

WELDING & CUTTING FIRE PROTECTION SAFETY



BASIC TYPES OF WELDING



ARC WELDING



**OXY/ACETYLENE
OR FUEL GAS
WELDING**

FUEL GASES USED FOR HEATING & CUTTING OPERATIONS



3 MAJOR TYPES

1. P GAS

{Propane}

2. MAPP GAS

{Methylaretylene- Propadiene}
Mixture

3. **ACETYLENE**

(MOST COMMON)

ARC WELDING

OXY/ACETYLENE

LONG SLEEVE SHIRT

GLOVES

HELMET GOGGLES

CORRECT SHADE LENS

**SUN GLASSES ARE NOT CORRECT TYPE
OF CUTTING GOGGLES!!!**

Welders , cutters, and their supervisor shall be trained in the safe operation of their equipment, safe welding/cutting practices, and welding/cutting respiratory and fire protection.

>AIHA publication “Welding Health and Safety: A field Guide for OEHS Professionals “ is recommended.

COMMON CONSIDERATIONS FOR ALL TYPES OF WELDING



FIRE EXTINGUISHER
FIRE WATCH
VENTILATION
FOLLOW 30 min. RULE



VENTILATION

(Mandatory in a **CONFINED SPACE!**)

FIRE RETARDANT CURTAIN

NO WRAPPING OF CABLE AROUND BODY

FIRE WATCH

PROPER GROUND

NO REPAIRS IN 1ST 10 FEET FROM THE ELECTRODE 10.E.03b

NEVER GROUND TO PIPES WITH GAS OR FLAMMABLES 10.E.06

EQUIPMENT SHALL BE SHUT DOWN WHEN THE LEADS ARE UNATTENDED



METAL ARC WELDING



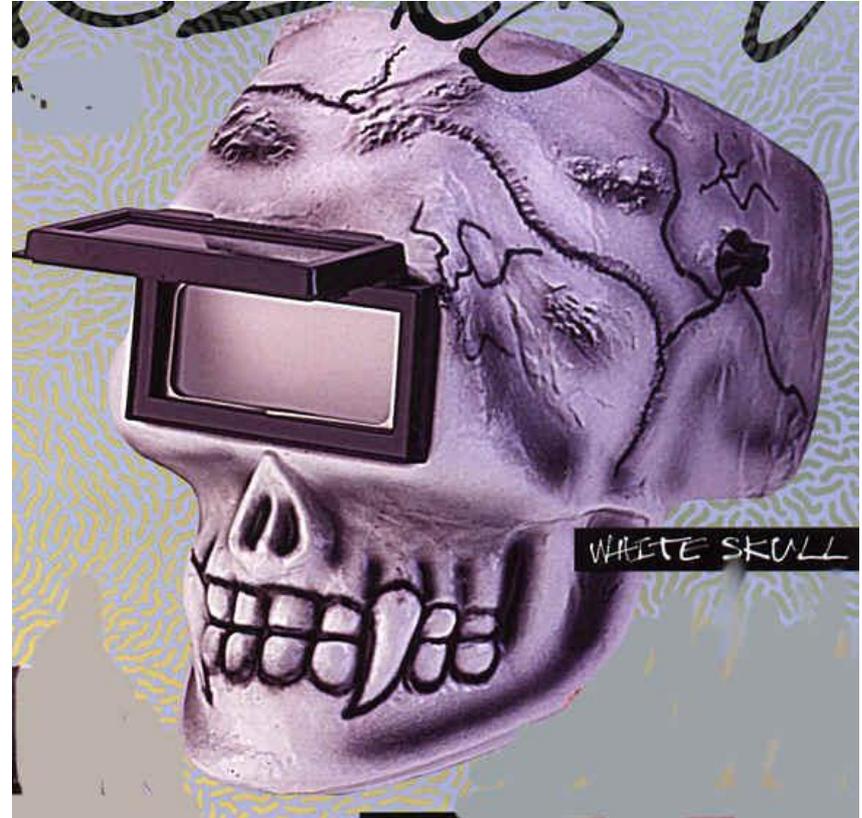
**CORRECT SHADE
OF LENS (See Table 5-2
COE page 49)**

