Los Angeles City Fire Department

TRAINING BULLETIN

J. C. GERARD Chief Engineer and General Manager

1962 (reprints 10-69/9-77) Bulletin 11

PRESSURIZED DRY CHEMICAL FIRE EXTINGUISHERS

Dry Chemical

1. What It Is: The chemical itself is baking soda (sodium bicarbonate, NaHCO 2) especially treated to make it resistant to caking and moisture, and capable of being readily dispersed into a fire-killing cloud.

2. How It Works: There have been many attempts to explain the Extinguishing action of dry chemical extinguishers. Research in recent years indicates that one or more of the following are responsible for its effectiveness:

   a. Dry Chemical, in the presence of heat, releases carbon dioxide and water vapor which provides a smothering action.
   b. Heat is absorbed by both the solid particles and water vapor which provides cooling.
   c. The chemical chain reaction of combustion is interrupted. That is, the dry chemical inactivates the intermediate products necessary for continued combustion.

   Although it is not known which of the above is most important, it is certain that extingiushment is a result of some chemical action taking place directly in the flame.

3. What It Can Extinguish: Generally dry chemical is most effective on fires involving flammable liquids, gases, and liquefied gases. It is the fastest and most spectacular extinguishing material for spilled fuel areas. Dry chemical is effective on fires involving deep-layer flammable liquids, natural gas leaks, and liquefied flammable gas leaks and spills. More specifically, dry chemical is effective on fires involving dip tanks, ruptured tank cars, broken gas lines, broken valves or flanges on liquefied flammable gas cylinders, and breaks and leaks in pipes and tubing for flammable gases, anesthetics, etc * it will extinguish fires involving bottled gases even when they are burning under high pressure. Dry chemical is approximately twice as effective as CO2 on hydrocarbon fires, including methane, for a given size

extinguisher. This extinguisher is especially suitable for use on fires in grease ducts above stoves, when applied into the lower end of the duct.

There has been an increasing use of dry chemical on Class A fires, especially in textile fibers such as cotton. However, it serves primarily to obtain very rapid control of the fire. The surface flames are almost immediately extinguished, but the Class A material will usually still smolder. It is desirable to have water available for final extinguishment; although larger quantities of dry chemical may be used for complete extinguishment in some instances when water is not available.

A cloud of dry chemical is similar to a flame arrestor, in that a flame cannot pass through a cloud of particles in proper concentration. When a car fire involving occupants is encountered, there are certain advantages to using dry chemical; the powder can be used as a heat screen to quickly move in on the fire and rescue the occupants, in addition, the powder will not have any adverse effect on the occupants of the car, where the use of water spray on the victim could result in steam burns and would not allow as quick access to the car. However, since the dry chemical will not completely extinguish the Class A fires involved, water in some form should be provided to quickly extinguish residual Class A fires and avert any reflash of the flammable liquids involved. This procedure should not be used unless at least two firemen are present-- one for rescue and one to provide protective cover. If a reflash should occur and involve firemen or civilians, do not hesitate to engulf them in a cloud of powder. The powder will absorb the heat, and anyone in the area can safely-walk-out through the cloud of dry powder. In some industrial occupancies where men are working around hazardous processes, they are supplied with a dry chemical extinguisher and instructed, if a fire should occur, to quickly fill the area with a cloud of dry chemical and walk out of the area through the protecting cloud.

The dry chemical in these extinguishers can also be used to neutralize acid spills. When an acid spill is encountered, pull the locking pin, hold the nozzle 2 or 3 feet above the acid, squeeze the valve just enough to allow the powder to flow gently from the nozzle and spread the powder over the surface of the acid. if the valve is opened wide, most of the powder will be lost and a splashing of the acid might occur. In any case, take precaution against any spattering which may occur when the acid reacts vigorously to the powder in becoming neutralized.

4. Use Caution: When fires are encountered involving leaks of gases, especially those heavier than air (butane, propane, etc.) the fire ordinarily should not be extinguished until control of the gas can be obtained, the

heavier-than-air gas will tend to remain in the vicinity and collect in low areas where explosions and further extension of the fire would be possible. A disadvantage of using dry chemical is its lack of control after extinguishment. Within a few seconds the powder may drift away leaving the fuel completely exposed for a reflash . It is wise never to step into the area of the burn; it is better to work around the perimeter of the burning area.

