



Compressed Gas Safety & Flashback Arresters

Presented by:
Superflash Compressed Gas
Equipment, IBEDA Inc.
Westlake, OH

References and Credits

- Pennsylvania Department of Environmental Protection, Bureau of Deep Mine Safety
- ANSI Z49.1:2005 Safety in Welding, Cutting, and Allied Processes
- IBEDA Inc.
- OSHA
- US EPA
- Compressed Gas Association (CGA) Standards, Safety Bulletins, and Alerts





Largest Manufacturer of Compressed & Welding Gas Safety Equipment with Sales in 100 Countries

**We are an active Compressed Gas Association
company member & sustaining member of the
American Welding Society**



Superflash Locations



Westlake, Ohio, U.S.A.



**Neustadt-Wied & Bollingen,
Germany**

Something to think about.....

Every time your employees use oxy-acetylene or oxy-fuel gas equipment , if safety guidelines are not followed, it would be the same as handling live explosives ready to go off.....



Now let's talk about the gases

Which gas is most hazardous?

- Acetylene
- Propane
- Natural Gas
- Oxygen
- Hydrogen



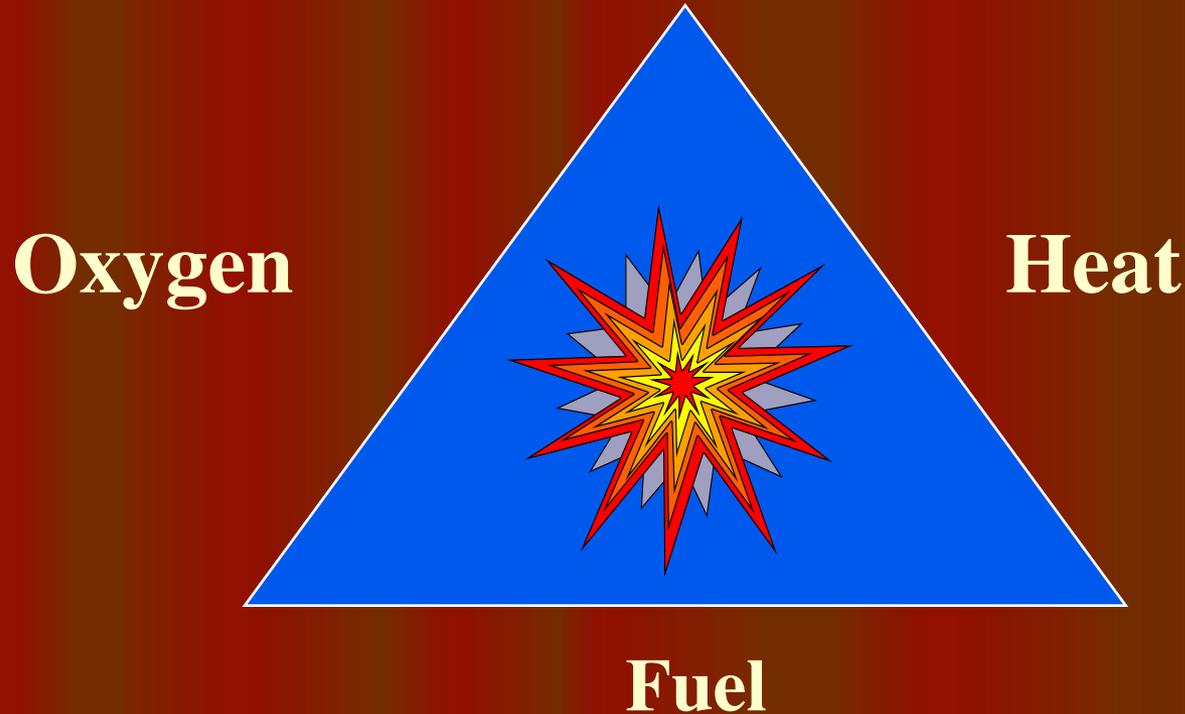
**Answer: All are hazardous,
however:**

Oxygen is the most hazardous because this pure gas is the most misunderstood. For example many believe that oxygen is ordinary air...

Oxygen is NOT air!