WELDING CURTAINS

FIRE EXTINGUISHER

FIRE WATCH

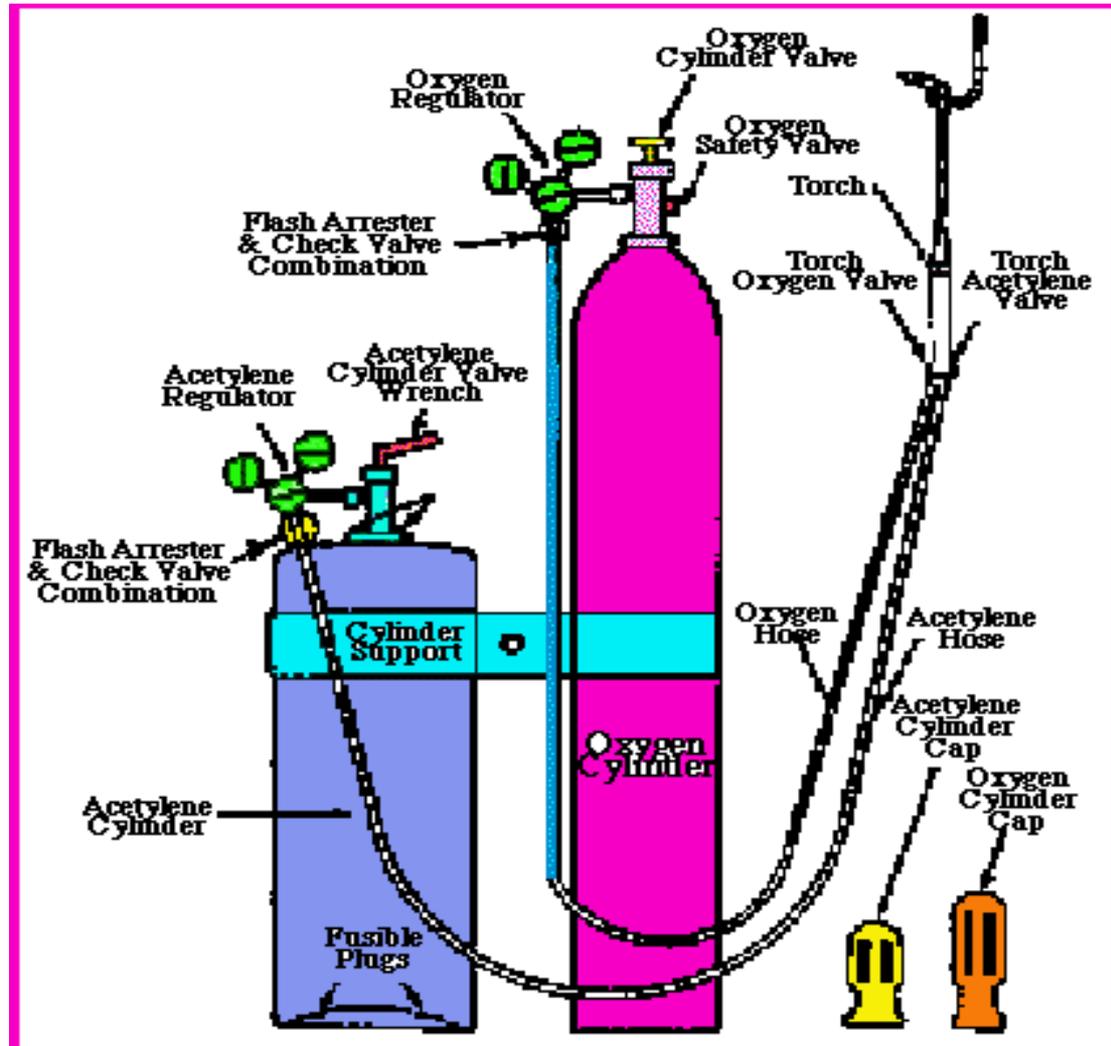
10' NO REPAIR IN LEADS



TYPICAL FUEL GAS RIG



**LOCATION OF
COMBO REVERSE
FLOW CHECK VALVE
AND FLASH
ARRESTOR
IN EACH HOSE, AT
THE
TORCH AND
REGULATOR
10.D.07a**



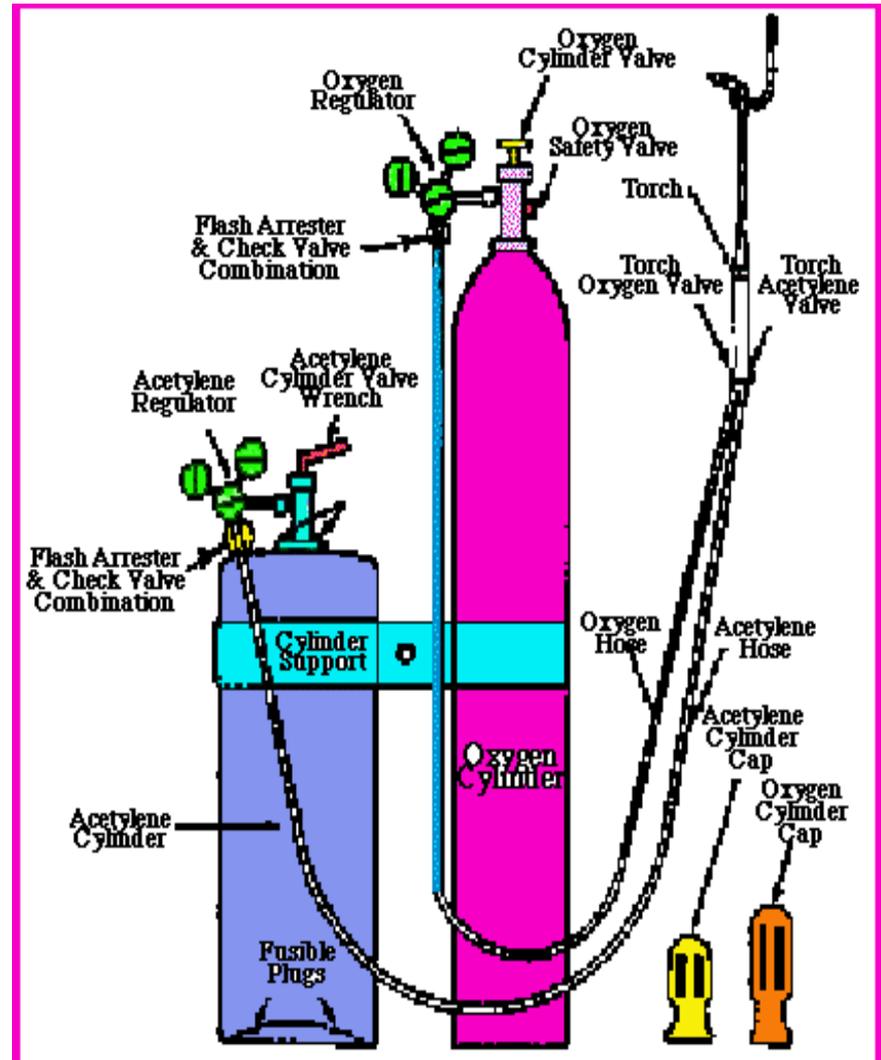
WHAT TO LOOK FOR? OXY/ACETYLENE



**Secured in place:
Hand Truck
Fixed/portable racks
Substantial Tie Off**

