

WELDING & CUTTING FIRE PROTECTION SAFETY



BASIC TYPES OF WELDING



ARC WELDING



**OXY/ACETYLENE
OR FUEL GAS
WELDING**

STANDARD PPE AND SAFETY REQUIREMENTS

ARC WELDING

OXY/ACETYLENE

LONG SLEEVE SHIRT

GLOVES

HELMET GOGGLES

CORRECT SHADE LENS

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

COMMON CONSIDERATIONS FOR ALL TYPES OF WELDING



FIRE EXTINGUISHER
FIRE WATCH
VENTILATION
FOLLOW 1 HR. RULE

ARC WELDING SAFETY CONSIDERATIONS



VENTILATION

(Mandatory in a CONFINED SPACE!)

**FIRE RETARDANT
CURTAIN**

**NO WRAPPING OF
CABLE AROUND
BODY**

FIRE WATCH

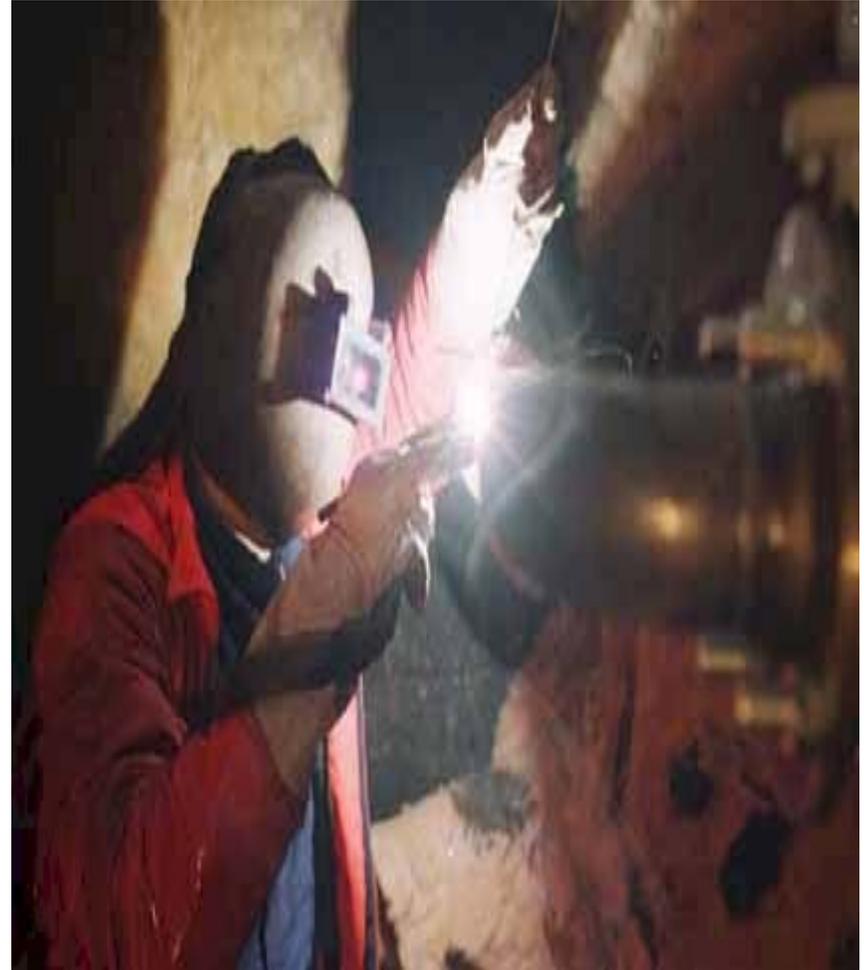
ARC WELDING SAFETY

PROPER GROUND

**NO REPAIRS IN 1ST 10
FEET FROM THE
ELECTRODE**

NEVER GROUND TO
PIPES WITH GAS OR
FLAMMABLES

PROVIDE SHIELD



METAL ARC WELDING

**CORRECT SHADE
OF LENS (See Table 5-2
COE page 33)**

WELDING CURTAINS

FIRE EXTINGUISHER

FIRE WATCH

**10' NO REPAIR IN
LEADS**



FUEL GASES USED FOR HEATING & CUTTING OPERATIONS

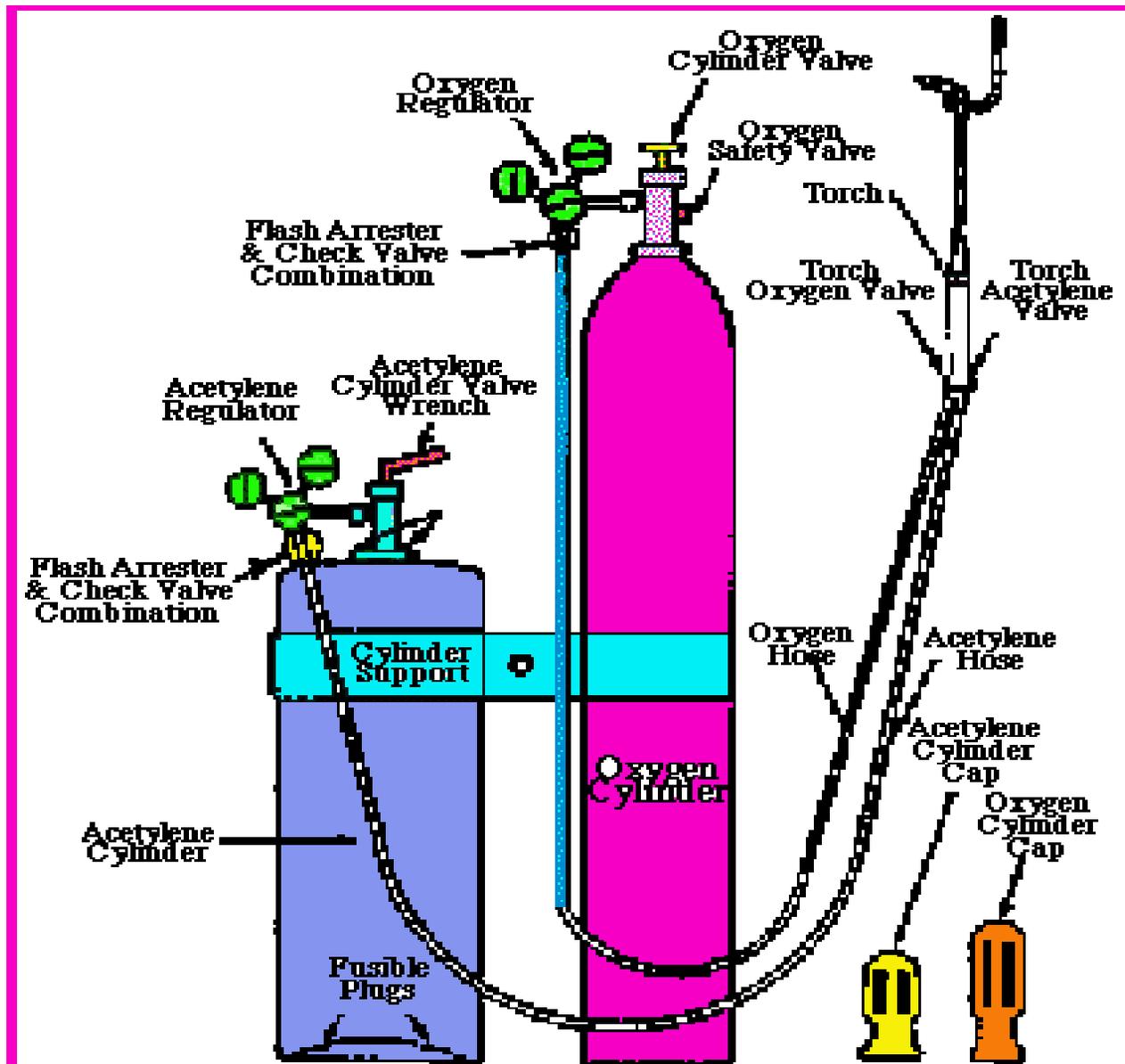
3 MAJOR TYPES

LP GAS

MAPP GAS

ACETYLENE
(MOST COMMON)

TYPICAL FUEL GAS RIG



WHAT TO LOOK FOR?

