

Portable Fire Extinguishers

Module 1

Chapter 7



LEARNING OBJECTIVES

**Explain portable
fire extinguisher
classifications.**

**Define the ratings
in a portable fire
extinguisher rating
system.**

**Describe types of
portable fire
extinguishers.**

**Explain the
considerations
taken when
selecting and using
portable fire
extinguishers.**



ALABAMA FIRE COLLEGE



LEARNING OBJECTIVES

Identify
procedures used
for the inspection,
care, and
maintenance of
portable fire
extinguishers.

Operate a dry
chemical (ABC)
extinguisher.

Operate a stored-
pressure water
extinguisher.

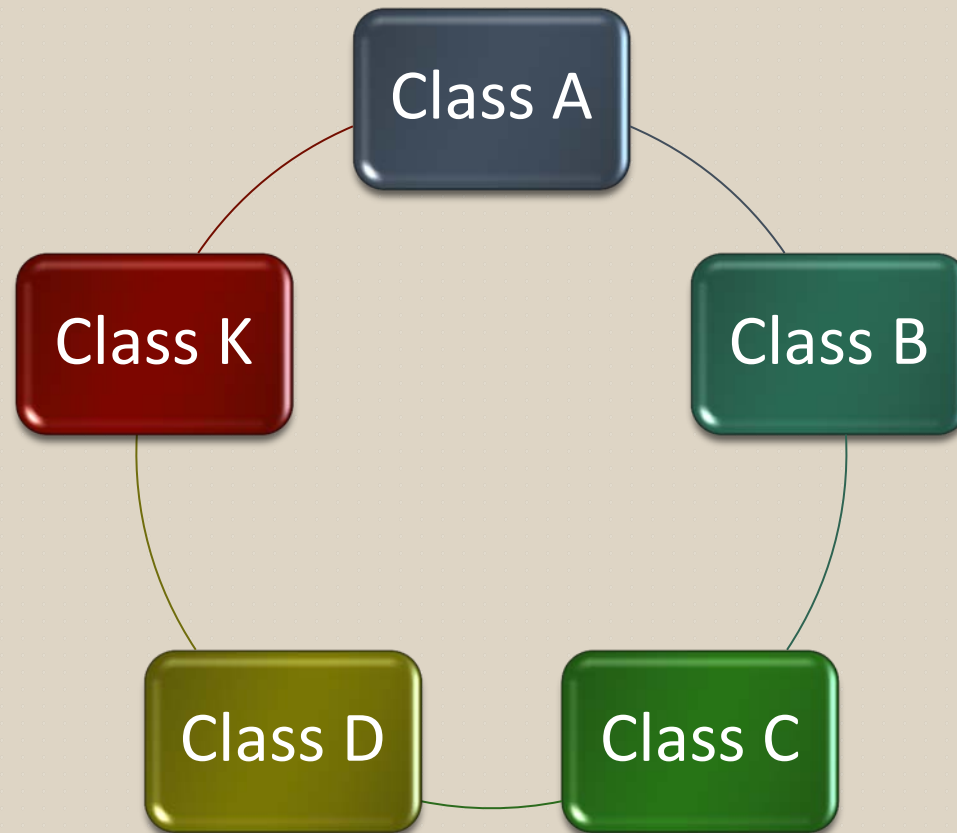
Operate a carbon
dioxide (CO₂)
extinguisher.



ALABAMA FIRE COLLEGE



PORTABLE FIRE EXTINGUISHERS ARE CHOSEN BASED ON THE TYPE OF FUEL BURNING.



CLASS A FIRES INVOLVE ORDINARY COMBUSTIBLES.

Extinguished with:

- Water
- Water-based agents (Class A foam)
- Dry Chemicals

Fuel

- Textiles
- Paper
- Plastics
- Rubber
- Wood



CLASS B FIRES INVOLVE FLAMMABLE, COMBUSTIBLE LIQUIDS AND GASES.

Extinguished with:

- Carbon Dioxide
- Dry Chemicals
- Class B Foam

Fuel

- Alcohol
- Gasoline
- Lubricating Oils
- Liquefied petroleum gas (LPG)



CLASS C FIRE INVOLVES ENERGIZED ELECTRICAL EQUIPMENT.



**Treat as
Class A or B
once power
is off**



ALABAMA FIRE COLLEGE

CLASS D FIRES INVOLVE COMBUSTIBLE METALS AND ALLOYS.

Lithium

Magnesium

Potassium

Sodium



CAUTION

The use of water or water-based agents on Class D fires will cause the fire to react violently, emit bits of molten metal, and possibly injure firefighters close by.



USE DRY POWDER, NOT DRY CHEMICAL,
EXTINGUISHERS ON CLASS D FIRES.



ALABAMA FIRE COLLEGE



CAUTION

Do not use a dry chemical extinguisher on Class D fire. The dry chemical often reacts violently with burning metals.



CLASS K FIRES INVOLVE COMBUSTIBLE COOKING OILS.



Controlled by
wet chemical
systems,
portable
extinguishers

- Vegetable or animal fats
- Burn at extreme temperatures
- Found at commercial, institutional, industrial, home



ALABAMA FIRE COLLEGE

FIRE EXTINGUISHERS ARE ORGANIZED BY TYPE OF EXTINGUISHING AGENT AND THE METHOD USED TO EXPEL THEIR CONTENTS.

Extinguishing agent

Smothering – Excludes oxygen

Cooling – Reduces temperature

Chain breaking – Interrupts chemical chain reaction

Saponification – Forms oxygen-excluding foam



FIRE EXTINGUISHES ARE ORGANIZED BY TYPE OF EXTINGUISHING AGENT AND THE METHOD USED TO EXPEL THEIR CONTENTS.