Triangle of Combustion



- Oxygen lowers the kindling point, increases the speed, and temperature of combustion.

Oxygen Demonstrations

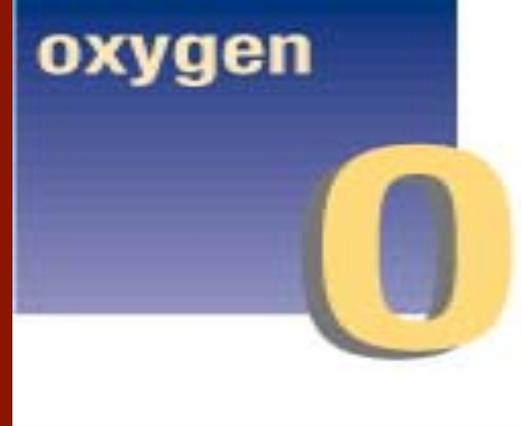


Warning!

- **USE NO OIL in, on, or around oxygen.**
- **Most equipment is lubricated for life.**
- **Only use oxygen compatible leak testing solution such as Superflash #1109-1023 and sealants like Superflash Telfon tape #1100-9910 which meet military specifications for oxygen compatibility**

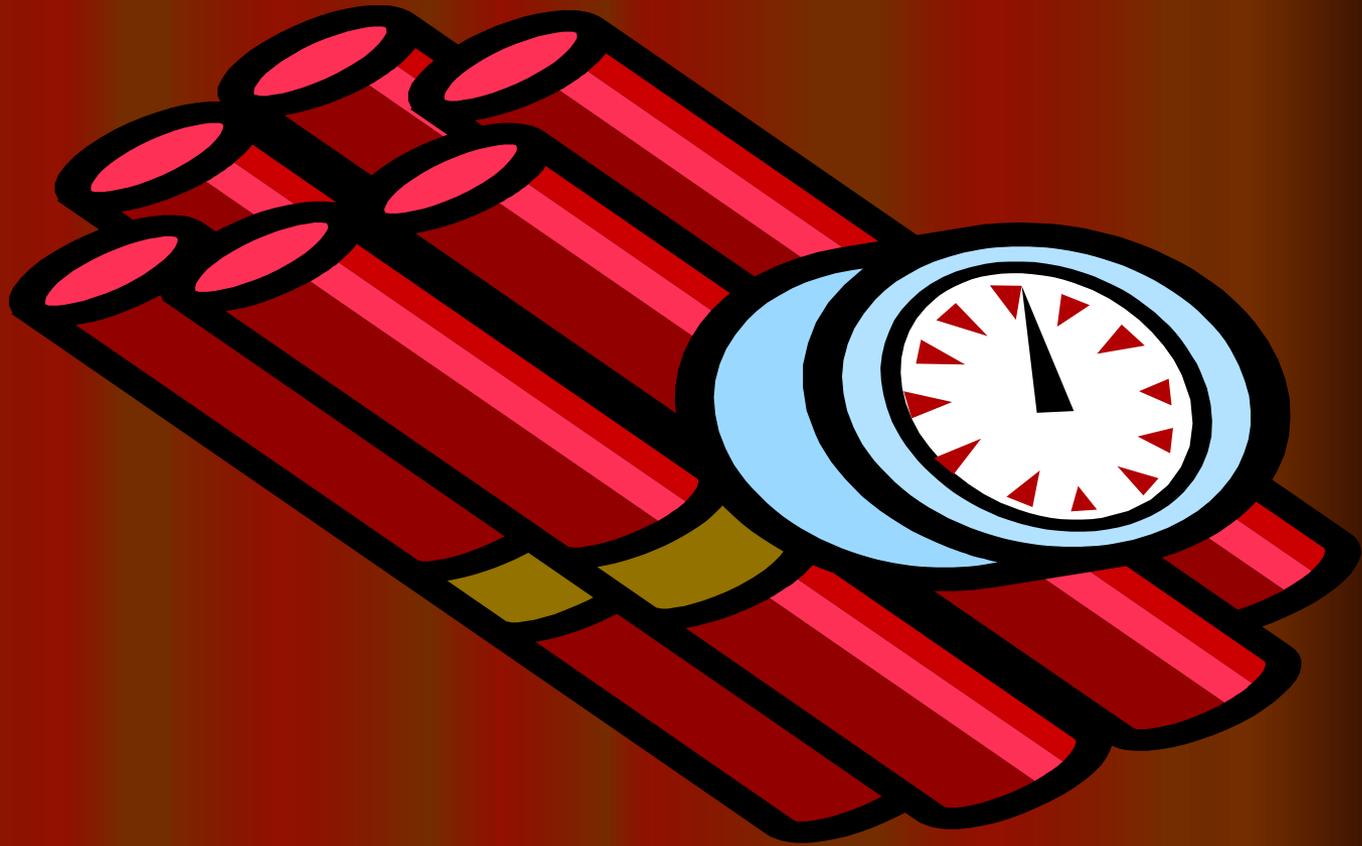


What is Oxygen



- Remember, oxygen is not air
- There is approximately 21% oxygen in normal air the balance is nitrogen and trace gases
- Oxygen is found naturally in the atmosphere
- It is produced industrially by distilling air below it's freezing point
- Pure oxygen does not burn or explode
- Oxygen is an **“accelerant”** , it causes every thing it comes in contact with to burn at lower temperatures, hotter and faster
- Air has a vapor density of 1.000, Oxygen is heavier than air (1.105) This means if a oxygen bottle is leaking, the gas will settle in low areas before diffusing back into the atmosphere.
- 23.5% or higher concentrations of oxygen in the atmosphere will cause things to burn or explode 8 times faster

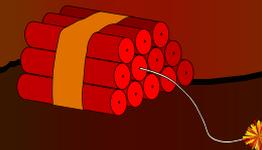
Flashback Arrester Demonstrations



Backfires and flashbacks



- **Backfires occur when the torch flame burns back into the torch tip and is extinguished with a loud pop.**
- **They occur either because the torch tip touched the work or because of insufficient gas pressure.**
