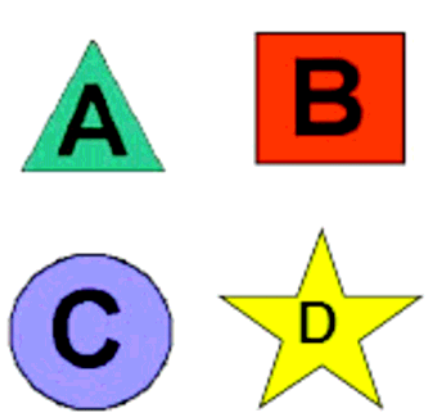


Figure 2

EXTINGUISHER OPERATION

Portable extinguishers come in many shapes, sizes and types. An operator should be able to choose the correct size and type of extinguisher for any particular fire. When the proper extinguisher is in hand, the operating principles of each type are similar. Every extinguisher should have a label showing its operating instructions, but in an emergency situation every second is of great importance, especially at the beginning. Therefore, everyone should be acquainted with the following general instructions applicable to most portable fire extinguishers. Everyone should still take the time to read the detailed instructions on the particular extinguishers, in advance at their place of work or at home, which they may be called upon to use.

Modern extinguishers are designed to be carried to the fire in an upright position. When instructing the general public in the use of extinguishers, it should be strongly emphasized that they are operated in an upright position. Only obsolete soda-acid, foam and cartridge operated water extinguishers are designed to be turned upside down. Avoid them.

Do not attempt to activate the extinguisher until close enough to the fire to be within the reach of the stream of that extinguishing agent according to the information on the following pages. Smaller extinguishers require closer approach to the fire.

The general instructions follow the letters P - A - S - S.

- P - Pull** the pin at the top of the extinguisher which keeps the handle from being pressed. Break the plastic or thin wire inspection band.
- A - Aim** the nozzle or outlet toward the fire. Some hose assemblies are clipped to the extinguisher body. Release it and point.
- S - Squeeze** the handle above the carrying handle to discharge the agent inside. The handle can be released to stop the discharge at any time.
- S - Sweep** the nozzle back and forth before the flames to spread out the extinguishing agent. Apply it toward the base of the flames. After the fire is out, probe for remaining smoldering hot spots or possible reflash of flammable liquids. Make sure the fire is out.

Pull pin - Aim nozzle - Squeeze handle - Sweep agent back and forth.

EXTINGUISHER TYPES

Pressurized Water Extinguishers

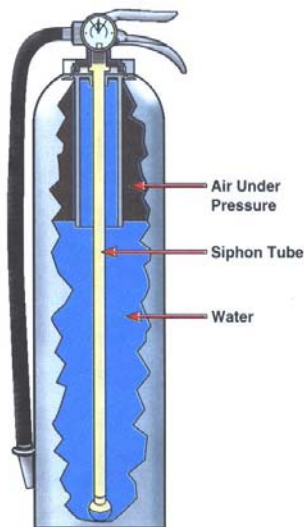
The stored pressure 2 1/2-gallon water extinguisher is rated at 2A. The extinguisher weighs about 30 LBS. The stream range is approximately 35-40 feet. Continuous use will expel the contents in 60 seconds; however, it can be used on an intermittent basis.

Water is the best overall extinguishing agent and the most common. Water is considered the best extinguishing agent for the following reasons: 1) Water has the ability to absorb a large amount of heat (it has a high specific heat); 2) Water is easily accessible in vast quantities; and 3) Water is relatively inexpensive compared to other agents.

Extinguishment by water is primarily achieved through cooling. When completely converted to steam, water can expand its volume 1700 times, displacing heat and oxygen. Extinguishment can also be achieved by dilution in miscible (water soluble) liquids and by smothering in dense immiscible (water insoluble) liquids. Water used in a fog stream can be used to control other flammable liquid fires, however, should not be considered as an effective extinguishing agent.