**Flash Arrestor/Check
valves at regulators and
torches.**

**Wrench on Acetylene
Max open 1/2 Turns**



OXY/ACETYLENE EQUIPMENT



0

OXYGEN REGULATOR



ALWAYS GREEN

RIGHT THREADS

**NO PRESSURE
GUAGE LIMITS**

**OXYGEN BOTTLE
2200 PSI**



ACETYLENE REGULATOR

ALWAYS RED

LEFT THREADS

**MAX PRESSURE
SHOULD BE**

15 PSI!!

**ACETYLENE
BOTTLE AT 250 PSI**



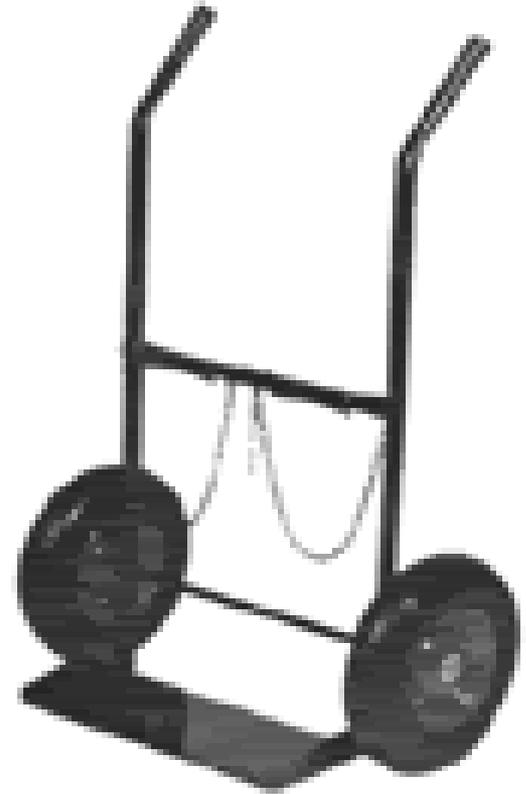
OXY/ACETYLENE STORED AT OUR JOB SITES



**FIXED OR PORTABLE
RACKS**

**SUBSTANTIAL HAND
TRUCKS**

**SECURED TO A PERMANENT &
SUBSTANTIAL STRUCTURE
WITH ROPES/WIRE/CHAIN, ETC.**



OXY/ACETYLENE STORAGE AREA



Storage Area means where more than 1 bottle of each are stored

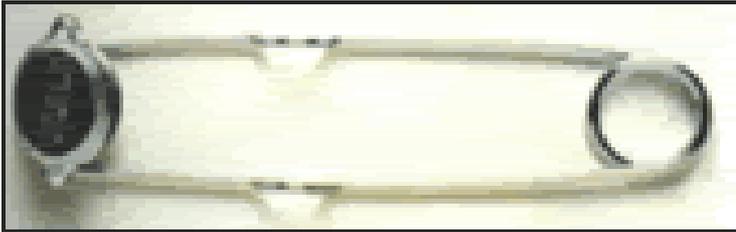
**SEPARATED AT LEAST 20 FEET APART
OR WITH A 1/2 HOUR FIRE RATED BARRIER
AT LEAST 5 FEET HIGH BETWEEN THE
OXYGEN AND ACETYLENE BOTTLES**

WHEN NOT IN USE...CAPS ON!

