

# Cylinder Identification

Adding up the clues

# Lots of Clues

- Product Labels
- Shoulder markings and DOT labels
- Cylinder shape & design
- CGA Valve numbers
- Connection design
- Pressure relief devices
- Info from facility operator or locals
- NOT COLOR

# CAVEAT

- Clues are helpful in cylinder identification in a facility that's used them for its operations or for sale
- Clues may not apply in case of mad scientists and meth labs

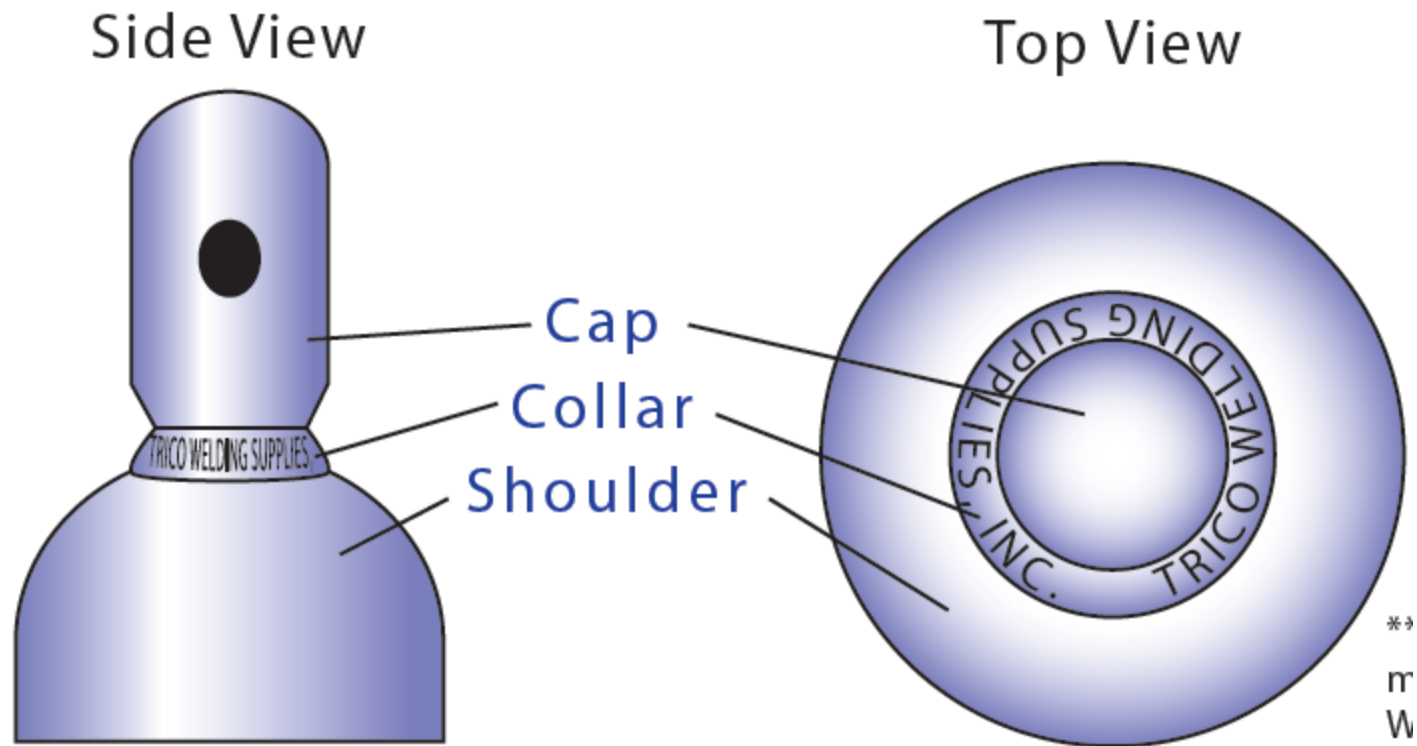
# Labels – the easy way



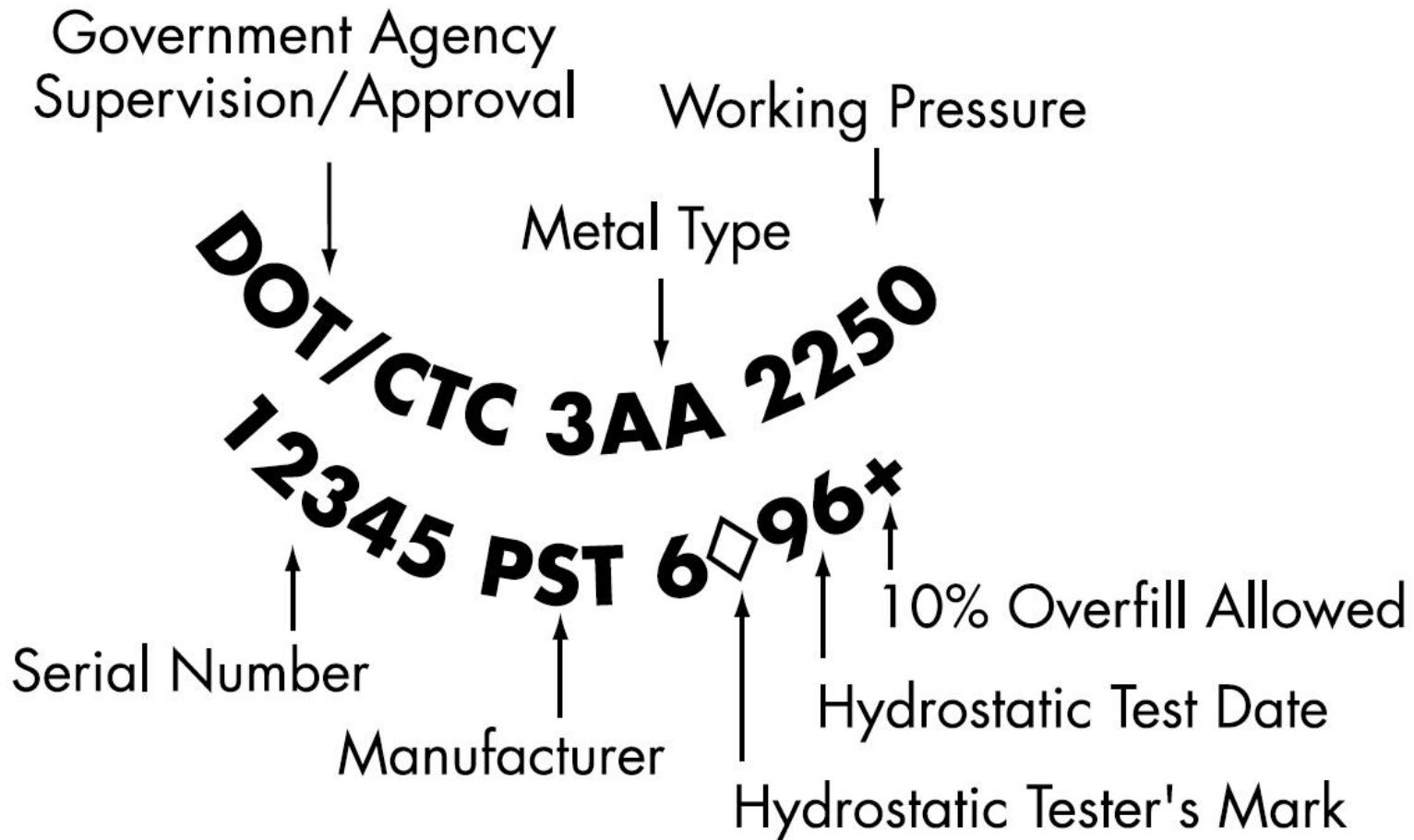
# DOT Placards



# Cylinder Features



# Cylinder Shoulder Markings per 49 CFR 178



# If you can read the markings...



Sometimes you can read them on an old, corroded cylinder...



and sometimes you just can't.



# Cylinder Shape and Design - Low Pressure Cylinders

- Up to 500 psi
- Thin walled
- Welded seams
- Footrings
- Fatter and lighter than high pressure



# Low Pressure Cylinders



Fat cylinders = low pressure



Footrings = low pressure

# Cylinder Shape and Design – High Pressure Cylinders

- Up to 10,000 psi
- Seamless
- Tall and narrow
- Thick-walled – heavy even when empty
- Steel or aluminum



# Cylinder Shape & Design – Cryogenic Containers

- 20-500 psi operating pressure
- Nitrogen, Oxygen, Argon, CO<sub>2</sub>, Nitrous Oxide
- Relief valves vent pressure as temp increases



# Cylinder Valves and Connections

- Compressed Gas Association (CGA) number on valve tells you a lot
- CGA plus 3 digits – e.g., CGA 540
- Number identifies shape and thread of inlet and outlet connections – where you attach to valve
- Indicates what gases might be inside
- Will sometimes tell you exact gas
- Will indicate characteristics: corrosive, flammable, inert, etc.