Mechanisms to expel

Manual pump – Physical pressure forces agent out nozzle

Stored pressure – Compressed air or inert gas forces agent out nozzle

Pressure cartridge – External expellant forces agent out nozzle when introduced to container



USE PUMP-TYPE WATER EXTINGUISHERS ON SMALL CLASS A FIRES, GROUND COVER FIRES.



ALABAMA FIRE COLLEGE

USE STORED-PRESSURE WATER EXTINGUISHERS ON SMALL CLASS A FIRES.



ALABAMA FIRE COLLEGE

USE WET CHEMICAL STORED-PRESSURE EXTINGUISHERS ON CLASS K FIRES.

Courtesy of Ron Moore/McKinney (TX) FD



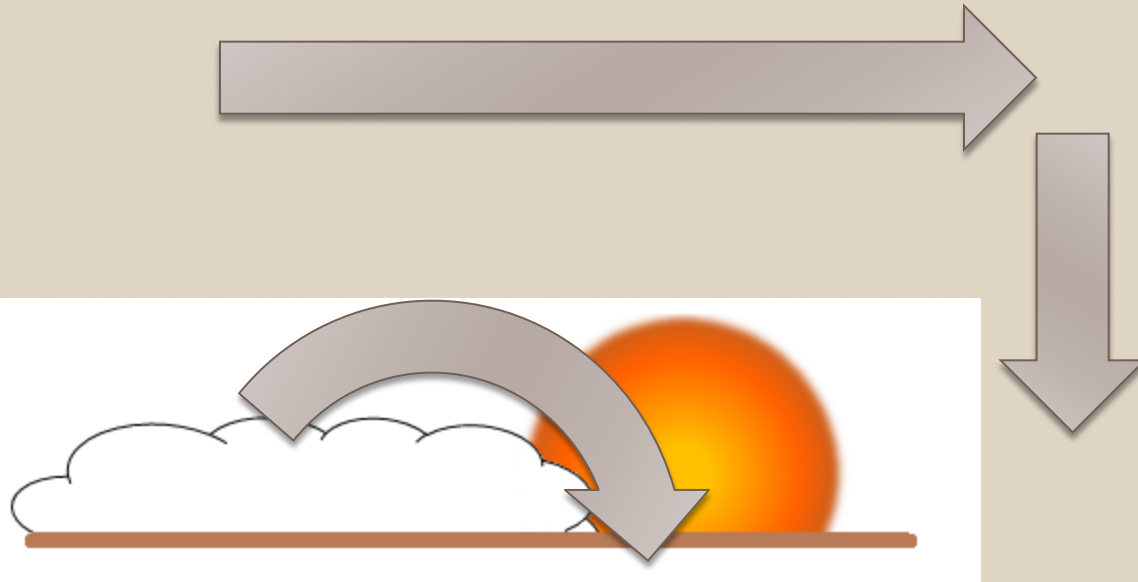
Potassium based,
low pH

Saponification



ALABAMA FIRE COLLEGE

USE AQUEOUS FILM FORMING FOAM (AFFF) EXTINGUISHERS ON CLASS B FIRES, SMALL FUEL SPILLS.



CLEAN AGENT EXTINGUISHERS REPLACED HALOGENATED AGENTS.



Courtesy of Ansul Corp.

Rapidly evaporating liquid that leaves no residue

Cools, smothers Class A and B fires

Nonconductive, safe on energized electrical equipment



ALABAMA FIRE COLLEGE

CARBON DIOXIDE (CO₂) EXTINGUISHERS DISCHARGE AS A GAS AND ARE MOST EFFECTIVE ON CLASS B AND C FIRES.



Have limited reach

Easily dispersed by wind

No freeze protection required



ALABAMA FIRE COLLEGE

CO₂ IS STORED UNDER ITS OWN PRESSURE AND IS DISCHARGED THROUGH A PLASTIC OR RUBBER HORN.



Dry ice crystals

CO₂

- Smothers fire
- Little cooling effect
- Reignition possible

O₂



ALABAMA FIRE COLLEGE

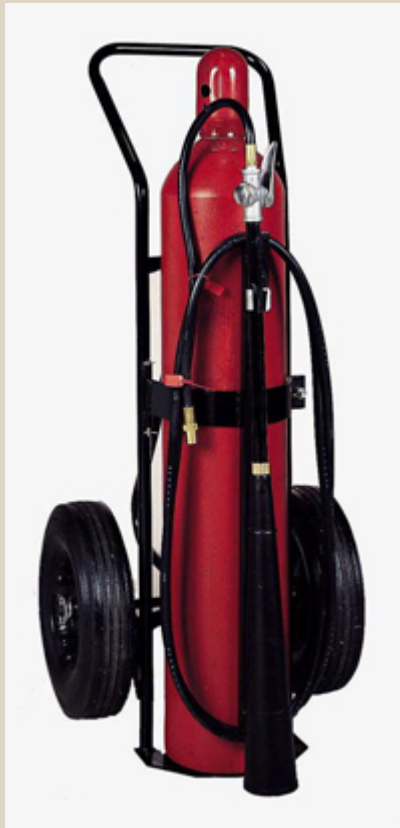


CAUTION

When carbon dioxide is discharged, a static electrical charge builds up on the discharge horn. Touching the horn before the charge has dissipated can result in a shock.



OPERATE WHEELED (CO₂) EXTINGUISHERS IN THE SAME MANNER AS HANDHELDS.



Courtesy of Badger Fire Protection

Commonly found in
airports and
industrial facilities



ALABAMA FIRE COLLEGE

DRY CHEMICAL EXTINGUISHERS USE ADDITIVES TO KEEP EXTINGUISHING AGENTS READY FOR USE, EVEN AFTER LONG STORAGE PERIODS.