OXY/ACETYLENE SAFETY PRECAUTIONS



**STRIKER NOT CIGARETTE
LIGHTER!!!**



**FLASHBACK
ARRESTORS!**

REVERSE FLOW/FLASH BACK ARRESTORS



GAS IS RED



OXYGEN IS GREEN



2"-3" LONG

REVERSE FLOW/FLASH BACK REVERSE-FLOW CHECK VALVES



**WHERE ARE THEY
TO BE INSTALLED?**



COMBO/REVERSE FLOW CHECK VALVES



**INSTALLED AT
THE TORCH AND
THE
REGULATOR...**

10.D.07a

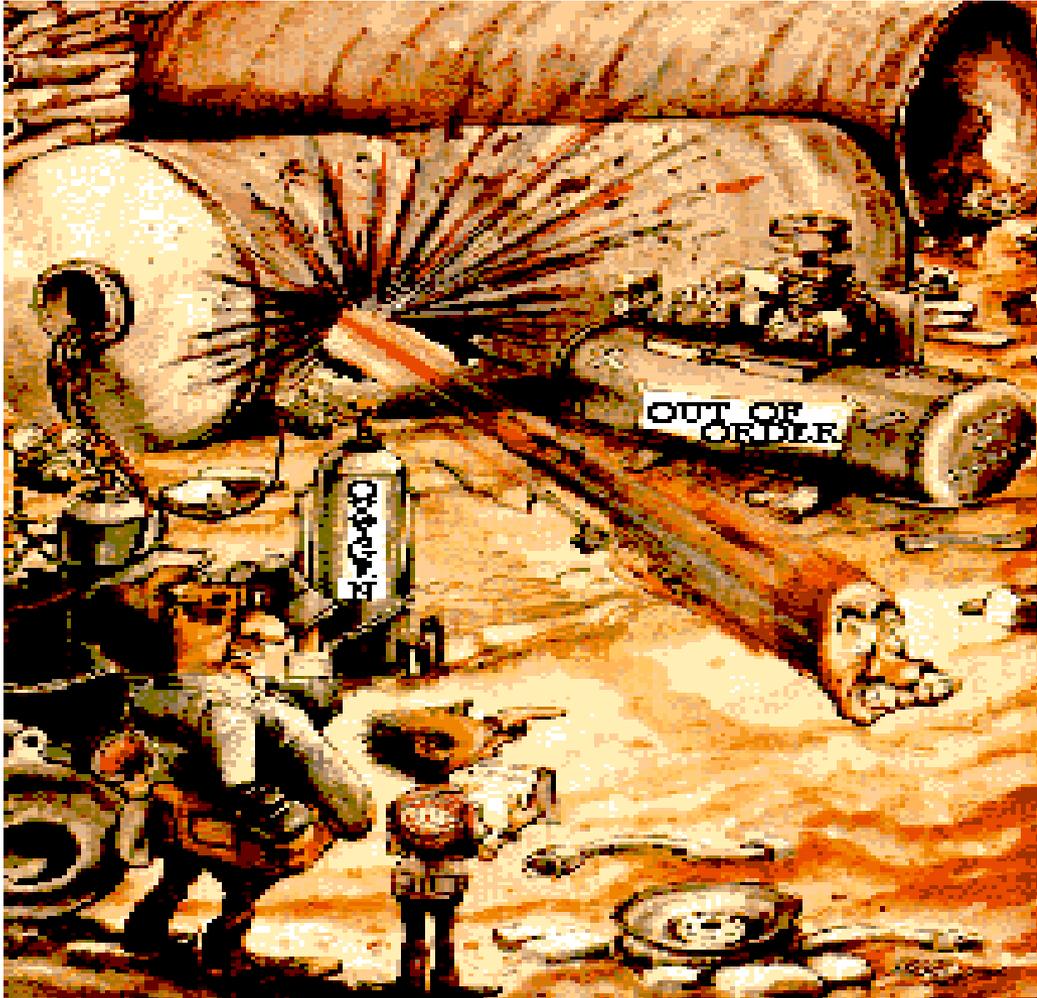
DANGERS OF ACETYLENE AND OXYGEN EQUIPMENT



**I TOLD YOU JONES,
SOME OF YOUR
MEN WERE USING
OIL ON THEIR
OXYGEN
REGULATORS!**



DANGERS OF ACETYLENE AND OXYGEN EQUIPMENT



**THERE GOES
JONES NOW...
AND HIS THEORY
OF USING
OXYGEN
FOR
VENTILATION!!**

DANGERS OF ACETYLENE AND OXYGEN EQUIPMENT



**Naw...I never
release the
adjusting screw
on the regulators
Just takes too
much time...
Whoops!!!**

OXYGEN DANGERS



**CONFINED SPACE
OXYGEN WILL
CAUSE ENRICHED
ATMOSPHERE!**

**(Cotton thread will
burn 8 times faster!)**

**OIL AND GREASE
AND OXYGEN
CAUSES AN
EXPLOSION!**

ACETYLENE DANGERS



Acetylene not safe to store above **15 PSI**...Acetone is used as a stabilizing agent.

STORE AND USE IN A VERTICAL POSITION

Note: A cylinder stored in a horizontal position should be stored for 24 hr. vertically before use.



DANGERS WHEN **USING** OXY/ACETYLENE EQUIPMENT



REVERSE FLOW

FLASHBACK

BACKFIRES



REVERSE FLOW



OCCURS WHEN FUEL GAS PRESSURE IS HIGHER THAN OXYGEN PRESSURE (OXYGEN CYLINDER ALMOST EMPTY)

RESULTS: FUEL **GAS TRAVELS** UP THE OXYGEN LINE, MIX WITH GAS IN HOSE, REGULATOR OR CYLINDER.

LIGHTING TORCH **WITHOUT PURGING HOSES** WILL RESULT IN RAPID BURN BACK, EXPLOSION IN TORCH, HOSE, REGULATOR, OR CYLINDER.