# Handbook of Compressed Gases

- Produced by the Compressed Gas Association
- Very useful reference for cylinder work
- Info on valves, connections, pressure relief devices, cylinder markings, gas characteristics, individual gases, etc.
- Chapters on dozens of individual gases
- A bit expensive
- If you're doing a cylinder job, get one

# Gases and Their CGA Numbers

Gas	CGA Valve Outlet & Conn. No. CGA/UHP CGA
Acetylene	510
Air, Breathing	346
Air, Industrial	590*
Allene	510**
Ammonia, Anhydrous	705**
Ammonia, Electronic	660/720
Argon	580*/718
Argon-3500 psig	680***
Argon-6000 psig	677
Arsine	350/632
Boron Trichloride	660**/634
Boron Trifluoride	330**/642

# CGA Valve Examples



CGA 580, for inert gases only: nitrogen, helium, argon, etc.  
Interior threading on outlet connector



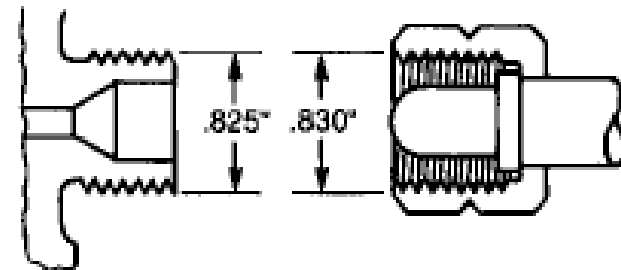
CGA 350, for flammable gases: hydrogen, methane, silane, etc.  
Exterior threading on outlet connector



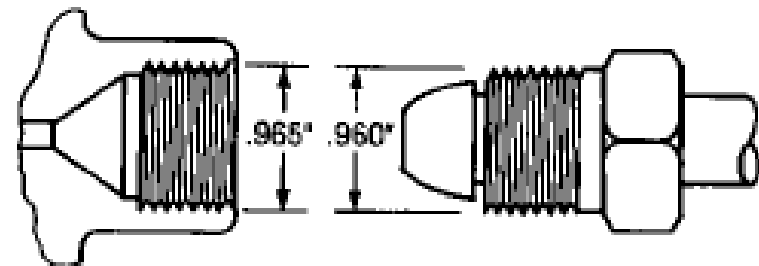
# Outlet Connections

- Same valves as previous slide
- Flammable gas valve – 350 – top diagram
- Inert gas valve – 580 – bottom diagram

**CGA 350**  
.825"-14 NGO-LH-EXT (ROUND NIPPLE)



**CGA 580**  
.965"-14 NGO-RH-INT



**CGA 160**  
 $\frac{1}{8}$ "-27 NGT-RH-INT



**CGA 166**  
 $\frac{1}{4}$ "-20 UNF-2A-EXT ( $\frac{1}{4}$ " SAE FLARE)



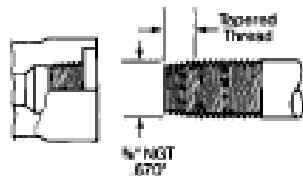
**CGA 170**  
 $\frac{1}{8}$ "-27 UNF-2A-RH-EXT



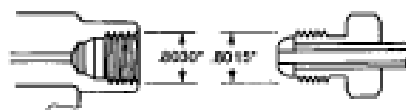
**CGA 180**  
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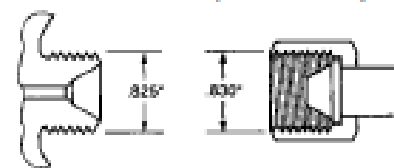
**CGA 240**  
 $\frac{3}{8}$ "-18 NGT-RH-INT



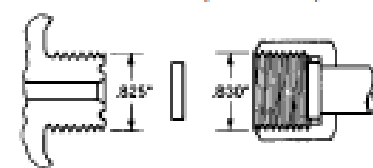
**CGA 296**  
 $\frac{1}{8}$ "-14 UNS-2B-RH-INT  
 (BULLET NIPPLE)