Water does have two primary disadvantages: 1) It conducts electricity and 2) It freezes. Water also has a high surface tension which inhibits the ability of water to penetrate compacted materials. The surface tension of water can be reduced by adding wetting agents to the water, such as Wet water, Fireout, etc. Foam concentrates can also be added to water for use on flammable liquid fires.

Filling and Recharging



The extinguisher should only be filled to the "fill mark" which, on some models, is stamped into the shell about 6" from the top. Some manufacturers have installed an overfill tube in the shell opening in order to ensure filling to the proper level. The cap (head) assembly consists of a siphon tube, combination carrying handle/operating lever, discharge valve, air pressure valve, gauge, discharge hose, and nozzle. Through an automobile tire-type air-valve, the extinguisher is pressurized with air or inert gas. The cap has cuts through the thread or a hole in the thread to vent the internal pressure, if necessary. Charging pressures vary from 90 to 125 PSI. Follow the directions on the label when filling. The air pressure gauge is marked showing the normal pressure range.

Figure 3

The operating lever is held in a locked position to prevent accidental discharge while being carried. A ring pin must be pulled out before the operating lever can be depressed. To do this, it is best to set the extinguisher on the ground and, while loosely holding the combination handle in one hand, pull out the ring pin with the other hand. Then, grasp the hose and nozzle in one hand and squeeze the discharge lever with the other. The stream should be directed at the base of the flames, working from side to side or around the fire. Application should begin as close to the fire as possible. As the flames diminish and it is possible to get closer to the fire, the solid stream can be changed to a spray by extending the tip of the index finger over the end of the nozzle. A spray stream will be more effective in extinguishing burning embers. In order to thoroughly wet deep-seated smoldering or glowing surfaces, it is best to kick or poke apart burning materials.

Principal items that need to be checked during inspections are: worn or damaged hose, loose hose, plugged nozzle, dented shell, damaged indicator gauge, a damaged or jammed ring pin. A hydrostatic test is required every 5 years.

Carbon Dioxide Extinguishers



The CO₂ extinguisher is rated at 40 BC. The extinguisher holds 15 LBS. of agent. It has a stream range of 3-8 feet. Continuous use will expel the contents in 8-30 seconds. It can be used intermittently however. Extinguishment with carbon dioxide is achieved by smothering and is most effective with Class B/C fires in enclosed areas. An advantage of carbon dioxide is that it leaves no residue which makes it great for stove and oven fires. CO₂ will subject any surface it strikes to a temperature of -110 degrees (thermal shock). Despite this cold discharge, the cooling effect of CO₂ is minimal. CO₂ should not be used on combustible metal as it can disassociate the carbon and oxygen.

Figure 4

Carbon dioxide is a colorless, odorless gas that has a vapor density of 1.529. CO₂ exists in its natural state as a gas. It can be a liquid when under pressure or it may be a solid (dry ice). This solid does not melt to a liquid state, but is said to **sublimate** (proceed directly from a solid to a gas). In fire extinguishers, CO₂ is stored under pressure as a liquid. CO₂ exists in all three states of matter (solid, liquid, gas) at 75 PSIA (pounds per square inch absolute) and -69.9 degrees F. This is called the **triple point**. Regardless of pressure, CO₂ exists as a gas at temperatures above 87.8 degrees F (the **critical temperature**). CO₂ is a simple asphyxiant; a concentration of 9% is considered hazardous.

Carbon dioxide is the most commonly utilized compressed gas in fire extinguishers. The CO₂ is retained in a heavy seamless drawn steel shell in a liquid state at a pressure of 800-900 PSI and temperatures below 88 degrees F. The extinguisher consists of a pressure cylinder (shell), a siphon tube and valve for releasing the agent, and a discharge horn/hose. The horn is made of a plastic (commonly bakelite) in order to withstand the extreme temperature change to -110 degrees F. The horn also will not conduct electricity and is non-magnetic. A safety relief valve on the side of the handle is pre-set to go off when the contents reach 130 degrees F.