**WITH FULL OXYGEN CYLINDER:
VALVE OPENED & RESIDUAL FUEL
GAS IS IN THE OXYGEN REGULATOR**

**RESULTS: HEAT GENERATED BY
HIGH PRESSURE OXYGEN ENTERING
THE REGULATOR MAY CAUSE
FIRE OR EXPLOSION!**

REVERSE GAS FLOW



BOTH CYLINDERS FULL OXYGEN IS USUALLY HIGHER PRESSURE THAN THE FUEL GAS HOWEVER:

BLOCKING THE TORCH TIP OR TOUCHING IT TO THE WORK DURING OPERATIONS FORCES OXYGEN BACK INTO THE FUEL GAS LINE...CAN CAUSE A BACKFIRE! FLASHBACK CAN OCCUR CAUSING A FIRE OR EXPLOSION!

**PURGING THE HOSES
BEFORE LIGHTING THE
TORCH AVERTS THE
DANGER OF REVERSE
GAS FLOW!**

EXPLOSIONS



BACKFIRE: An explosion usually confined to the torch head and usually has a popping sound!

FLASHBACK: An explosion that progresses back through the torch, hose, regulators, etc.

CAUSES OF BACKFIRE



- 1. Tip is too close to the work**
- 2. Loose connections**
- 3. Leaking hoses**
- 4. Incorrect Gas Pressures**
- 5. Anything that causes a gas starvation at the torch tip**

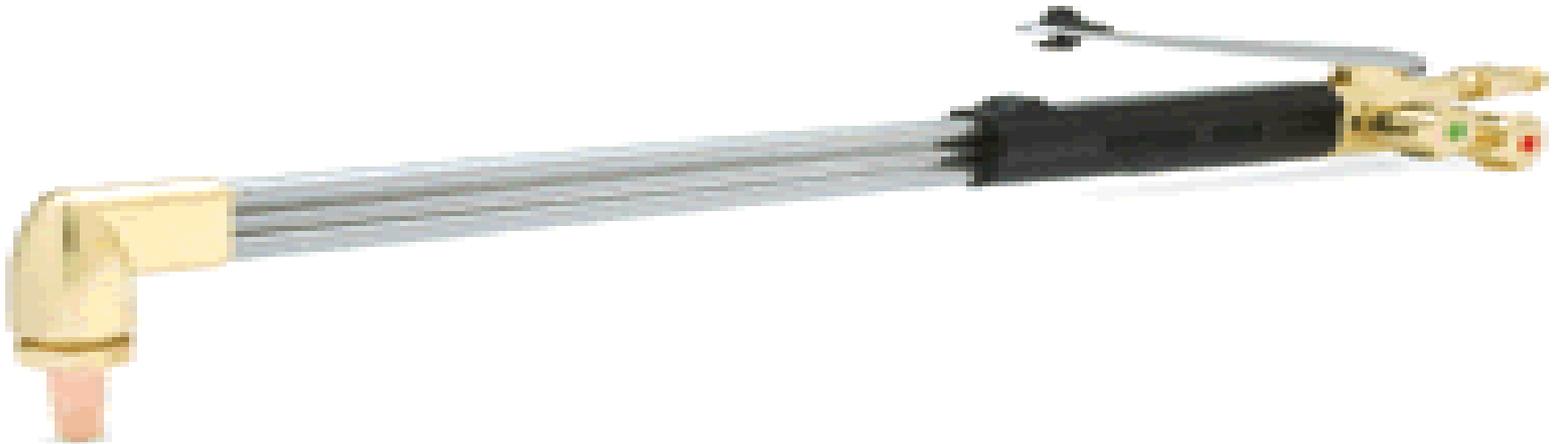
CAUSES OF FLASHBACK



BY EITHER REVERSE GAS FLOW OR BACK FIRE. WHEN NOT STOPPED A FLASHBACK CAN OCCUR!

Flashback is when an explosion progresses back through the torch and hoses. (Usually has a whistle sound)

**CLOSING IMMEDIATELY
THE OXYGEN VALVE
ON THE TORCH!**



CHECK VALVES FLASHBACK ARRESTORS



Check valves can stop reverse gas flow. **NOT FLASHBACK**

Flashback arrestors eliminate the risk of explosion in the regulator and cylinders.