Ordinary dry chemical, such as is used in LAFD portable extinguishers causes rapid breakdown and collapse of foam blankets when used in conjunction with mechanical foam. It is ineffective on metal fires such as magnesium and sodium.

Dry chemical is non-toxic. Although some irritation of the throat and nasal passages may be experienced, there should be no residual effect under normal conditions. The normal precautions should be taken, however, when moving into confined areas since the oxygen content may be below that necessary for breathing. Because of its dielectric characteristics, dry powder can be used safely' on electrical fires, such as fires involving oil cooled electric switches and transformers. Because of its slight corrosive and abrasive properties, it should be used with care on fires in fine electrical or electronic gear, such as printing presses, I.B.M. equipment, telephone switchboards, etc. This consideration, however, should be secondary to the control of the fire.

The Extinguisher

This extinguisher consists of:

a. a shell of heavy gauge steel, tested to 600 psi
b. a nylon reinforced hose
c. a positive control squeeze grip valve.
d. a nozzle which shapes the dry chemical into a 60 degree fan stream
e. an air pressure gauge protected by a gauge guard.

The shell is filled with twenty (20) pounds of dry chemical and then pressurized to approximately 165 psi with compressed air.

This extinguisher has a rating of 20-B,C, meaning that in the hands of an average operator it is capable of extinguishing a 20 square foot deep-layer Class B fire, and is safe for use on fires involving energized electrical equipment. An expert operator will

be able to extinguish an even larger "fire with this extinguisher. Under the

Present method of classification it is possible for units of the same size to have different classification. This extinguisher has been given a 20-B,C Rating because of its actual performance under test conditions.

Operation

This extinguisher is operated in much the same manner as a C02 Extinguisher with a few exceptions. To operate, stand extinguisher upright and pull locking pin. Hold nozzle in one hand, lever at top of extinguisher in other hand; direct nozzle at fire, squeeze lever to release powder (keep extinguisher upright while in use). Release lever to stop flow of powder. The discharge time of a 20-pound dry chemical extinguisher with the valve fully open is 10 seconds. The 20 pound CO 2 extinguisher in use on the Department will last 60 seconds. It can be seen, that the dry chemical extinguisher can be exhausted very rapidly. It is, therefore, advantageous during drills to alternately stop and start the flow to conserve powder. When using the extinguisher on a fire, the valve normally should be wide open to maintain proper discharge and to preclude any possibility of the valve becoming clogged.

Best results are obtained with this type extinguisher by working from windward side of fire and floating powder in over the fire. This can be done by holding the nozzle about waist height, aiming the nozzle straight forward or slightly upward (rather than down into the fire) then giving a short blast of powder'. The cloud floating in over the fire will absorb most of the heat and can be used as a heat screen when fighting large fires. As the cloud of dry powder floats in over the fire, a quick follow-up action is necessary. With a side-to-side sweeping action, cover the entire area of fire. With each sweep of the nozzle, extend slightly beyond the perimeter of the fire area to preclude any flashback. Since dry powder is not completely effective on Class A materials, water in some form should be provided to extinguish any residual Class A fires.

The extinguisher has an effective range of approximately 15 to 20 feet. To prevent splashing when using on
depths of flammable liquid, care should be taken to direct the initial discharge from a distance not closer than 6 to 8 feet.

Maintenance

1. The extinguisher shall be kept fully charged at all times. The pressure gauge should be checked daily for a full charge. The extinguisher will function effectively only so long as the air pressure is between 125 to 175 psi.

2. Inspect periodically and after use to detect deteriorate worn, or damaged parts.

3. Inspect nozzle periodically for any obstruction or collection of moisture.

4. Once each month, remove the extinguisher from the rack, invert it, and shake to preclude any possibility of the chemical caking.

Recharging

Tag the extinguisher and send it to a Department High-Pressure Air-Filling Station whenever it needs to be recharged with air or dry chemical.