- **Backfires over time damage the torch. However, flashbacks are more serious when the flame front does not extinguish, but burns back sometimes beyond the mixing chamber, through the hoses, and even into regulator and supply.**
- **A common inside diameter of oxy-fuel gas hose is 1/4 inch. If you calculate the volume of 100 feet of hose with an inside diameter of 1/4 inch, this means, should oxygen enter the fuel gas hose or should fuel gas enter the oxygen hose, a mixed gas explosion with the force potential of 20 sticks of dynamite could occur.**



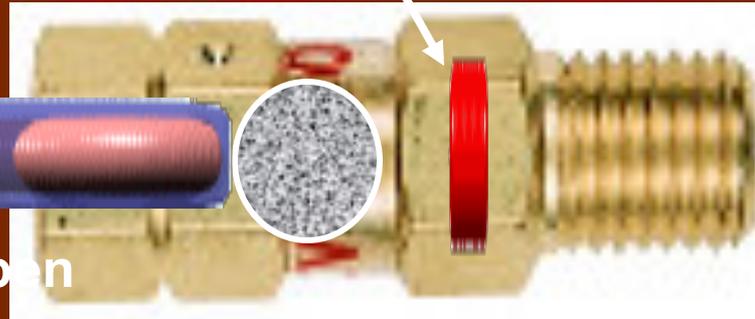
CHECK VALVES

- ***The purpose of an internal check valve is to reduce the possibility of reverse flow gas.***
- ***It is not intended to act as a fire stop or flashback arrestor!***
- ***Ensure that the internal check valves are working properly by testing at least every six months, more often if the hoses are frequently removed from the torch. No inlet filter.***

Gas flow



Spring activated



Once flow pressure decreases, valve will close preventing back flow of gas

Flow of gas keeps valve open

Examples of OSHA citations which were a result of noncompliance with safety requirements including use of flashback arresters or backflow preventers.

U.S. Department of Labor
Occupational Safety and Health Administration
Citation and Notification of Penalty
U. S. Department of Labor - OSHA
Federal Building - Room 1428
1000 Liberty Avenue
Pittsburgh, PA 15222

1. Type of Violation(s)	2. Citation Number
Serious	O1

9. To:

The violation(s) described in this Citation are alleged to have occurred on or about the day the inspection was made unless otherwise indicated within the description given below.