Combination heavy duty check valve to stop reverse gas flow, filter that stops flames, pressure sensitive cut-off valve that shuts off gas flow if explosion occurs and thermal cut-off valve of temperature of arrestor exceeds 220F.

**PLACED AT EACH REGULATOR!
and TORCH!**

SURVEY OF 620 AVERAGE OPERATORS WITH 13 YEARS OF CONSTRUCTION EXPERIENCE

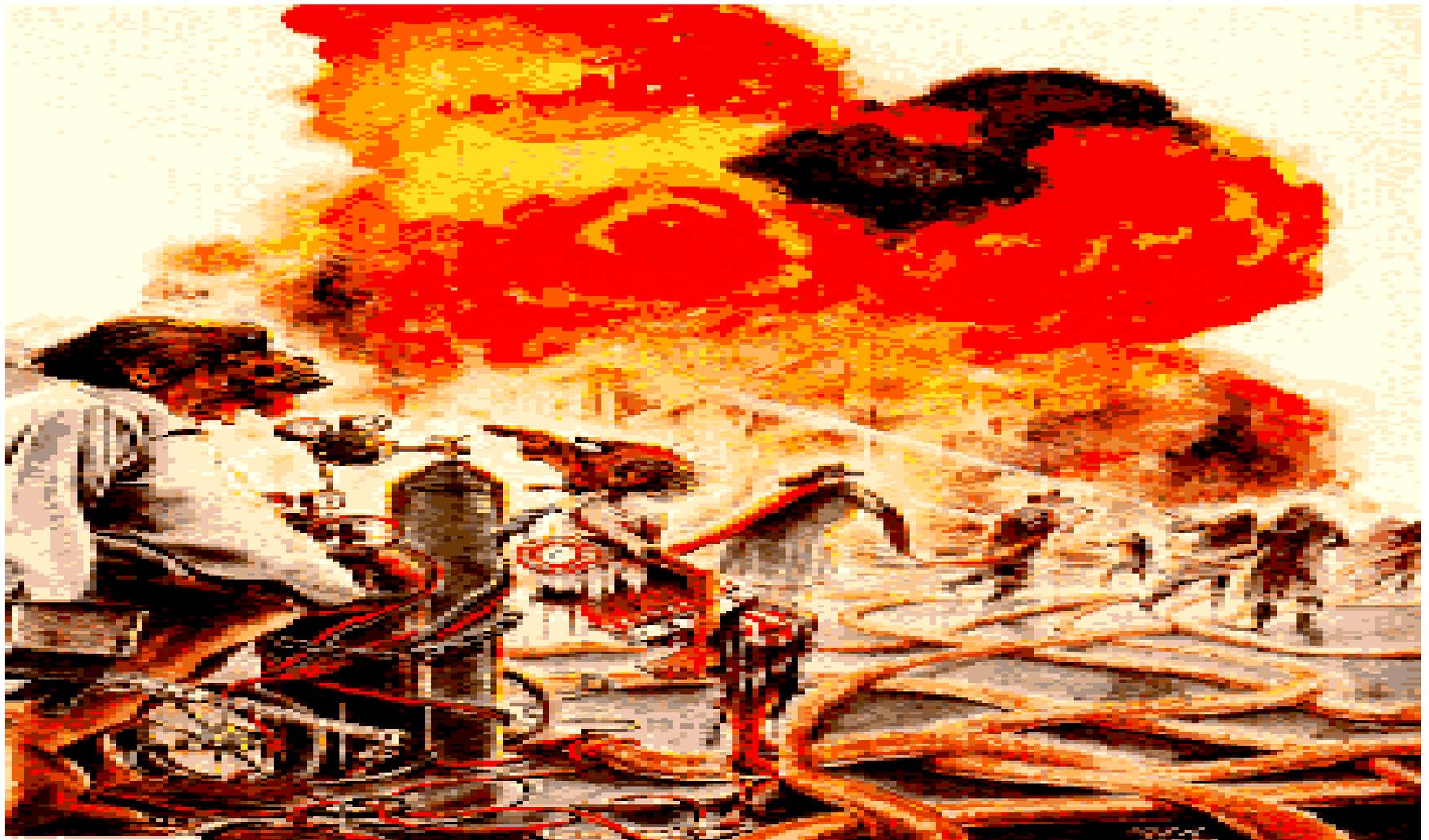


- 18%** Oxygen ok to use for breathing
- 16%** Unaware of Oil and Oxygen Hazards
- 37%** Unaware of Flashbacks or Backfires
- 15%** Unaware of reason for purging hoses
- 53%** Unaware of dangers of reverse flow
- 89%** Unaware of set-up/shut-down procedures
- 53%** Unaware of oxy/Fuel pressure settings