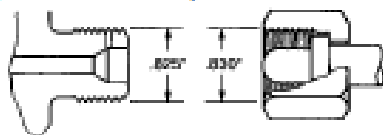
**CGA 300**  
 $\frac{1}{8}$ "-14 NGO-RH-EXT (CONICAL NIPPLE)



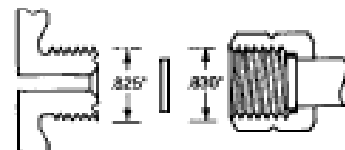
**CGA 320**  
 $\frac{1}{8}$ "-14 NGO-RH-EXT (FLAT NIPPLE)



**CGA 326**  
 $\frac{1}{8}$ "-14 NGO-RH-EXT  
 (SMALL ROUND NIPPLE)



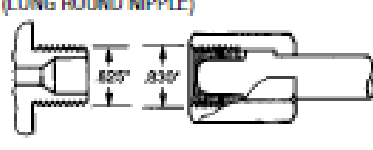
**CGA 330**  
 $\frac{1}{8}$ "-14 NGO-LH-EXT (FLAT NIPPLE)



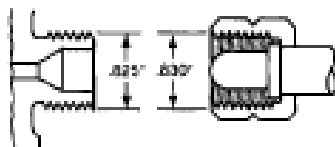
**CGA 346**  
 $\frac{1}{8}$ "-14 NGO-RH-EXT  
 (LARGE ROUND NIPPLE)



**CGA 347**  
 $\frac{1}{8}$ "-14 NGO-RH-EXT  
 (LONG ROUND NIPPLE)



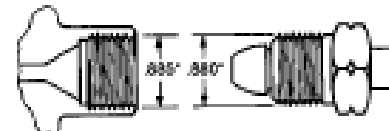
**CGA 350**  
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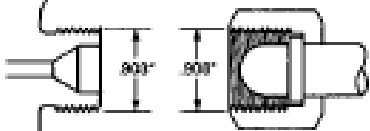
**CGA 500**  
 $\frac{1}{8}$ "-14 NGO-RH-INT (BULLET NIPPLE)



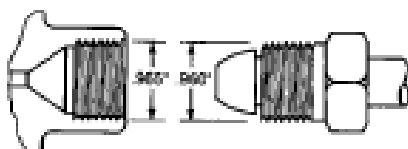
**CGA 510**  
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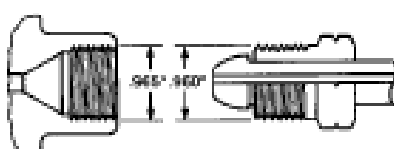
**CGA 540**  
 $\frac{1}{8}$ "-14 NGO-RH-EXT



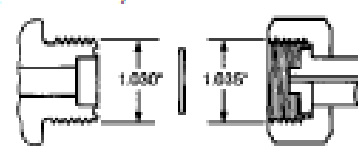
**CGA 580**  
 $\frac{1}{8}$ "-14 NGO-RH-INT



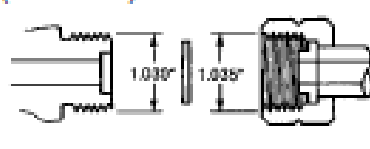
**CGA 590**  
 $\frac{1}{8}$ "-14 NGO-LH-INT



**CGA 660**  
 $\frac{1}{8}$ "-14 NGO-RH-EXT  
 (FACE WASHER)



**CGA 670**  
 $\frac{1}{8}$ "-14 NGO-LH-EXT  
 (FACE WASHER)



# Pressure Relief Devices (PRDs)

- A little trickier to use as an identifier
- PRD types have CGA numbers too – e.g., CG-1
- Some PRDs are activated by pressure, some by heat, some by both
- Different gases have different requirements for pressure relief devices – per CGA
- CGA Table of PRDs as a reference to sort out what you might have

# Pressure Relief Device Requirements

- Some gases must have a certain PRD – acetylene has to have a CG-3
- Some gases have a few options of what type to use – e.g., nitrogen, natural gas
- Some gases are prohibited from having PRDs – arsine, fluorine, hydrogen cyanide, others
- Some gases aren't required to have PRDs