11. Inspection Site:

3. Issuance Date	4. Inspection Number
5. Reporting ID	6. CSHO ID
7. Optional Report No.	8. Page No. B of 15
10. Inspection Date(s):	

Penalties Are Due Within 15 Days of Receipt of This Notification Unless Contested (See enclosed Booklet)

This Section May Be Detached Before Filing

THE LAW REQUIRES that a copy of this Citation be posted immediately in a prominent place at or near the location of violation(s) cited below. The citation must remain posted until the violations cited below have been abated, or for 3 working days (excluding weekends and Federal holidays), whichever is longer.

This Citation describes violations of the Occupational Safety and Health Act of 1970. The penalty(ies) listed below are based on these violations. You must abate the violations referred to in this Citation by the dates listed below and pay the penalties proposed, unless within 15 working days (excluding weekends and Federal holidays) from your receipt of this Citation and penalty you mail a notice of contest to the U.S. Department of Labor Area Office at the address shown above. (See the enclosed booklet which outlines your rights and responsibilities and should be read in conjunction with this form.) You are further notified that unless you inform the Area Director in writing that you intend to contest the Citation or proposed penalties within 15 working days after receipt, this Citation and the proposed penalties will become a final order of the Occupational Safety and Health Review Commission and may not be reviewed by any court or agency. Issuance of this Citation does not constitute a finding that a violation of the Act has occurred unless there is a failure to contest as provided for in the Act or, if contested, unless the Citation is affirmed by the Review Commission.

2. Item Number	13. Standard, Regulation or Section of the Act Violated	14. Description	15. Date by Which Violation Must Be Abated	16. Penalty
7	29 CFR 1910.253(e)(1)	Equipment was not installed and used only in the service for which it was approved and as recommended by the manufacturer:	Immediately Upon Receipt	\$1500
	(a) Facility:	Cutting equipment (hoses, torch, gauges, etc.) was not installed and used in an approved manner as recommended by the equipment's manufacturer.		
8	29 CFR 1910.253(e)(3)(iii)(C)(2)	Backflow protection was not provided by an approved device that would prevent oxygen from flowing into the fuelgas system or fuel from flowing into the oxygen system:	Immediately Upon Receipt	\$1500
	(a) Facility:	There was no backflow protection on the cutting equipment that an employee was using.		

Area Director

18.

NOTICE TO EMPLOYEES — The law gives an employee or his representative the opportunity to object to any abatement date set for a violation if he believes the date to be unreasonable. The contest must be mailed to the U.S. Department of Labor Area Office at the address shown above within 15 working days (excluding weekends and Federal holidays) of the receipt by the employer of this Citation and penalty.

EMPLOYER RIGHTS AND RESPONSIBILITIES — The enclosed booklet outlines employer rights and responsibilities and should be read in conjunction with this notification.

CITATION AND NOTIFICATION OF PENALTY

EMPLOYER DISCRIMINATION UNLAWFUL — The law prohibits discrimination by an employer against an employee for filing a complaint or for exercising any rights under this Act. An employee who believes that he has been discriminated against may file a complaint no later than 30 days after the discrimination with the U.S. Department of Labor Area Office at the address shown above.

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CASE FILE COPY

OSHA 2 (10-8)

Total Penalty for This Citation
Make Check or Money Order Payable to: "OSHA"
Indicate Inspection Number on Remittance

U.S. Department of Labor
Occupational Safety and Health Administration
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Penalties Are Due Within 15 Days

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2. Item Number	13. Standard, Regulation or Section of the Act Violated	14. Description	15. Date by Which Violation Must Be Abated	16. Penalty
		The alleged violations below have been grouped because they involve similar or related hazards that may increase the potential for injury resulting from an accident.		
1a	29 CFR 1910.252(a)(2)(xiii)	The employer did not recognize its responsibility for the safe usage of cutting or welding equipment on its property, in accordance with 29 CFR 1910.252 (a)(2)(xiii)(A) through 29 CFR 1910.252(a)(2)(xiii)(D):		\$1050.00
	(a) Facility:	The employer did not recognize its responsibility for the safe usage of cutting equipment on its property. Cutting equipment had broken gauges, improper splice of the fuel-gas hose, no flashback arresters, etc.		