**75% DID NOT KNOW THE
PROCEDURES USED IN
CASE OF FLASHBACK TO
SHUT DOWN THE
EQUIPMENT!!!!**

RESULTS.....

EXPLOSION & FIRE!!!



MAJOR CAUSES ON JOBSITES

- 1. Oxy/Acetylene Operations**
- 2. Flammable Storage Area**
- 3. Roofing Spontaneous Combustion**
- 4. Housekeeping**
- 5. No Fire Protection (Extinguisher)**
- 6. Not following 1 Hr. Secure Rule**
- 7. Fire Watch not used.**

FLAMMABLE STORAGE AREA



Separate for other construction areas

Signs and minimum of one 20-B-C fire extinguisher at the storage area

**No more than 60 gallons of each product
maximum of 1100 total gallons**

Max of 1 days use stored in building.

A FIRE EXTINGUISHER RATED AT 4-A:20-B-C INDICATES:

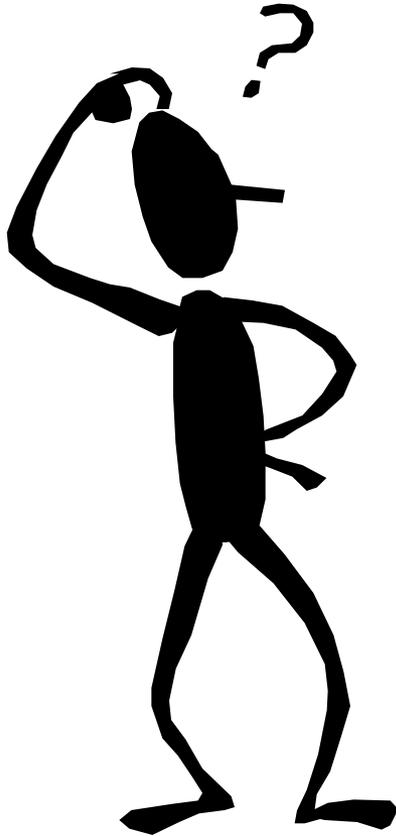
- 1. Can extinguish twice as much Class “A” fire as a 2-A (2 1/2 gal) rated fire extinguisher**
- 2. Should extinguish 20 times as much Class “B” extinguisher rated 1-B**
- 3. Suitable for extinguishing electrical Class “C” fires.**

MINIMUM FIRE EXTINGUISHER REQUIREMENTS



At least one 4-A: 20-B-C on all jobs.
Fueling Areas required additional one
Fuel storage area same requirements
Maximum travel distance to a fire
extinguisher on a job is 75 feet.
See COE page #185 Fire Distribution
Table. Note Multi Story building
requirements.

FIRE EXTINGUISHER QUESTION?



On a multi-story project, what is the minimum correct **location** and **distances** for placement of fire extinguishers?

ANSWER



At least one adjacent to each stairwell, and placed at a travel distance no farther apart than 75 feet.

See Page 185 Table 9-4 foot note

HOUSEKEEPING...OILY RAGS

FAILURE TO USE 1 HR. RULE

**ASPHALT MOPS LEFT OF ROOF
TWO EXTINGUISHERS AT KETTLE**

FAILURE TO PROVIDE FIRE WATCH

APPROVED TYPE

FLASH SUPPRESSOR

**OUTSIDE HELP IS SOURCE OF
FIRE PROTECTION**



**WRITTEN AGREEMENT OR
MEMORANDUM OF RECORD**

DETAILS FOR SERVICES

COPY TO ROICC (09-A-16)

FIRE EXTINGUISHERS



PROPER SIZE

PROPERLY LOCATED

UPRIGHT

FULLY CHARGED

ACCESSABLE.