**TABLE 8-2—ALPHABETICAL LIST OF GASES AND DEVICES ASSIGNED (SEE NOTES)**

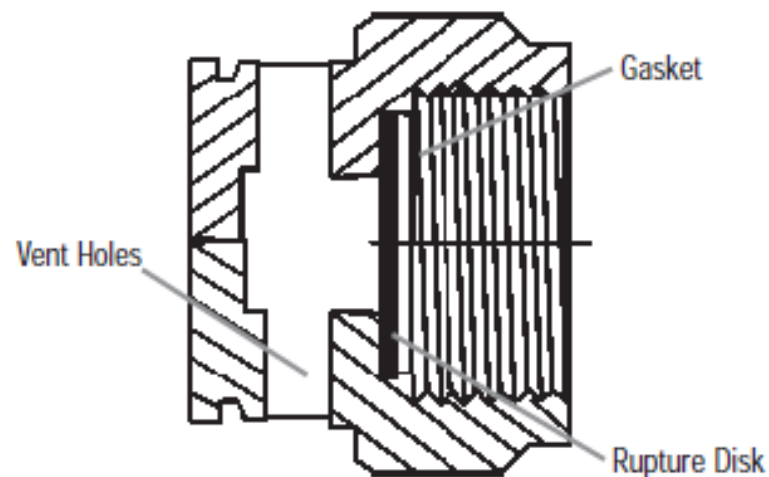
- Note 1: When more than one type of device is listed in Table 8-2 for a particular gas, only one type is required.
- Note 2: The symbols used in Table 8-2 are defined at the end of the table. Interpretation of these symbols is necessary to determine the type of relief device to be used with the specific lading.
- Note 3: Type CG-4 and type CG-5 devices are not acceptable for 110% fill; see 49 CFR 173.302(c).
- Note 4: For certain gases, use of pressure relief devices is not permitted. For such gases the pressure relief device column is marked "Prohibited"; see 49 CFR 173.40.
- Note 5: "None required" does not remove the possibility that a pressure relief device may be used.
- Note 6: When used in direct medical service, CG-1 devices for Carbon Dioxide, Carbon Dioxide/Nitrous Oxide Mixture (Liquid), Cyclopropane, Nitrous Oxide shall be of the projecting type.

**GASES**

FTSC Code	LC <sub>50</sub> PPM	Name of Gas	CG-1 Disk	CG-2 165 °F	CG-3 212 °F	CG-4 165 °F w/Disk	CG-5 212 °F w/Disk	CG-7 RV	CG-8 Disk/RV	CG-9 217 °F
5130		Acetylene			F					
1060		Air	A		KB	B	B	K		
2100		Allene		M				A		
		Allylene (See Methylacetylene)								
2102		Ammonia, Anhydrous (over 165lb) (None required if under 165lb)		E						
0303		Antimony Pentafluoride	PROHIBITED							
0160		Argon	A			B	B	K		
2300	20	Arsine	PROHIBITED							

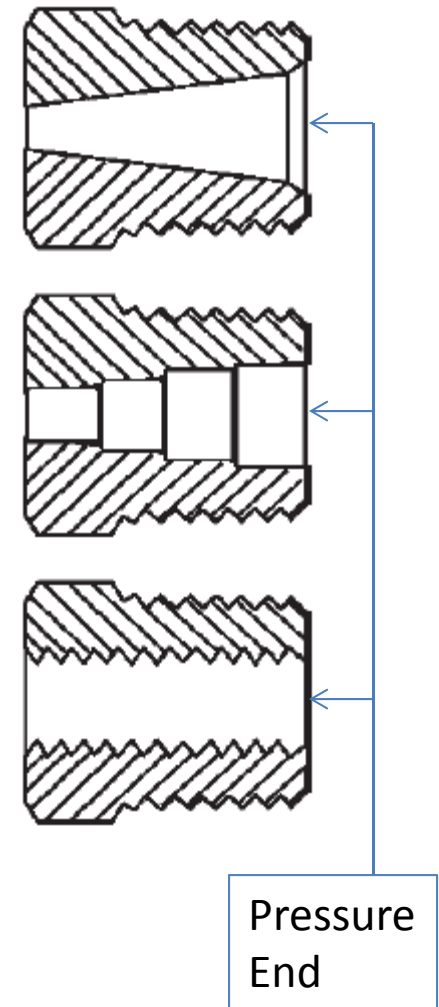
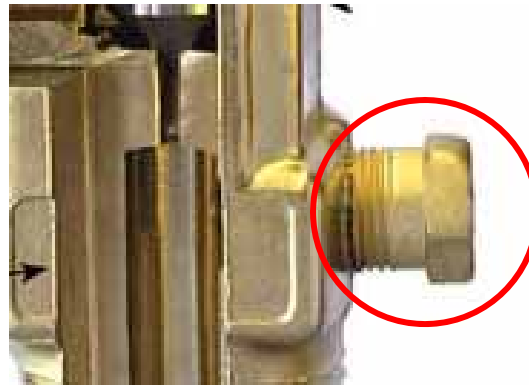
# Rupture Disk: CG-1