The siphon tube extends from the valve to almost the bottom of the shell, so normally only liquid CO₂ reaches the discharge horn until about 80 percent of the contents are released. The remaining 20 percent of the contents enters the siphon tube as a gas. The rapid expansion from a liquid to a gas (450:1) when the CO₂ leaves the discharge horn produces a refrigerating effect that converts about 30 percent of the liquid to a carbonic snow or dry ice which sublimates into a gas. **WARNING!** The discharge horn will become extremely cold during operation and should not be touched with bare hands.

The extinguisher is carried in an upright position, the locking ring is pulled and the operating lever is squeezed. The initial application must start relatively close to the fire (3-4 feet) but not so close as to blast burning liquids from an open vessel or across an open space. The most commonly used method of agent application is to start at the near edge and direct the discharge in a slow side-to-side sweeping motion gradually progressing toward the back of the fire. Agent application should be continued even after the flames appear to be extinguished to prevent any reflash from adjacent hot surfaces or open fingers of flame. On fires involving electrical equipment the discharge should be directed into the source of the flames. It is important to de-energize the equipment as soon as possible to eliminate the potential source of re-ignition.

Weighing is the only method of determining that CO₂ extinguishers are fully charged. They should be checked at least monthly for loss of weight, deterioration, or physical damage. The weight of the extinguisher is stamped on the neck of the cylinder. Any CO₂ extinguisher that has a content weight loss of 10 percent or more should be recharged and leak tested. Recharging is done by an extinguisher servicing company.

CO₂ extinguishers are hydrostatically tested every five years at five-thirds of the service pressure stamped into the cylinder. The discharge hose is tested to 1500 PSI.

Beware of using CO₂ extinguishers in an enclosed area as it can cause unconsciousness in concentrations of 9 percent or more.

Dry Chemical Extinguishers

There are five types of dry chemical agent, and each has certain advantages and disadvantages. The approximate fire extinguishing capabilities of each type using sodium bicarbonate for comparison and a uniform application rate is as follows: sodium bicarbonate (1), monoammonium phosphate base (1.5x), potassium chloride base (1.8x), potassium bicarbonate base (2x), and urea-potassium bicarbonate base (2.5x). The monoammonium phosphate base agent (multipurpose) is the only one that is suitable for Class A protection.

Dry chemicals extinguish primarily by breaking the chemical chain reaction. The biggest disadvantage of dry chemicals is the mess and damage the residue can cause. This is especially true with the multipurpose base as it forms a sticky crust on application. Electronic components can be corroded by the use of dry chemicals. Dry chemicals are considered non-toxic, but irritating.

There are two methods whereby dry chemical agent can be discharged from an extinguisher shell depending on the basic design of the extinguisher. They are the **cartridge-operated** method and the **stored pressure** method.



Figure 5
Cartridge-Operated Dry
Chemical Extinguisher



Figure 6
Stored Pressure Dry
Chemical Extinguisher

The **cartridge-operated** design consists of a chamber, with a large fill opening at the top, in which the agent is kept at atmospheric pressure. A small cylinder of propellant gas (CO₂ or nitrogen) is threaded (left hand thread) into a puncture valve and gas tube assembly attached to the side of the shell. Grooves are cut into the threads of some cartridges to relieve pressure if you mistakenly unscrew it while the system is pressurized. Some units have a small hole in the female threads to relieve pressure. Likewise, on the shell, the large fill opening has grooves cut into its threads, or a hole drilled into the female threads. Discharge of the agent, for cartridge operated extinguishers, is through a hose attached to the bottom edge of the shell. Rate is controlled by a squeeze grip nozzle on the end of the hose.

To activate, the extinguisher is generally placed on the ground in an upright position. The nozzle should first be removed from its holder and held in one hand while the puncture lever is pushed down. Pushing the puncture lever releases the propellant gas which, in turn, pressurizes the large chamber agitating the dry chemical agent. Operation requires two hands: one hand is needed to carry the extinguisher, and the other hand is needed to release and direct agent discharge. When depressing the puncture lever, the operator should stand to the side of the extinguisher so that the possibility of injury will be reduced, should the extinguisher shell fail. The discharge hose is double braided, neoprene wrapped steel, which is tested to 300 psi.