Regular

B:C rated

Multipurpose

A:B:C
rated



DRY CHEMICAL EXTINGUISHERS MAY REACT CHEMICALLY
WITH OTHER TYPES OF EXTINGUISHING AGENTS.



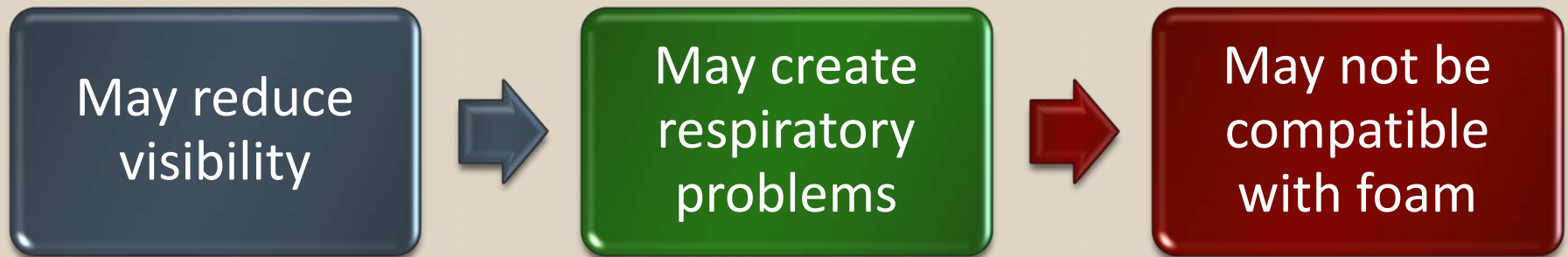
WARNING

Never mix or
contaminate
dry chemicals
with any other
type of agent.



ALABAMA FIRE COLLEGE

DRY CHEMICAL AGENTS ARE CONSIDERED NONTOXIC AND SAFE FOR USE.



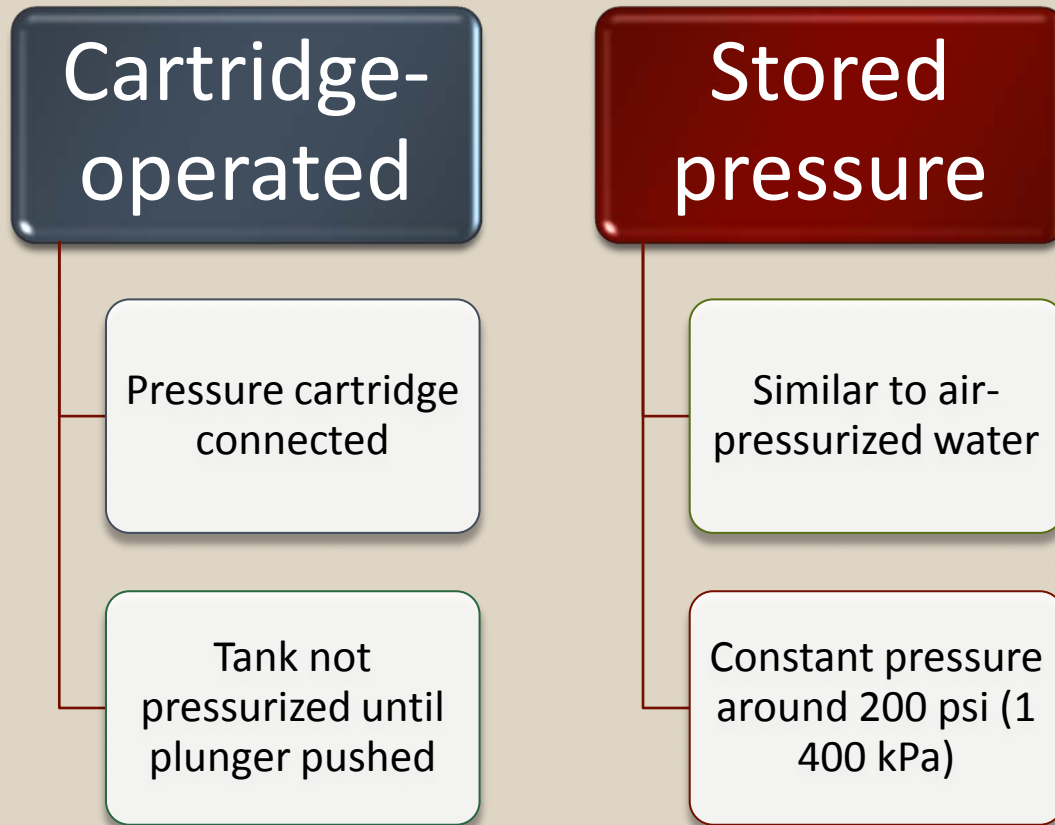
FOLLOW THESE STEPS WHEN USING DRY CHEMICAL EXTINGUISHERS ON CLASS A FIRES.

1. Direct discharge to
cover with chemical

2. After flames
knocked down, apply
to smoldering area



HANDHELD DRY CHEMICAL EXTINGUISHERS COME IN TWO BASIC DESIGNS.