- Also called a burst disk
- Disk bursts when it reaches a set pressure
- Burst pressure stamped on cap
- Prevents cylinder rupture due to fire or overfilling
- Does not reclose – dumps entire cylinder



# Fusible Plugs: CG-2, CG-3

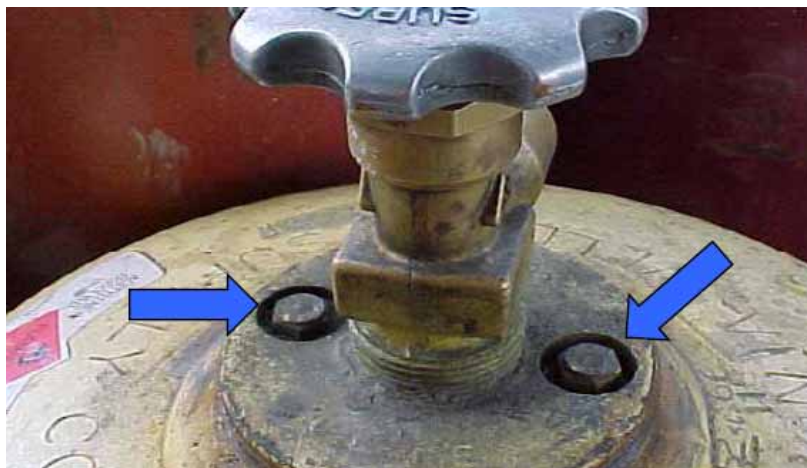
- Designed to melt at set temperatures
- 165° F for CG-2 – LPG
- 212° F for CG-3 – acetylene
- Pressure <500 psi
- Prevents overpressure due to fire
- Does not reclose



Pressure  
End

# Fusible Plugs : CG-2, CG-3

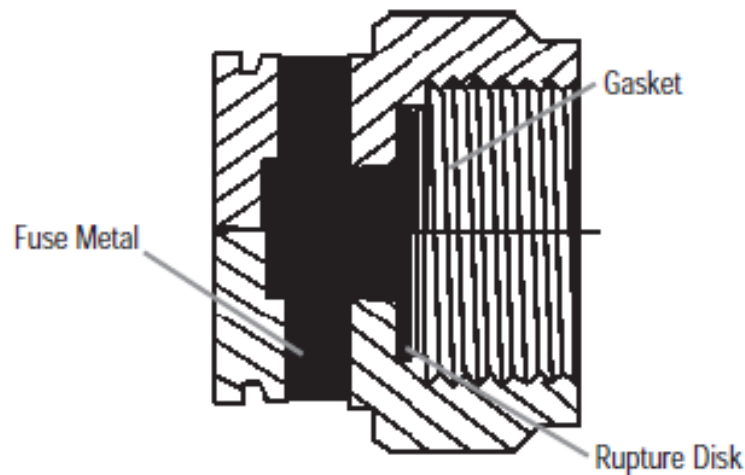
- Plugs can be on the valve or body of the cylinder
- Acetylene cylinders usually have two fusible plugs on the collar





# Combo: Burst Disk & Fusible Plug, CG-4, CG-5

- Burst disk backed by a fusible plug
- Plug has to melt first, then disk can burst with pressure increase
- CG-4 plug melts at 165 °
- CG-5 plug melts at 212 °
- Temp and pressure stamped on cap



Fusible  
plug

# Pressure-Relief Valve, CG-7

- Spring-loaded valve, opens at set pressure
- Relieves pressure on a cylinder, then closes



# Quick Valve Clue

- Wrench-operated valve (no handwheel)
- Generally used for corrosives – chlorine, ammonia, fluorine, etc.
- Often have a screw-on cap on the outlet
- Immediate sign to be cautious with contents



So this is a bit worrisome...