Recharging should take place promptly after actuation or use. This is because several hours after the extinguisher has been pressurized, the propellant gas can leak away and result in a "dead" extinguisher, even though no agent has been discharged.

A **stored pressure** extinguisher expels the agent through a siphon tube and is controlled by a handle/operating lever. This type of extinguisher is pressurized by nitrogen gas or carbon dioxide gas. There are two basic types of stored pressure extinguishers: the disposable shell type and the rechargeable shell type.

Once the extinguisher has been used, even though only a small amount of agent has been discharged, particles may adhere to the valve seat and allow the propellant gas to leak away. Recharging or replacement should immediately take place.

All dry chemical extinguishers can be carried and operated simultaneously, and can be discharged intermittently. The discharge stream has a horizontal range of **5' to 20'** depending on extinguisher size. The stream should be directed at the base of the flame. Best results are generally obtained by attacking the near edge of the fire and progressing forward, moving the nozzle rapidly with a side-to-side sweeping motion. Care must also be taken not to direct the initial discharge directly at the burning surface at close range (less 5 to 8 ft.) because the high velocity of the stream may cause splashing and/or scattering of the burning material. When used on outdoor fires, maximum effectiveness can be achieved when the wind is behind

the operator. In this way, the wind bends the flames away and helps to carry the agent into the area of the fire, thus extending the effective range.

Correct application techniques for extinguishing Class B fires will vary depending on actual fire conditions. In general, there are five types of Class B fires: liquid spills, liquids in depth, three dimensional (running or falling) liquid leaks or spills, pressurized liquid leaks, and pressurized gas discharge. Where obstacles are present in the fire area, a more difficult extinguishing condition will be encountered. For example, in a spill fire in a flammable liquid storage room where 55-gal. drums are standing on the floor, the drums would present an obstacle by shielding the flames from a lone operator. This type of fire condition requires the combined attack of two or more operators.

Dry chemical extinguishers extinguish by breaking the "chain reaction" on Class B fires. The chemicals used prevent the union of free radical particles in the combustion process. Combustion does not continue when the flame front is completely covered with the chemical agent. Reignition can occur if hot surfaces or another ignition source remains in the fire area, or if the dry chemical doesn't cover the entire flaming area.

For Class A fires, the only listed dry chemical agent is multipurpose dry chemical (Monammonium phosphate). Although this agent extinguishes the flames in the same manner as other dry chemical agents, when in contact with hot surfaces it has the additional characteristic of softening. In this way it can adhere to burning materials and form a coating which will smother and isolate the fuel from the air. When applying the agent, it is important to coat all burning areas in order to eliminate or minimize the number of small embers which may be a potential source of reignition. The agent itself has little cooling effect and cannot penetrate below the burning surface. This means that multipurpose dry chemical cannot be relied upon for the extinguishment of deep seated fires. It is usually desirable to watch carefully for any evidence of rekindling, and to subsequently apply water where rapid cooling is desired.

When Class A or Class B fires, or both, involve live electrical equipment, dry chemical can be effectively and safely used under dry conditions. If a moisture film is present due to dampness or water, dry chemical agents may combine to form a conductive path to ground. The initial discharge should first be directed at the base of the flames, and then rapidly sprayed over other burning areas. Because it presents a potential source of reignition, it is important to shut off electrical power as soon as possible. De-energizing will also prevent arcing and further equipment damage. Once the power is off the fire is essentially a Class A or Class B fire, or both, and it may be more practical to utilize a different agent for final extinguishment. Before de-energized electrical equipment is returned to service, it is essential to clean off all agent residue to avoid damage that could be caused by abrasion, corrosion, current leakage, or reduced conductivity.