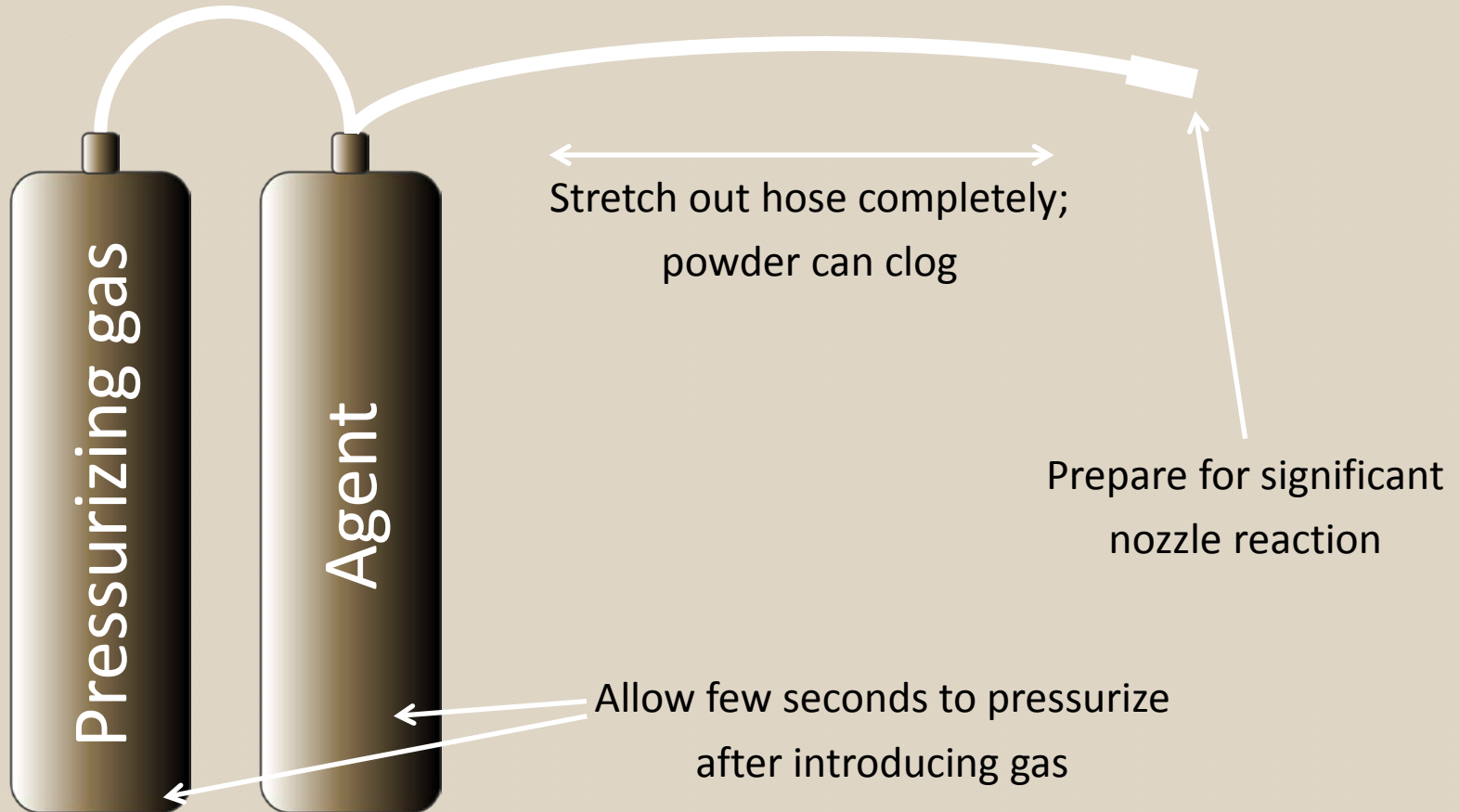


CAUTION

When pressurizing a cartridge-type extinguisher, do not place your head or any other part of your body above the top of the extinguisher. If the fill cap was not properly screwed back on, the cap and/or a cloud of agent can be forcibly discharged.



WHEELED DRY CHEMICAL EXTINGUISHERS OPERATE IN A SIMILAR MANNER AS HANDHELD CARTRIDGE-TYPES.



CAUTION

The top of the extinguisher should be pointed away from the operator and any other nearby personnel when pressurizing the unit.



USE DRY POWDER EXTINGUISHERS ON FIRES FOR CLASS D METALS.



No single agent
works on all
metals

Comes in
several models

Apply with
extinguisher or
scoop

Consult
manufacturer's
guide



ALABAMA FIRE COLLEGE



DRY POWDER CREATES A SMOTHERING BLANKET OVER BURNING AREA.

Apply sufficient depth

Apply gently; do not break crust

Avoid scattering



CAUTION

Water applied to a combustible metal fire results in a violent reaction that intensifies the combustion and causes bits of molten material to spatter in every direction.



FOLLOW THESE STEPS IF BURNING METAL IS ON A COMBUSTIBLE SURFACE.

1. Cover fire with powder

2. Create layer of powder nearby, 1-2 inches (25-50 mm) deep

3. Spread nearby – Add more as needed

4. Leave undisturbed until completely cool



FIRE EXTINGUISHERS ARE RATED ACCORDING TO PERFORMANCE CAPABILITY.

Class	Ratings	Explanations
A	1-A through 40-A	1-A (1¼ gallons [5 L] of water) 2-A (1½ gallons [10 L] of water)
B	1-B through 640-B	Based on the approximate square foot (square meter) area of a flammable liquid fire a non-expert can extinguish
C	No extinguishing capability tests	Tests are to determine non-conductivity
D	No numerical ratings	Tested for reactions, toxicity, and metal burn out time
K	No numerical rating	Tested to ensure effectiveness against 2.25 square feet (0.2 m ²) of light cooking oil in a deep fat fryer



FIRE EXTINGUISHERS ARE RATED ACCORDING TO PERFORMANCE CAPABILITY.