# Info from Facility, Employees & Locals

- Can be helpful
- Not always totally reliable
- Not a bad idea to verify what you hear using other clues from cylinders
- Facility type can provide context – guides your thinking

Color is NOT a useful indicator



A Rainbow of Ammonia Cylinders

# Using the Clues – Going From This



# To This





# Using the Clues

- Adding up the clues can provide lots of identifying info
- Not like hazcat – doesn't have to go in a particular order
- More like building the clues to solve a mystery

# Using the Clues in American Samoa

- Started with 700+ cylinders
- Sorted them by hazard, based on:
  - Cylinder shape and design
  - CGA valve numbers
  - Color (all rust-colored)
- Sorted them into:
  - Corrosives (ammonia, chlorine)
  - Flammables (acetylene, propane)
  - High-pressure inerts (oxygen, CO<sub>2</sub>, nitrogen, etc.)

# Identification Practice



Things we can observe:

- Type of cylinder
- CGA #
- Valve features
- Pressure relief device
- Outlet thread
- Context – water treatment plant



- Type of cylinder = **high-pressure**
- CGA # = **none**
- Valve features
  - **Wrench-operated**
  - **Vapor-tight cap**
- PRD = **165 ° fusible plug**
- Outlet thread = **external, RH thread**
- Context = **water treatment plant**



- Type of cylinder
- CGA #
- Valve control
- Manufacturer's name
- Pressure relief device
- Outlet thread
- Context – outside old storage unit



- Type of cylinder = **low pressure**
- CGA # = **none**
- Valve control = **handwheel**
- Manufacturer's name = **Rego**
- Pressure relief device = **relief valve**
- Outlet = **internal LH thread, cone nipple**
- Context = **unused bldg**



- Type of cylinder
- CGA #
- Pressure relief device
- Outlet thread
- Shoulder markings



- Type of cylinder = **low pressure**
- CGA # = **510 or 540**
- Pressure relief device = **fusible plugs on collar, no PRD on valve**
- Outlet thread = **internal LH thread**
- Shoulder markings = **DOT 8 250**

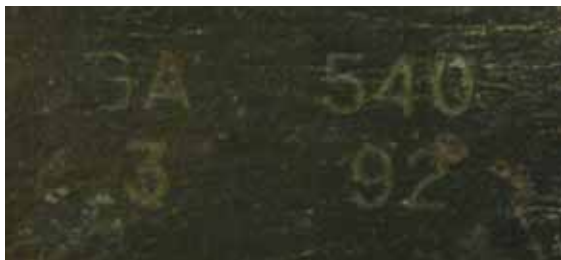




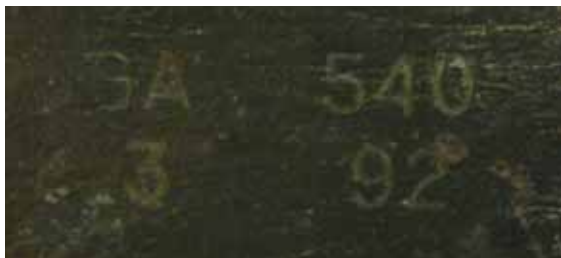
- Type of cylinder
- DOT label
- CGA #
- Valve features
- Pressure relief device
- Outlet thread



- Type of cylinder = **high pressure**
- DOT label = **Non-flammable gas**
- CGA # = **none**
- Valve features = **"Helium of U.S."**
- Pressure relief device = **burst disk**
- Outlet thread = **internal RH thread**



- Type of cylinder
- CGA #
- Pressure relief device
- Outlet thread
- Context = wreckage of a house



- Type of cylinder = **high pressure**
- CGA # = **540**
- Pressure relief device = **burst disk**
- Outlet thread = **external RH**
- Context = **in wreck of house**



- Type of cylinder
- CGA #
- Valve features
- Pressure relief device
- Outlet thread



- Type of cylinder = **high pressure**
- CGA # = **320**
- Valve features = **handwheel**
- Pressure relief device = **burst disk & fusible plug at 165°**
- Outlet thread = **external RH thread, flat face connection**



- Type of cylinder
- CGA #
- Pressure relief device
- Outlet thread
- Context = found during hazmat sweep after natural disaster



- Type of cylinder = **high pressure**
- CGA # = **580**
- Pressure relief device = **burst disk**
- Outlet thread = **internal RH thread**
- Context = **head down in a manhole**