OXY/ACETYLENE

Secured in place:

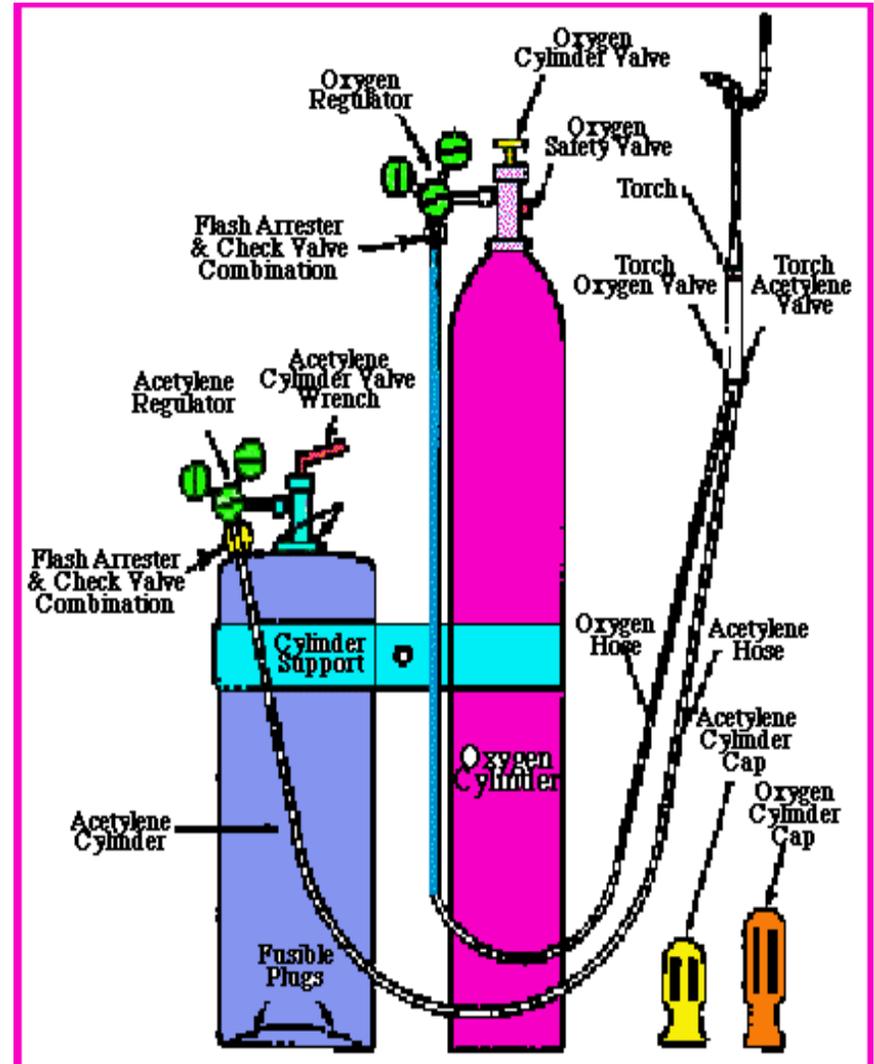
Hand Truck

Fixed/portable racks

Substantial Tie Off

Flash Arrestor/Check valves at regulators

Wrench on Acetylene
Max open 1/2 Turns



OXY/ACETYLENE EQUIPMENT



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**

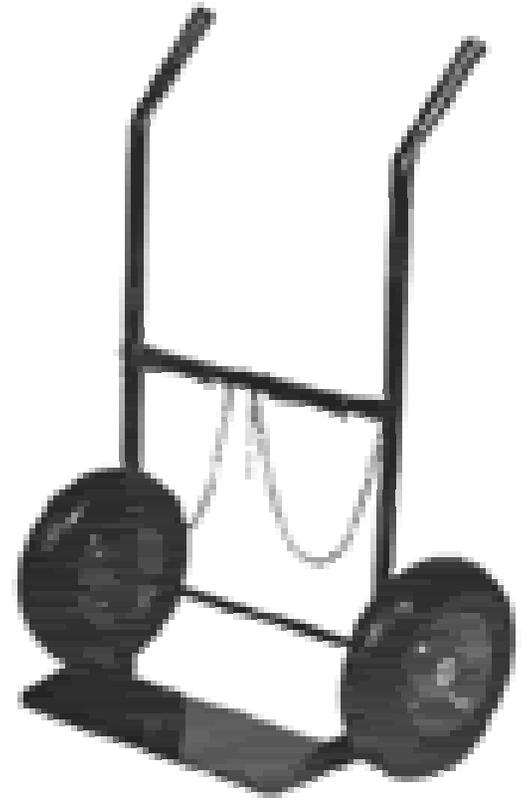


OXY/ACETYLENE STORED AT OUR JOB SITES

**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

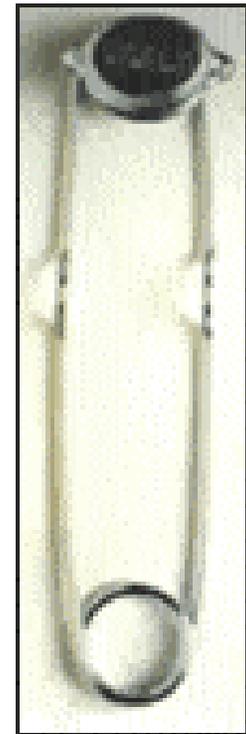
**SEPARATED AT LEAST 20 FEET APART
OR WITH A 1/2 HOUR FIRE RATED BARRIER
AT LEAST 5 FEET HIGH BETWEEN THE
OXYGEN AND ACETYLENE BOTTLES**

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

LOCATION
IS CRITICAL!