A

- Based on amount of agent, duration, and range of discharge

B

- Based on approximate area that nonexpert can extinguish with full extinguisher

C

- No specific capability testing except for nonconductivity

D

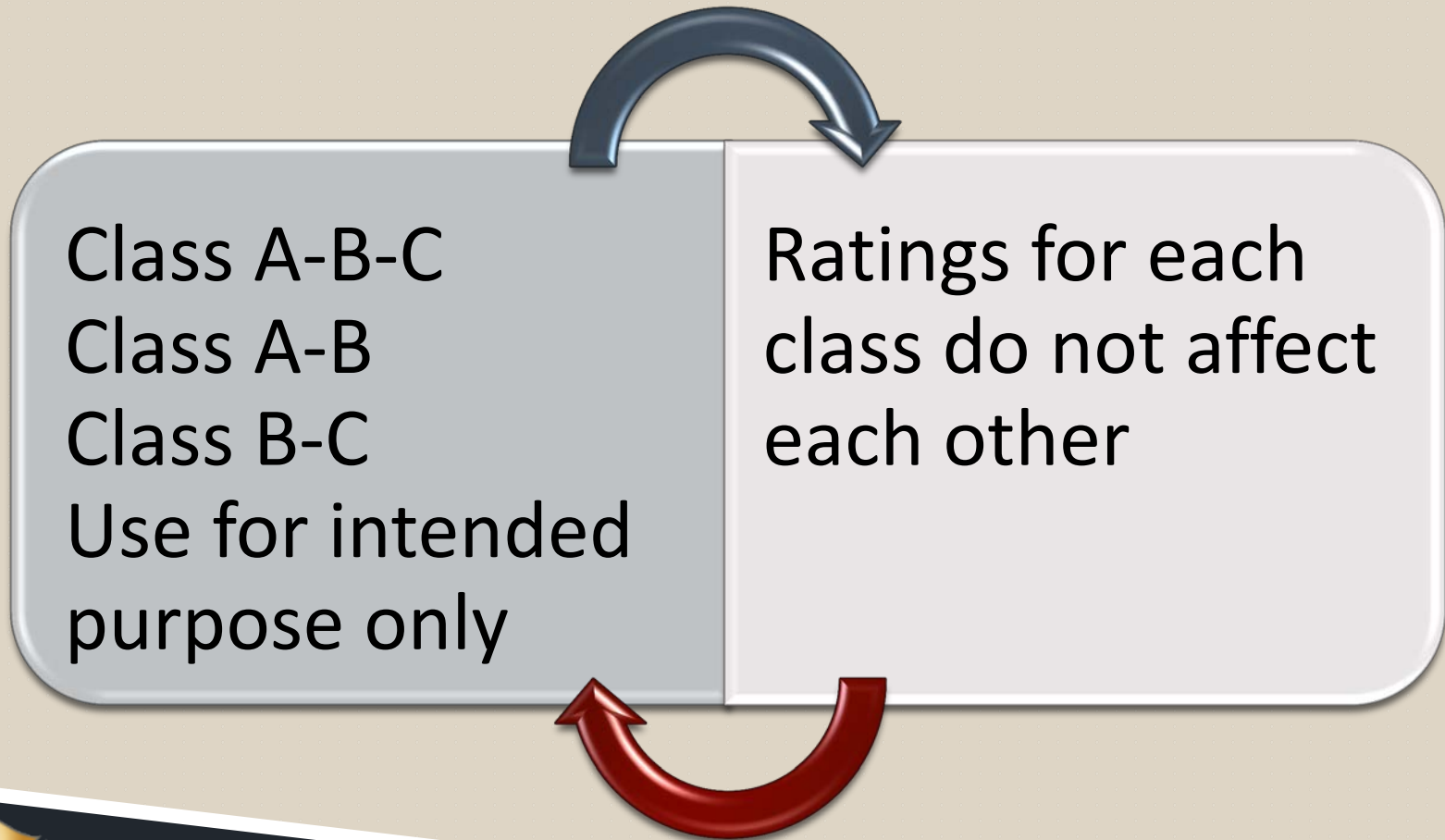
- Based on type of combustible metal

K











- Based on capability of saponifying cooking oils



FIRE EXTINGUISHERS RATED FOR MULTIPLE CLASSES OF FIRE ARE IDENTIFIED BY A COMBINATION OF LETTERS.



FIRE EXTINGUISHERS ARE IDENTIFIED BY COLORED GEOMETRIC SHAPES OR PICTOGRAPHS.


Class Name	Letter Symbol	Image Symbol	Description
Class A or Ordinary Combustibles	 Ordinary Combustibles		Includes fuels such as wood, paper, plastic, rubber, and cloth.
Class B or Flammable and Combustible Liquids and Gases	 Flammable Liquids		Includes all hydrocarbon and alcohol based liquids and gases that will support combustion.
Class C or Electrical	 Electrical Equipment		This includes all fires involving energized electrical equipment.
Class D or Combustible Metals	 Combustible Metals		Examples of combustible metals are: magnesium, potassium, titanium, and zirconium.
Class K or Kitchen	 Cooking Oils		Includes unsaturated cooking oils in well-insulated cooking appliances located in commercial kitchens.

Reproduced with permission from Wayne State University, Detroit, MI.