Our dry chemical extinguishers should be inspected daily. They should also undergo normal annual maintenance. The quantity of agent for cartridge-operated models can be checked by weighing, or by removing the fill cap and checking visually. The gas cartridge is also checked by weighing. For 10 lb. dry chemical extinguishers, if the cartridge stated weight is 18 ounces, remove from service if 1/4 ounce low. For 20 lb. dry chemical extinguishers, if the cartridge stated weight is 35 ounces, remove from service when 1/2 ounce low. During the annual maintenance, all agent should be dumped or vacuumed from the shell.

Dry chemical extinguishers need to be promptly refilled after use, even when only partially discharged. Before refilling dry chemical extinguishers, extreme caution must be taken to see that no water or moisture is allowed to enter the cylinder. Even though dry chemical agents are treated for moisture repellency, they can eventually harden if moisture is present. When dry chemical extinguishers are hydrostatically tested, they must be thoroughly dried so that no trace of water or moisture remains. Before dry chemical is added it is advisable to remove all of the unused agent by dumping or vacuuming, and to remove any dry chemical residue from the hose.

The Department of Transportation (D.O.T.) requires that any fire extinguisher carried on a vehicle be hydrostatically tested every five years. In a business, cartridge operated extinguishers would only need to be hydrostatically tested every twelve years. Stored pressure extinguishers always need to be tested every five years.

The type of dry chemical specified by the manufacturer is used in recharging. For example, if an extinguisher contains a Class BC type dry chemical (bicarbonate base or potassium chloride) it should not be replaced with a Class A:B:C agent (monoammonium phosphate base). Intermixing types of dry chemical agent can result in malfunction or damage to the extinguisher or both. The bicarbonate base agent is chemically basic and will react with the acidic monoammonium phosphate. This reaction is aggravated by exposure to heat or the presence of moisture or both. One result is caking (hardening) of the agent; another possible result is the internal corrosion of the extinguisher. Under certain conditions the reaction will cause a significant pressure buildup within the shell to the point of damage or rupture of the extinguisher. Substituting another manufacturer's dry chemical of the same type is not recommended unless it has the same chemical and physical characteristics, or has been tested and found to give equivalent performance.

Recharge operations for the cartridge-operated models are relatively easy. The rubber sleeves on the gas tube should be checked for cracks or over-stretched shape, the gasket and gasket seats on the shell and cap wiped clean, and the cap screwed on hand tight. In replacing the cartridge, care should be taken to see that the threads are not dirty, cross-threaded or otherwise damaged.

EXTINGUISHER OVERVIEW

Extinguishing Agent	Method of Operation	Capacity	Horizontal Range	Duration	Hydrostatic Test Interval	Class
Water	Stored Pressure	2-1/2 gal.	30-40'	60 sec.	5 yr.	A
CO ₂	Self Expellent	15 lb.	3-8'	8-30 sec.	5 hr.	BC
Dry Chem (Sodium Bicarbonate)	Cartridge/ Stored Pressure	20 lb.	5-20'	10-25 sec.	12 yrs./ 5 yrs.	BC

FIRE EXTINGUISHER RATINGS

In order to correlate the correct size and type of fire extinguisher with the fire at hand, extinguishers are rated by Underwriter's Laboratory, Inc. (UL).

Class A fire extinguishers receive three tests: wood-crib, wood-panel, and excelsior. The wood-crib test is conducted by making a wooden crib made of spruce or fir, kiln-dried to a specific moisture content. The size of the members and the crib varies with the rating. The crib is ignited by burning a pan of N-Heptane. The wood-panel is constructed of 3/4" fir strips laid over spruce or fir solid backing. The panel is sprayed with fuel oil, ignited, and allowed to burn until ten feet of the panel has broken away. The excelsior test consists of laying out, in a certain area of the floor of the test facility, a bed of seasoned shavings of aspen, poplar, or basswood. All of these tests are conducted indoors or outdoors in still air. A rating of 1A requires 1 1/4 gallons of water.