REVERSE FLOW FLASH BACK REVERSE-FLOW CHECK VALVES

**WHERE ARE THEY
TO BE INSTALLED?**



REVERSE FLOW CHECK VALVES



**INSTALLED IN
BETWEEN THE
TORCH & THE
REGULATOR...**

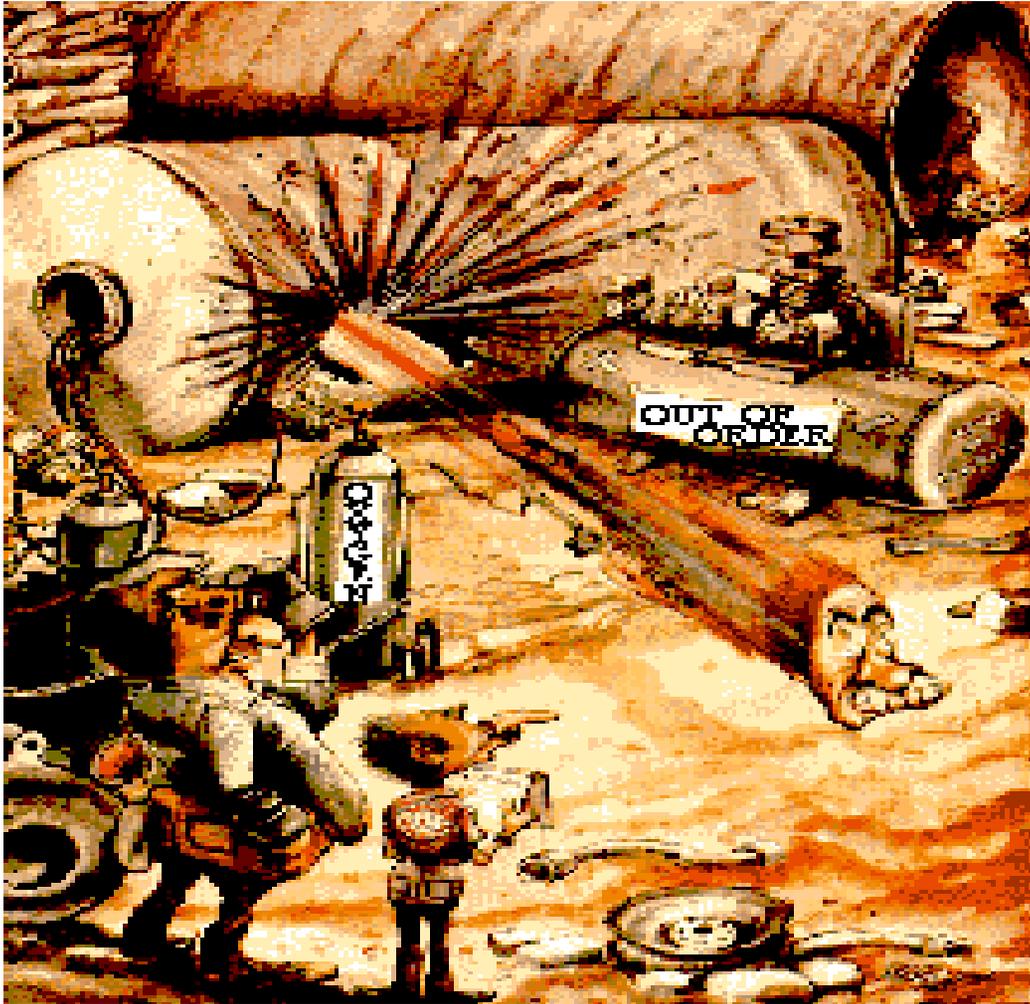
**PREFERABLY
AT THE
REGULATORS!**