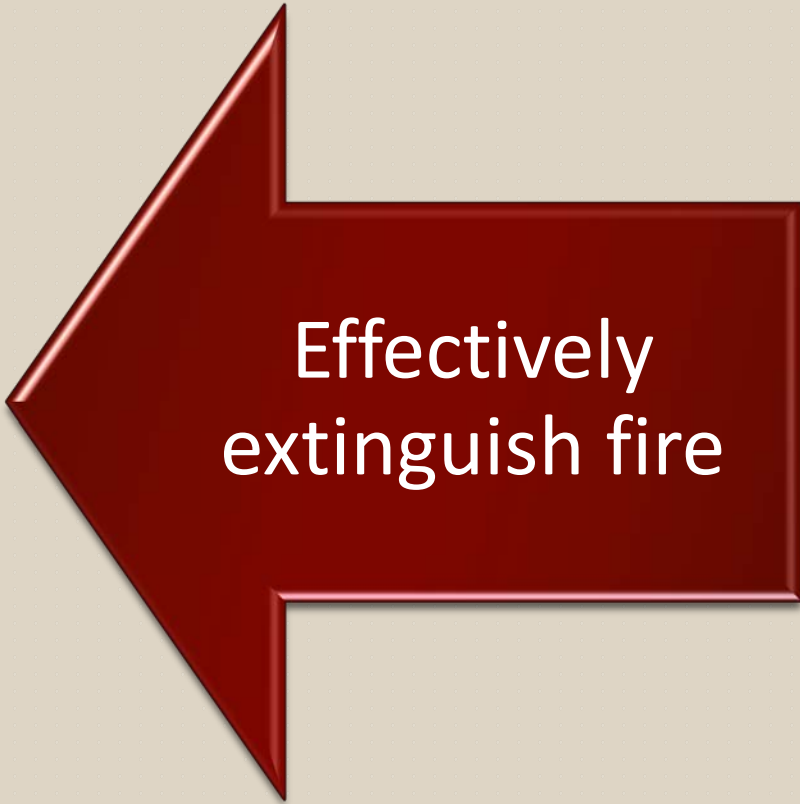


ALABAMA FIRE COLLEGE

FIRE EXTINGUISHERS ARE CHOSEN TO ACHIEVE TWO MAIN GOALS.



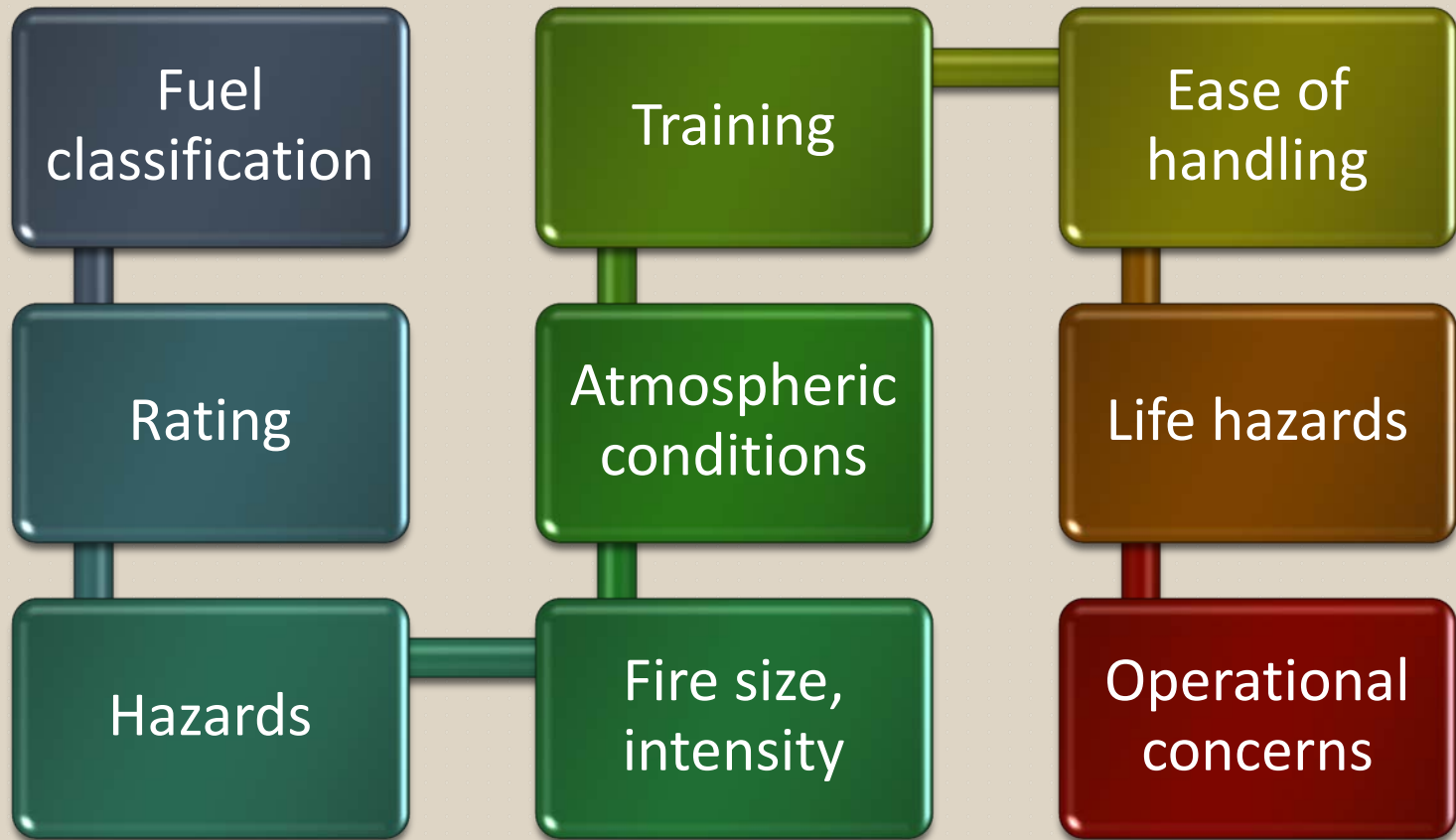
Minimize risk
to life and
property



Effectively
extinguish fire



CONSIDER SEVERAL FACTORS WHEN SELECTING THE PROPER FIRE EXTINGUISHER.