17. Area Director

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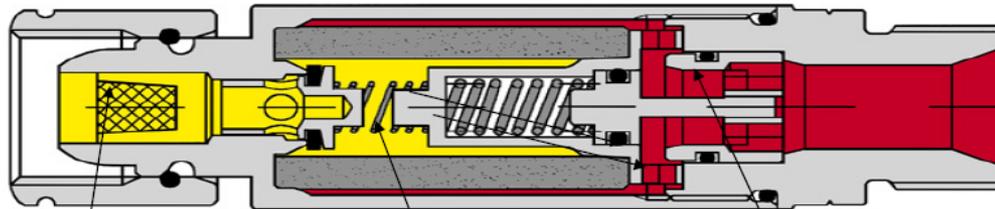
CASE FILE COPY

Total Penalty for This Citation
Make Check or Money Order Payable to: "OSHA"
Indicate Inspection Number on Remittance



Flashback Arrestors stop flashbacks, reverse flow of gases, and hose burn backs (regulator type only) with:

- Check valve stops reverse flow of gases



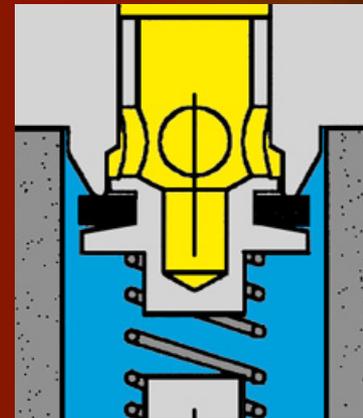
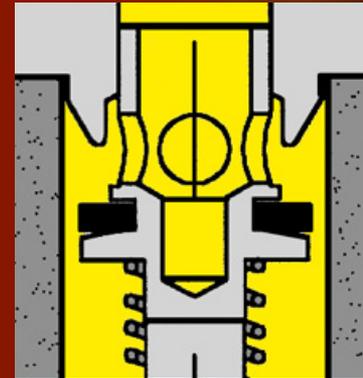
- Flame barrier stops flashbacks

- Stainless inlet screen helps keep dust and dirt out

- In regulator type flashback arrestors **thermal shut off** is included to stop hose burn from reaching cylinders and pipe lines

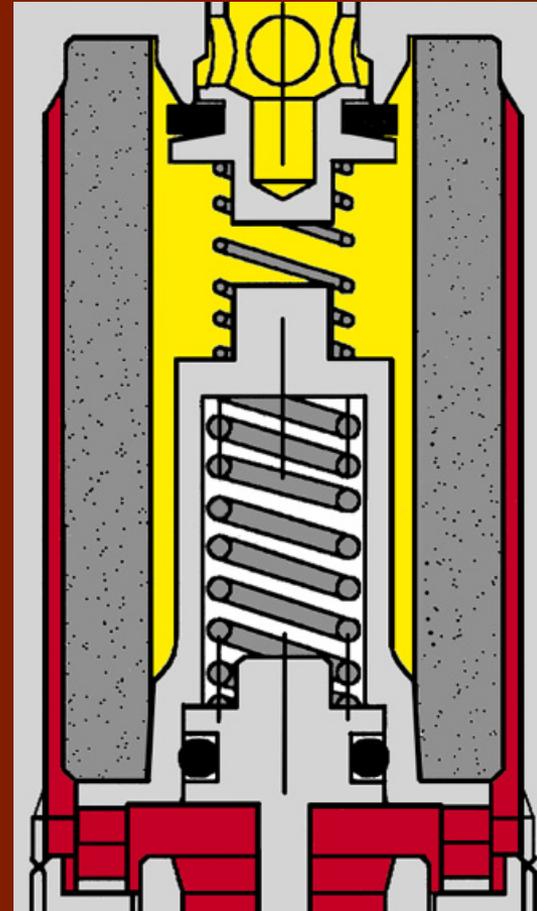
Gas non-return valve

- The gas non-return valve allows gas to flow in just one direction.
- The Gas non-return valve prevents a mixture of gases occurring.