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



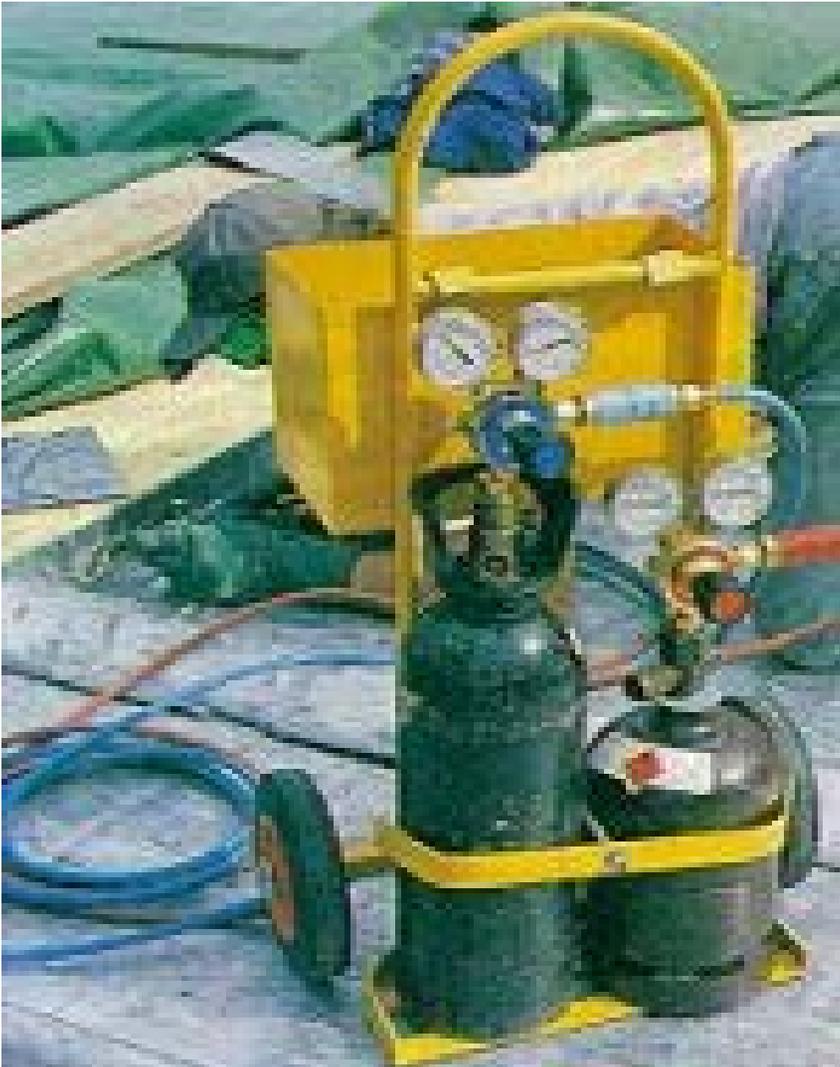
**THERE GOES
JONES NOW...
AND HIS THEORY
OF USING
OXYGEN
FOR
VENTILATION!!**

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!)**

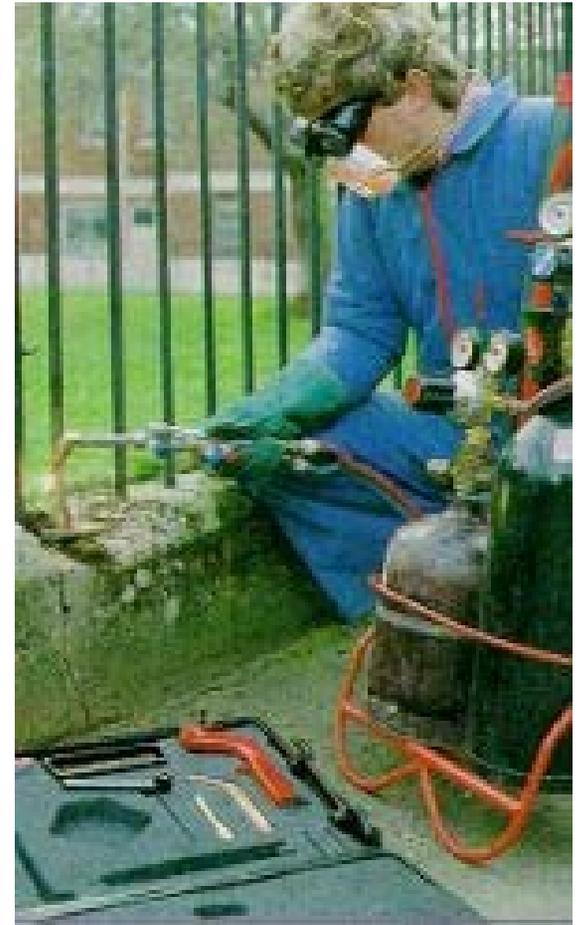