USE CLEAN AGENT OR CO₂ EXTINGUISHERS IN AREAS WITH COMPUTER EQUIPMENT.



Dry chemicals can
be damaging



ALABAMA FIRE COLLEGE

OPERATING PROCEDURES FOR ALL FIRE EXTINGUISHERS ARE SIMILAR, BUT BE FAMILIAR WITH LABEL INSTRUCTIONS.



ALABAMA FIRE COLLEGE



NOTE

Wear full structural or wildland fire fighting personal protective equipment including appropriate respiratory protection when operating any portable fire extinguisher. Even small incipient fires will produce toxic gases that can injure you.



AFTER YOU SELECT THE EXTINGUISHER MAKE A QUICK VISUAL INSPECTION.



External
condition



Hose/nozzle



Weight



Pressure
gauge



ALABAMA FIRE COLLEGE

FOLLOW THESE GENERAL STEPS FOR USING FIRE EXTINGUISHERS.

Approach with wind at back



Pick up and carry by handles



ALABAMA FIRE COLLEGE

FOLLOW THESE GENERAL STEPS FOR USING FIRE EXTINGUISHERS.

Be sure agent reaches fire



Apply from appropriate distance



After fire reduces in size

- If not extinguished after full discharge, withdraw and reassess
- If solid fuel, use appropriate tool to overhaul
- If liquid fuel, appropriate foam may be necessary



REMEMBER THE FOLLOWING CONSIDERATIONS WHEN USING EXTINGUISHERS.