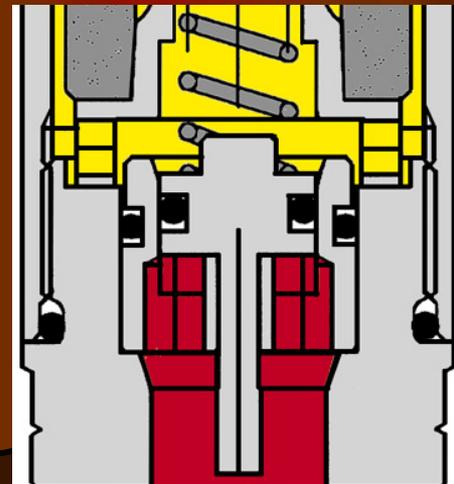
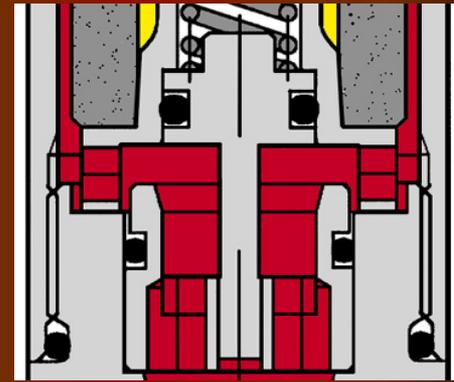
Flame arrestor

- The flame arrestor cools the advancing flame down below the ignition temperature.
- The flame arrestor also prevents a flashback from occurring.



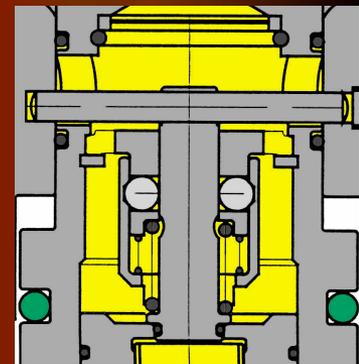
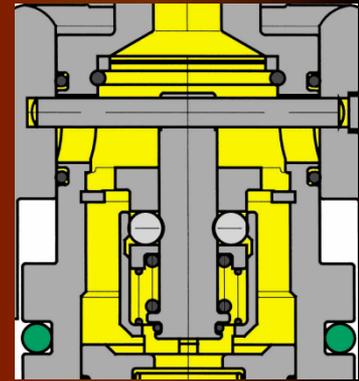
Temperature -sensitive cut-off valve

- The temperature-sensitive cut-off valve prevents the arrestor from overheating.
- The valve shuts off the gas flow automatically when a specific temperature is reached.



Pressure-sensitive cut-off valve

- The pressure-sensitive cut-off valve prevents a further flow of gas in the event of sudden pressure build-up.
- The Gas flow can then be manually released.