**OIL AND GREASE
AND OXYGEN
CAUSES AN
EXPLOSION!**

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.

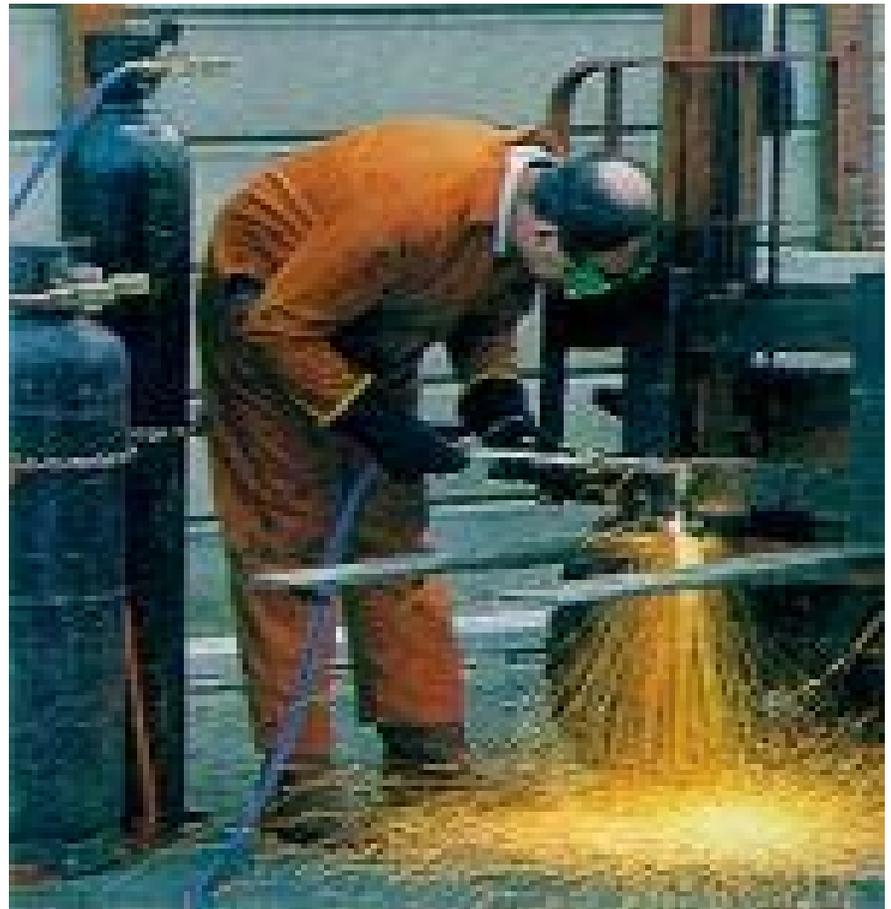


DANGERS WHEN **USING** OXY/ACETYLENE EQUIPMENT

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.