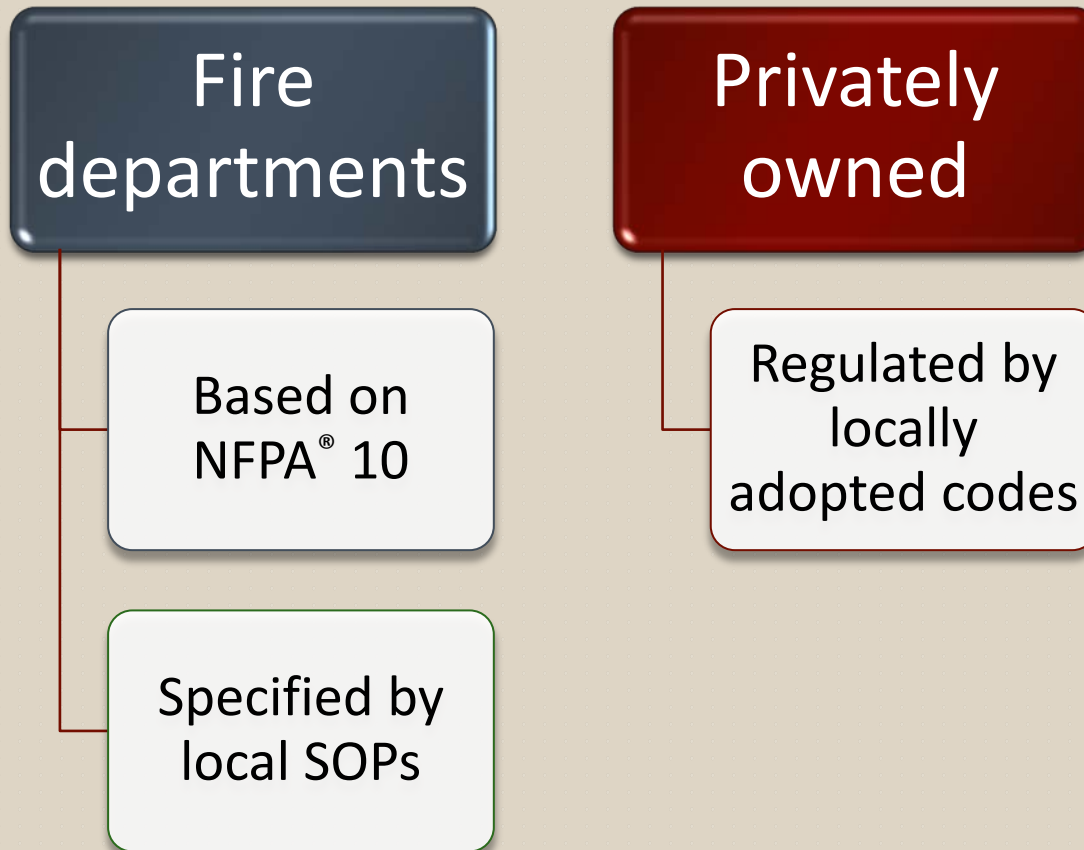
Extinguishers
are first-aid
appliances

Work in unison
if more than
one

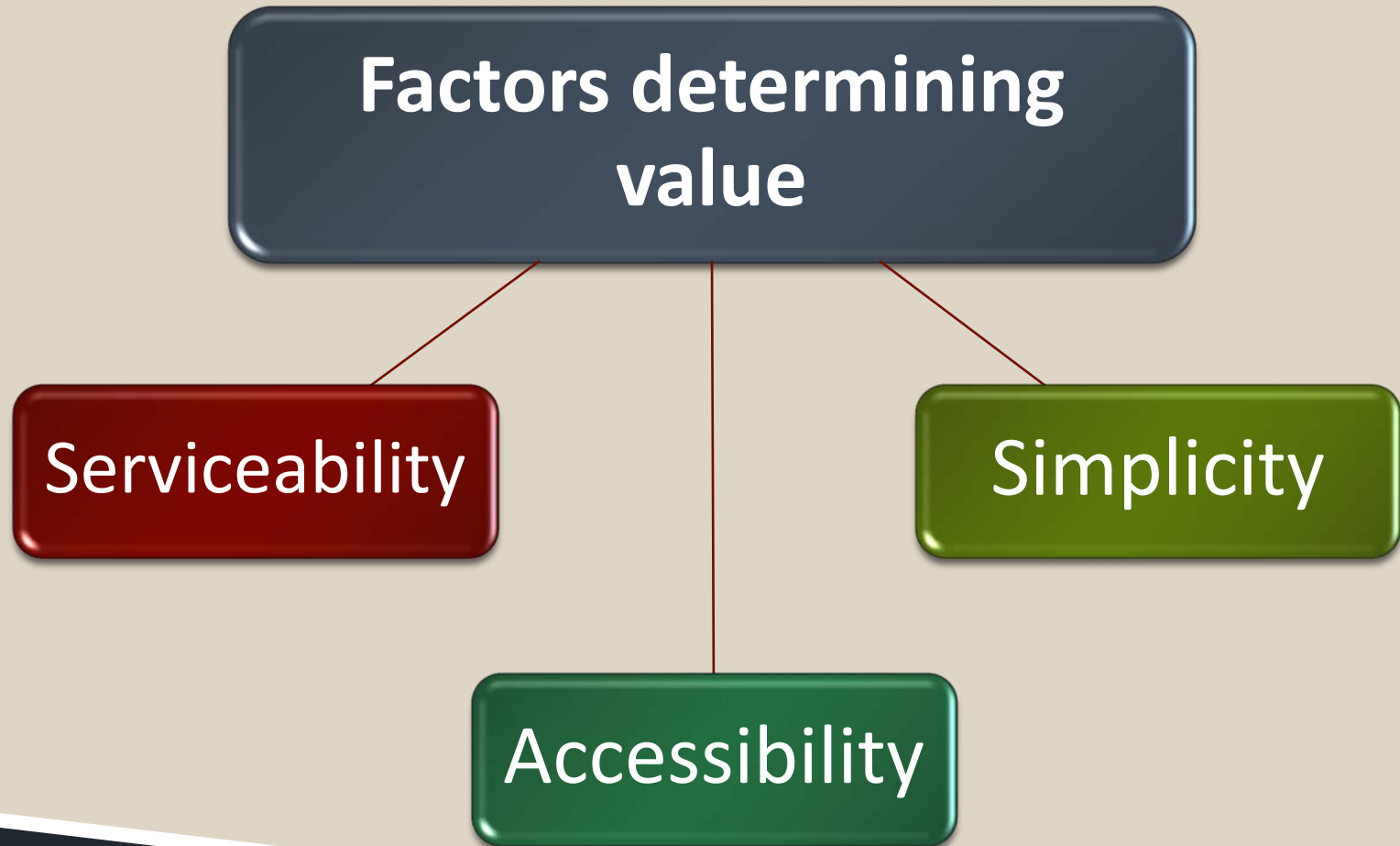
Lay empty
extinguishers
on their side



INSPECTION, CARE, AND MAINTENANCE OF EXTINGUISHERS ARE MANDATED BY A NUMBER OF ORGANIZATIONS.



NFPA® 10 REQUIRES AT LEAST AN ANNUAL INSPECTION; LOCAL SOPS ESTABLISH POLICY.



FOLLOW THESE GENERAL PROCEDURES FOR EVERY EXTINGUISHER INSPECTION.

✓ In proper location, accessible

✓ Nozzle/horn unobstructed

✓ Hose free of cracks, dirt, grease

✓ Shell free of damage



FOLLOW THESE GENERAL PROCEDURES FOR EVERY EXTINGUISHER INSPECTION.

✓ Instructions are legible

✓ Seal and pin not tampered with

✓ Filled and fully pressurized; if deficient by 10% weight, remove from service


✓ Check inspection tag




FOLLOW THESE STEPS IF ANY EXTINGUISHERS ARE FOUND TO BE DEFICIENT.



- 1. Remove from service



- 2. Replace with operational extinguisher



- 3. Report need for service



- Only trained personnel should repair or refill



FOLLOW THESE GENERAL GUIDELINES WHEN CARING FOR EXTINGUISHERS.

Never drop or throw

Carry according to size and weight

Remove pin only when ready to use

Store securely



FOLLOW THESE GENERAL GUIDELINES WHEN CARING FOR EXTINGUISHERS.

Lay on side
when empty

Do not store/stack
items in front of
wall- mounted



Shake dry
chemical monthly



ALABAMA FIRE COLLEGE

CLEAN EXTINGUISHERS PERIODICALLY AND AFTER EVERY USE.



Warm water,
soap to
remove dirt,
grease

Avoid
solvents that
damage
plastic parts

Use steel
wool or sand
paper to
remove
corrosion

Only trained
personnel
should repair
or refill



ALABAMA FIRE COLLEGE

EXTINGUISHERS SHOULD BE REMOVED FROM SERVICE FOR ANNUAL MAINTENANCE.

Includes thorough inspection, disassembly

Pressurized units must be hydrostatically tested

- NFPA® 10
- Required by U.S. DOT and Transport Canada
- Test results affixed to shell

Dry chemical units emptied, refilled every six years



CAUTION

Never attempt to repair the shell or cylinder of a defective fire extinguisher. Contact the manufacturer for instructions on where to have it repaired or replaced.



SUMMARY

Portable fire extinguishers can control or extinguish small incipient or early growth stage fires quickly in the hands of trained personnel; you must be familiar with their characteristics and be able to select and use them properly.



Not only should you be familiar with their characteristics and be able to select and use them properly, you must also be able to educate the public.



Inspecting, caring for, maintaining extinguishers assigned to your apparatus and facility are also important skills for you to have.