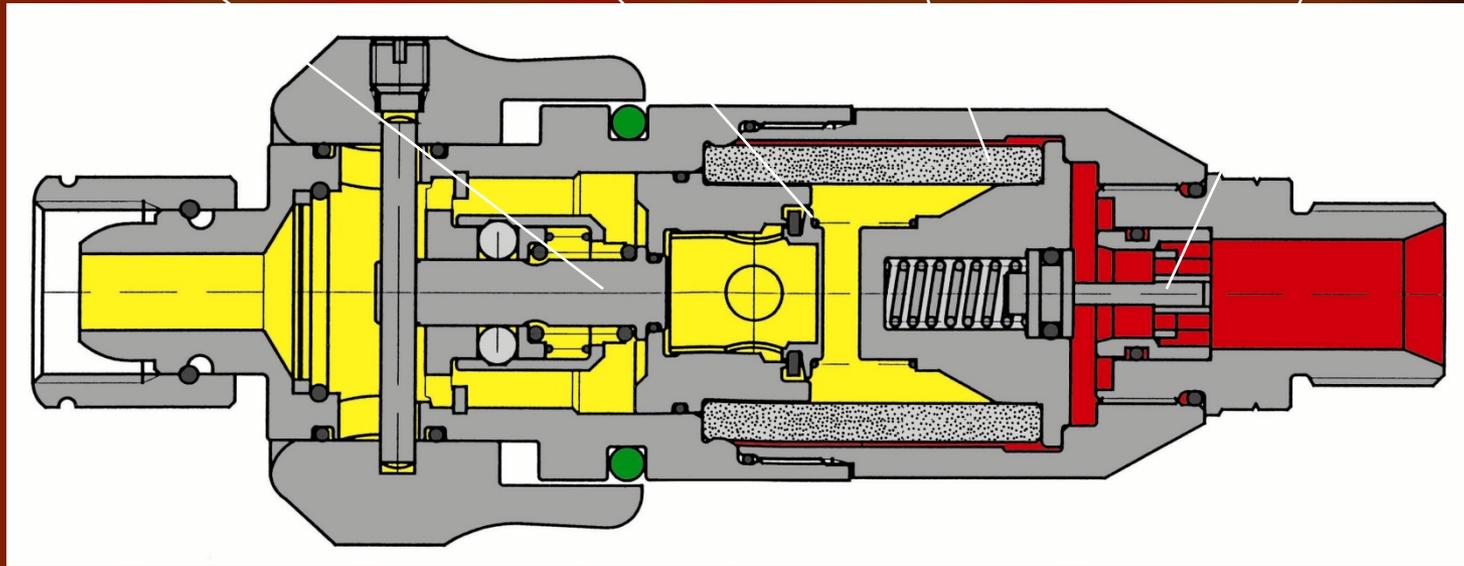
Flashback arrestor DS-2000

Pressure
sensitive
sensitive
cut-off valve

None- return
valve

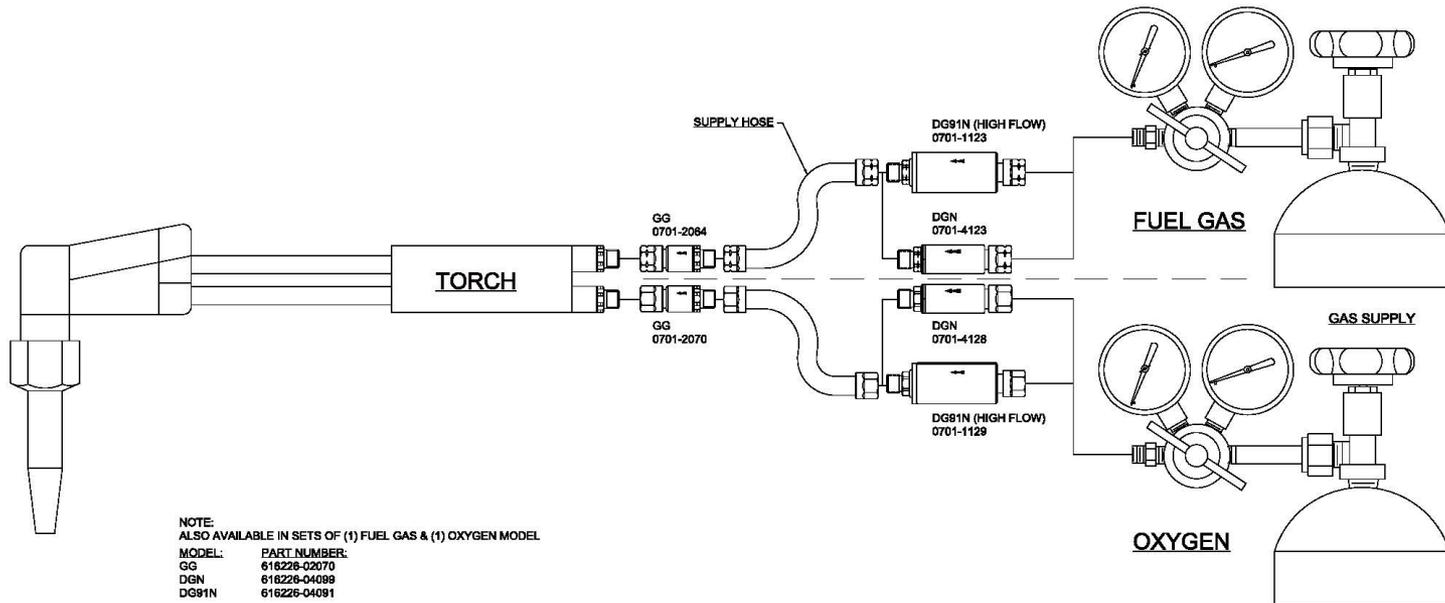
Flame
arrestor

Temperature
cut-off valve



Every torch & regulator should be equipped with an approved flashback arrester

PROPER PLACEMENT OF FLASHBACK ARRESTERS



Torch Flashback Arrestors

Model: GG

Part # 's:
0701-2064 (LH) &
0701-2070 (RH), or
616226-02070

(set)



- Torch and Point of Use flashback arrestors are combination reverse flow check valve and flame barrier in one body.
- They provide protection against flashback and reverse flow of gases to the operator at the torch or equipment point of use.
- Safety regulations and guidelines in many countries around the world require the use of flashback arrestors.

Regulator Flashback Arrestors

Model: DGN

Part # 's:
0701-4123 (LH)
& 0701-4128
(RH), or
616226-04099



- Regulator and point of supply flashback arrestors can be easily installed on the outlet fitting of most regulators and gas supply points.
- They help meet ANSI Z49.1 2005, OSHA, & NFPA requirements.
- Helps protect against the most common causes of accidents such as reverse flow, flashback, and hose burn backs. Each DGN & DG91N is 100% tested with actual flashbacks and have built in 100 micron inlet filters, reverse flow check valves, flame barriers, and thermal cut-off valves.

Model: DG91N

Part # 's*: 0701-1123
(LH) & 0701-1129
(RH), or 616226-04091



* Also available in sizes:
G 3/8", G 1/2". & CGA 'C'
7/8"



UL APPROVAL



YIIQ.MH20148

Oxygen-Fuel Gas Combination Flash Arrester and Back-Pressure Check Valves

Oxygen-Fuel Gas Combination Flash Arrester and Back-Pressure Check Valves

