EXTINGUISHER TRAINING
Objectives

- Understand the combustion process and different fire classes.

- Understand fire extinguisher types, operating procedures, capabilities, and limitations.

- Understand basic firefighting concepts:
  - R.A.C.E.
  - P.A.S.S.
The Combustion Process

THE FIRE TETRAHEDRON

FUEL

OXYGEN

CHAIN REACTION

TEMPERATURE
Fire Classes

A  Trash  Wood  Paper
- wood
- cloth
- paper
- rubber
- many plastics

B  Liquids  Grease
- gasoline
- oil
- grease
- tar
- oil-based paint
- lacquer
- flammable gases

C  Electrical Equipment
- energized electrical equipment

D  COMBUSTIBLE
- magnesium
- sodium
- potassium
- titanium
- zirconium
- other flammable metals

METALS
• Recently recognized by NFPA 10.

• Fires involving combustible vegetable or animal non-saturated cooking fats in commercial cooking equipment.
Fire Extinguisher Anatomy

DISCHARGE LEVER

DISCHARGE LOCKING PIN AND SEAL

DISCHARGE HOSE

DISCHARGE NOZZLE

DISCHARGE ORIFICE

DATA PLATE

BODY

PRESSURE GAUGE (not found on CO₂ extinguishers)

CARRYING HANDLE
<table>
<thead>
<tr>
<th>NUMERAL</th>
<th>FIRE CLASS</th>
<th>RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Trash Wood Paper</td>
<td>1-A thru 40-A</td>
</tr>
<tr>
<td>B</td>
<td>Liquids Grease</td>
<td>1-B thru 640-B</td>
</tr>
<tr>
<td>C</td>
<td>Electrical Equipment</td>
<td>N/A</td>
</tr>
<tr>
<td>D</td>
<td>COMBUSTIBLE METALS</td>
<td>N/A</td>
</tr>
<tr>
<td>K</td>
<td>Cooking Media</td>
<td>1-A:C:K or 2-A:C:K</td>
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</table>
# Fire Extinguisher Applications

<table>
<thead>
<tr>
<th>FIRE CLASS</th>
<th>EFFECTIVE EXTINGUISHER TYPES</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Trash Wood Paper</td>
<td>PRESSURIZED WATER, MULTIPURPOSE DRY CHEMICAL, LARGER SIZE HALON, WET CHEMICAL</td>
</tr>
<tr>
<td>B Liquids Grease</td>
<td>MULTIPURPOSE DRY CHEMICAL, CARBON DIOXIDE, HALON</td>
</tr>
<tr>
<td>C Electrical Equipment</td>
<td>MULTIPURPOSE DRY CHEMICAL, CARBON DIOXIDE, HALON, WET CHEMICAL</td>
</tr>
<tr>
<td>COMBUSTIBLE METALS</td>
<td>COMBUSTIBLE METAL</td>
</tr>
<tr>
<td>K Cooking Media</td>
<td>WET CHEMICAL</td>
</tr>
</tbody>
</table>
Fire Extinguisher Types

PRESSURIZED WATER

- Class “A” fires only.

- 2.5 gal. water at 150-175 psi (up to 1 minute discharge time).

- Has pressure gauge to allow visual capacity check.

- 30-40 ft. maximum effective range.

- Can be started and stopped as necessary.

- Extinguishes by cooling burning material below the ignition point.
Fire Extinguisher Types (cont.)

CARBON DIOXIDE (CO$_2$)

- Class “B” or “C” fires.
- 2.5-100 lb. of CO$_2$ gas at 150-200 psi (8-30 seconds discharge time).
- Has **NO** pressure gauge--capacity verified by weight.
- 3-8 ft. maximum effective range.
- Extinguishes by **smothering** burning materials.
- Effectiveness **decreases** as temperature of burning material increases.
Fire Extinguisher Types (cont.)

MULTIPURPOSE DRY CHEMICAL

- Class “A”, “B”, or “C” fires.
- 2.5-20 lb. dry chemical (*ammonium phosphate*) pressurized to 50-200 psi by nitrogen gas (*8-25 seconds discharge time*).
- Has pressure gauge to allow visual capacity check.
- 5-20 ft. maximum effective range.
- Extinguishes by *smothering* burning materials.
Fire Extinguisher Types (cont.)

HALON

- Class “A”, “B”, or “C” fires (smaller sizes ineffective against Class “A”).
- 9-17 lb. Halon 1211 (pressurized liquid) released as vapor (8-18 seconds discharge time).
- Has pressure gauge to allow visual capacity check.
- 9-16 ft. maximum effective range.
- Works best in confined area--ideal for electronics fire due to lack of residue.
- Extinguishes by *smothering* burning materials.
- Fumes toxic if inhaled.
- Halon is ozone depleting chemical--production halted in Jan ‘94.
Fire Extinguisher Types (cont.)

COMBUSTIBLE METAL

- Class “D” combustible metal fires only.
- 30 lb. pressurized dry powder optimized for specific combustible metal (*also available in bulk containers for hand scooping onto fire to extinguish*).
- 6-8 ft. maximum effective range.
- To activate, must first open nitrogen cylinder on back to pressurize body.
- Extinguishes by *smothering* burning materials.
Fire Extinguisher Types (cont.)

WET CHEMICAL

- Class “A”, “C”, and “K” fires.
- 1.5 gal. of stored pressure PRX wet chemical extinguishing agent (40 sec. discharge time).
- 10-12 ft. maximum effective range.
- On Class “K” fires, don’t use until fixed extinguishing system has activated.
- Extinguishes by cooling and forming foam blanket to prevent reignition.
# Fire Extinguisher Summary

<table>
<thead>
<tr>
<th>EXTINGUISHER TYPE</th>
<th>WORKS BY</th>
<th>EFFECTIVE AGAINST</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESSURIZED WATER</td>
<td>COOLING</td>
<td>![A]</td>
</tr>
<tr>
<td>CARBON DIOXIDE</td>
<td>SMOTHERING</td>
<td>![B] ![C]</td>
</tr>
<tr>
<td>MULTIPURPOSE DRY CHEMICAL</td>
<td>SMOTHERING</td>
<td>![A] ![B] ![C]</td>
</tr>
<tr>
<td>HALON</td>
<td>SMOTHERING</td>
<td>![A] ![B] ![C]</td>
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<tr>
<td>COMBUSTIBLE METAL</td>
<td>SMOTHERING</td>
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<tr>
<td>WET CHEMICAL</td>
<td>COOLING/SMOTHERING</td>
<td>![A] ![C]</td>
</tr>
</tbody>
</table>
Fire Emergency Response

R
Rescue

A
Alarm

C
Contain

E
Extinguish
Firefighting Decision Criteria

- **Know** department emergency procedures and evacuation routes.
- **Know** locations of extinguishers in your area and how to use them.
- **Always** sound the alarm *regardless* of fire size.
- **Avoid** smoky conditions.
- **Ensure** area is evacuated.
- **Don’t** attempt to fight unless:
  - Alarm is sounded.
  - Fire is *small* and *contained*.
  - You have safe egress route (can be reached *without* exposure to fire).
  - Available extinguishers are rated for size and type of fire.
- **If in doubt, evacuate!**
Fighting the Fire

P Pull the pin
Aim low at the base of flames
S Squeeze the handle
S Sweep side to side
Summary

• Combustion process (*Fire Tetrahedron*).
• Class A, B, C, D, K fires.
• Types of portable fire extinguishers:
  – *Operating procedures*.
  – *Capabilities and limitations*.

• Basic firefighting concepts:
  – *R.A.C.E.*
  – *P.A.S.S.*