REVERSE GAS FLOW

**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!**

**ELIMINATE REVERSE GAS
FLOW!**

**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**

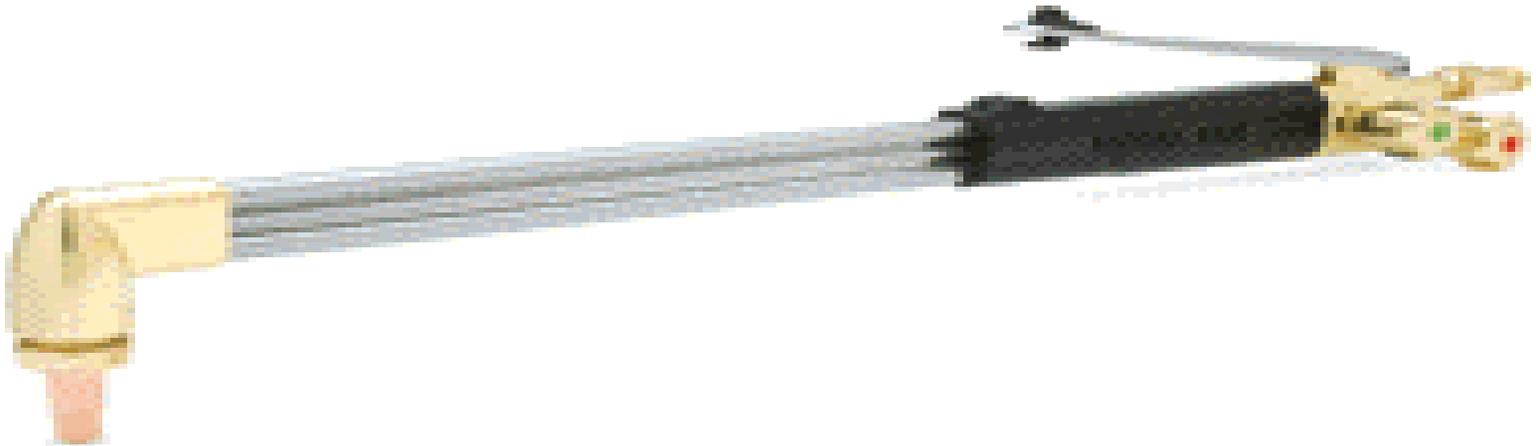
BY EITHER REVERSE GAS FLOW OR BACK FIRE.

WHEN NOT STOPPED A FLASHBACK CAN OCCUR!

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

STOPPING BACKFIRE & FLASHBACK

**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.

FLASHBACK & CHECK VALVE COMBINATION

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.