Models DG, DG91N, DGN, DGN-DK, DKSG, GG, SIMAX 3, SIMAX 5, SIMAX 8, DEMAX 5, DS2000, SR, SHT, MDG, MGG, DG91UA for use with acetylene, max pressure 15 psig; MPS-gas, max pressure 22 psig; LP-gas, hydrogen, natural gas, methane, max pressure 50 psig; oxygen, max pressure 143 psig, for use where hose I.D. does not exceed 3/8 in.

**SUPERFLASH
COMPRESSED GAS
EQUIPMENT IBEDA INC**

MH20148

28825 RANNEY PKY

WESTLAKE, OH 44145 USA

An independent organization working for a safer world with integrity, precision and knowledge.



Frequently Asked Questions



- **Why do I need flashback arrestors?**
- **Why aren't they built in to the torch or regulator?**
- **Why aren't they required by OSHA?**

Frequently Asked Questions



- Are flashback arrestors expensive?
- Why is high gas flow capacity important?

LAWS & REGULATIONS

for

Oxy-Acetylene & Oxy Fuel Gas Use

MSHA Regulations

OSHA Requirements

ANSI, AWS, and CGA



- **If flashback occurs, immediately turn off the O₂, then the acetylene, and allow unit to cool**
- **Always work in a well ventilated area**
- **Always light the acetylene first**
- **Oxygen cylinders must be opened the whole way**
- **Use an approved striker, never use matches or cigarette lighter**
- **Use the proper regulator for each specific gas**
- **Only qualified technicians should repair a regulator**
- **Keep regulators free of oil, grease and other flammable substances**



Next Steps...

1. Survey your organization
2. On site survey & training available

Contact:

ktarkany@oxyfuelsafety.com

Jschultz@oxyfuelsafety.com

A green SuperFlash compressed gas equipment unit is shown, featuring two pressure gauges and various hoses. The unit is mounted on a metal structure. The background is a dark, textured surface.

Questions & Answers



SuperFlash[®]
COMPRESSED GAS EQUIPMENT



*Thank you for attending the
Gas Safety Seminar*



SuperFlash[®]
COMPRESSED GAS EQUIPMENT