Classification & Rating	No. of Members	Normal Size and Length of Members (Inches)	Arrangement of Wood Members
1A	50	2 x 2 x 18 3/4	10 layers of 5
2A	70	2 x 2 x 24	13 layers of 6
3A	98	2 x 2 x 28 3/4	14 layers of 7
4A	120	2 x 2 x 31 1/4	15 layers of 8
6A	153	2 x 2 x 36	17 layers of 9
10A	209	2 x 2 x 44 1/2	19 layers of 11
20A	160	2 x 2 x 60	10 layers of 15 on edge 1 top layer of 10 flat
30A	192	2 x 2 x 72	10 layers of 18 on edge 1 top layer of 12 flat
40A	224	2 x 2 x 84	10 layers of 21 on edge 1 top layer of 14 flat

WOOD CRIB TEST

Classification & Rating	Test Panel Size (Ft.)	Gallons Fuel Oil Applied	Total Pounds Excelsior For Windows
1A	8 x 8	1	10
2A	10 x 10	2	20
3A	12 x 12	3	30
4A	14 x 14	4	40
6A	17 x 17	6	60

WOOD PANEL TEST

Classification & Rating	Weight of Excelsior (Pounds)	Test Area (Feet & Inches)
1A	6	2'10" x 5'8"
2A	12	4'0" x 8'0"
3A	18	4'11" x 9'9 1/2"
4A	24	6'0" x 10'8"
6A	36	6'11" x 13'11"

EXCELSIOR TEST

Figure 7

Class B fire extinguishers receive only one test. It is conducted in a square steel pan not less than eight inches deep by burning N-Heptane for one minute before extinguishing. Class B fires require considerably more skill to extinguish than Class A fires. For this reason, the tests are conducted by skilled operators and the results are devalued by 40%. For example, a 1B extinguisher is required to extinguish a 2 1/2 sq. ft. fire. A 1B extinguisher should be considered capable of extinguishing a 1 sq. ft. fire with a lay operator, or a 2 1/2 sq. ft. fire with a skilled operator.



Figure 8

There are no capability tests performed for Class C rated Fire Extinguishers. Extinguishers for use on Class C fires receive this rating only because the Class C fires are typically Class A or B fires involving energized electrical equipment. Class C extinguishing agents receive their rating because of the non-conductivity of the agent. The class C rating is assigned in addition to an A or B Class rating.

			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

Figure 9

A Class D fire extinguisher must be capable of extinguishing combustible metal test fires as designated by the testing laboratory for a given metal. The burning metal must not be scattered beyond the test-bed area during the test and there must be sufficient unburned combustible metal remaining to show extinguishment by the agent prior to burn out.

HYDROSTATIC TESTING

Portable fire extinguishers are hydrostatically tested to safeguard against unexpected, in-service failures from:

- 1) undetected internal corrosion caused by moisture in the extinguisher,
- 2) external corrosion caused by atmospheric humidity or corrosive vapors,
- 3) damage caused by rough handling (which may or may not be obvious by external inspection),
- 4) repeated pressurizations,
- 5) manufacturing flaws in the construction of the extinguisher,
- 6) improper assembly of valves or safety relief discs, or
- 7) exposure of the extinguisher to abnormal heat, as during exposure to fire.

It is not necessary to hydrostatically test certain extinguishers such as pump tanks, back packs, and similar devices. The factory-sealed, nonrefillable, disposable types of fire extinguishers cannot be hydrostatically tested. (Where such extinguishers are damaged, they should be replaced.)

HYDROSTATIC TEST SCHEDULE:

Stored-Pressure Water	5 Yrs.
Stored-Pressure Dry Chemical.....	5 Yrs.
Cartridge-Operated Dry Chemical.....	12 Yrs.
Cartridge-Operated Dry Chemical (carried on vehicle)	5 Yrs.
CO ₂	5 Yrs.
Cartridge-Operated Dry Powder.....	12 Yrs.
Cartridge-Operated Dry Powder (carried on vehicle)	5 Yrs.