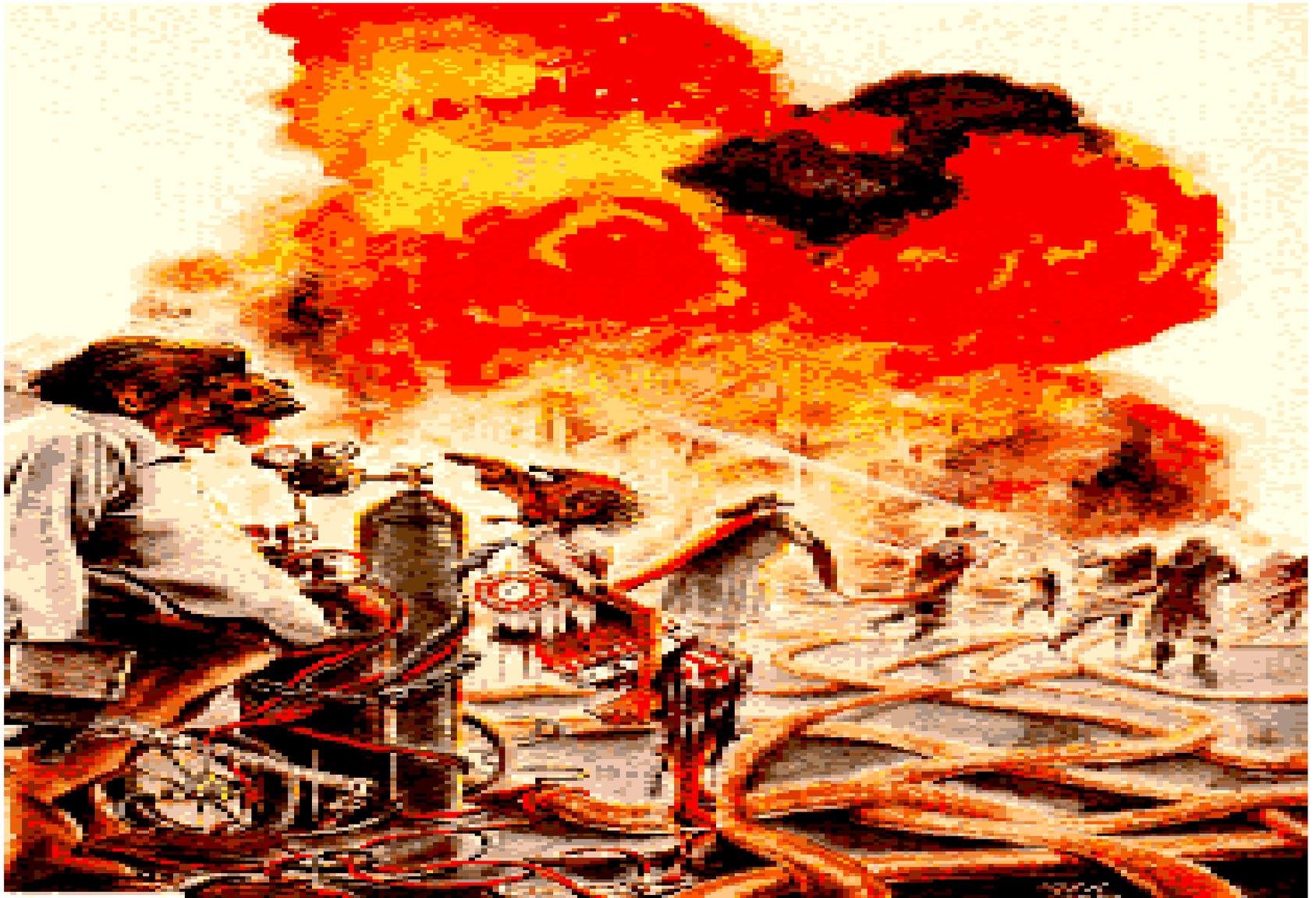
PLACED AT EACH REGULATOR!

SURVEY OF 620 AVERAGE OPERATORS WITH 13 YEARS OF CONSTRUCTION EXPERIENCE

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

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

RESULTS.....



EXPLOSION & FIRE!!!

FIRE PROTECTION

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.

FIRE EXTINGUISHER RATINGS (See Tab “D” page #2)

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

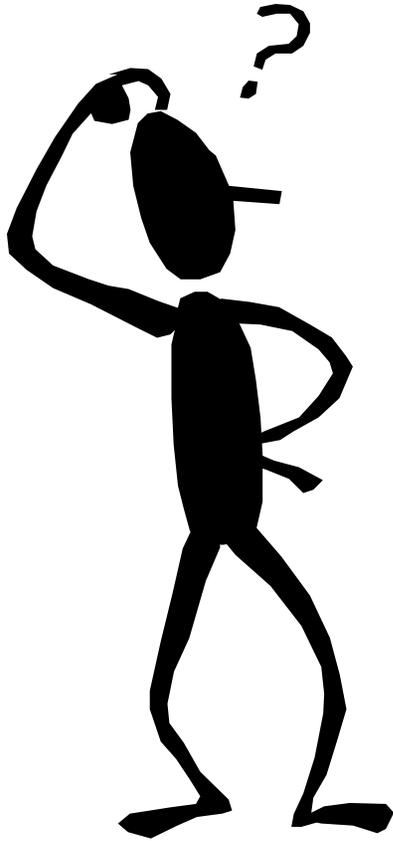
Fuel storage area same requirements

**Maximum travel distance to a fire
extinguisher on a job is 75 feet.**

See COE page #137 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 137 Table, foot note

SPONTANEOUS COMBUSTION

HOUSEKEEPING...OILY RAGS

FAILURE TO USE 1 HR. RULE

ASPHALT MOPS LEFT OF ROOF

TWO EXTINGUISHERS AT KETTLE

FAILURE TO PROVIDE FIRE WATCH

FUEL STORAGE CONTAINERS

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.