Because hydrostatic test records are of major importance, they must be recorded on the extinguisher. For compressed gas cylinders and cartridges passing a hydrostatic test, the month and year is stamped into the cylinder. It is important that the recording (stamping) be placed only on the shoulder, top head, neck, or footing (when so provided) of the cylinder. For noncompressed gas type extinguisher shells the test information should be recorded on a suitable metallic label, or on equally durable material. The label should be affixed by a heatless process to the shell, and should be self-destructive if removal is attempted. The label must include the following information:

1. Month and year the test was performed, indicated by a perforation, such as by a hand punch.
2. Test pressure used.
3. Name or initials of person performing the test, or name of agency performing the test.

Destroy any extinguisher shell which fails a hydrostatic test or if one or more of the following conditions exist: (Do not hydrostatically test if:)

1. There exist repairs by soldering, welding, brazing, or use of patching compounds.
2. The cylinder or shell threads are damaged.
3. Corrosion has caused pitting, including corrosion under the removable nameplate band assemblies.
4. Extinguisher has been burned in a fire.
5. A calcium chloride type of extinguishing agent was used in a stain less steel extinguisher.

INSPECTION OF FIRE EXTINGUISHERS

Firefighters are frequently required to inspect fire extinguishers. Two main factors that determine a fire extinguisher's worth and which will justify its purchase and installation are its serviceability and its accessibility. An inspector should look for the following items:

- Check accessibility and proper location
- Check tag for date of last recharge or inspection
- Check nozzle for obstructions and operation
- Examine for corrosion (leaks at seams) or mechanical damage
- Check lockpin and seal
- Determine if full (water level, pressure gauge, or weight)
- Examine condition of hose and hose coupling
- Check horns for cracks, dirt, or grease accumulations
- Date of this inspection and initials of inspector should be placed on tag



Figure 10

Check Accessibility



Figure 11

Every check or recharge should be recorded.



Figure 12

Check the nozzle for obstructions.



Figure 13

Make sure the extinguisher has not been tampered with since the last inspection. Is the leaded wire seal in place?



Figure 14

If the seal is plastic, is it in place through the lockpin?



Figure 15

If a gauge is provided, note the amount of pressure in the cylinder.

DAMAGED EXTINGUISHERS

Leaking, corroded, or otherwise damaged extinguisher shells or cylinders should be discarded or returned to the manufacturer for repair. **CAUTION: NEVER TRY TO REPAIR A SHELL OR CYLINDER SUBJECTED TO PRESSURE.** If an extinguisher shows only slight damage or corrosion, and it is questionable whether it is safe to use, it should not be used until given a hydrostatic test by the manufacturer or a qualified testing agency. Leaking hose, gaskets, nozzles, and inner chambers can be replaced by firefighters.

OBSOLETE EXTINGUISHERS

In 1969, American manufacturers stopped making inverting-type extinguishers, including soda-acid, foam, cartridge-operated water, and loaded stream extinguishers. Nevertheless, it is estimated that there are still several million in use. Some of their disadvantages are:

- They cannot be turned off once activated.
- The agent is more corrosive than water.
- They are potentially dangerous. If the discharge hose is blocked, these extinguishers can build up pressures in excess of 300 psi and explode, causing serious injury or death.

Extinguishers made of copper or brass joined by soft solder or rivets have also been discontinued.

The soda-acid extinguisher is the most common obsolete type. When this extinguisher is inverted, acid from a bottle mixes with a soda-and-water solution and produces a gas that expels the liquid. The pressure on an acid-corroded shell has exploded many soda-acid extinguishers.

Inverting foam extinguishers look like soda-acid extinguishers. Inverting mixes solutions from two chambers, forming a foam that expands at a 1.89 ratio and a gas that expels the foam to fight Class B and C fires. These units have been replaced by stored-pressure units.

Users of cartridge-operated water extinguishers have to invert and bump the units to puncture a CO₂ cylinder. The pressure of the gas released from the cartridge expels the water.

Some people still have liquid carbon tetrachloride extinguishers, obsolete since the 1960's. When carbon tetrachloride comes in contact with heat it releases a highly toxic phosgene gas.