Gas Manifold

Safety Operation Guide

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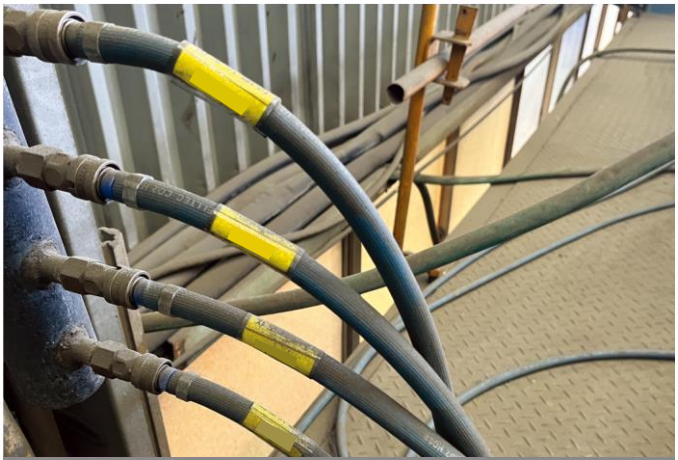
Gas Manifold

Definition A multi-pipe or branch pipe designed for simultaneous use of different gases by multiple people in heavy industry, shipyards, etc.

※ Use with caution, as a gas leak may lead to an explosion.

Composition Color-coded according to the type of gas:
Oxygen: Green, Carbon Dioxide: Blue, Ethylene or LPG Gas: Yellow

Gas manifold

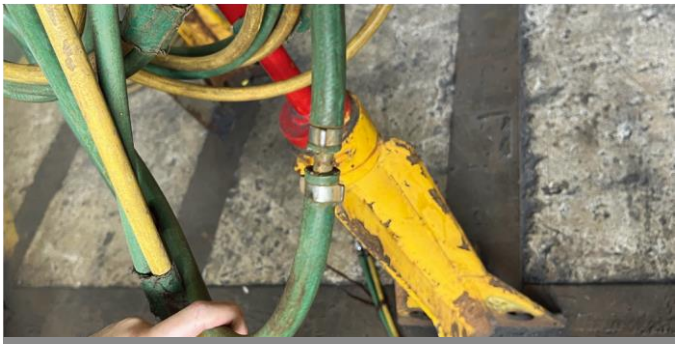


Hose seals

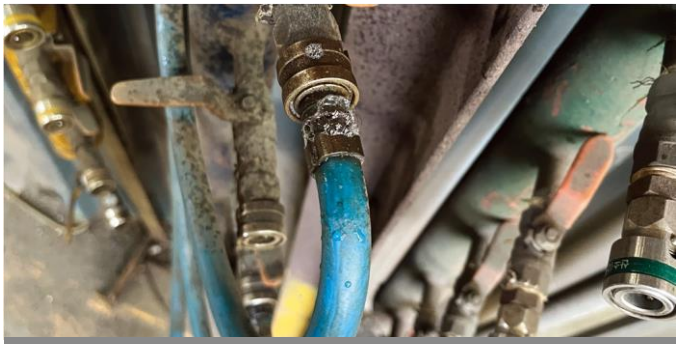
Manifold inspection plate

1 Major Hazards

- Risk of suffocation from inert gas leaks (e.g., carbon dioxide or argon)
- Risk of fire or explosion from ignition sources when flammable gases leak
- Risk of gas leaks from cracked or damaged hoses, regulators, etc.
- Risk of gas leaks from aging hoses due to long-term use or neglect.
- Risk of gas leaks from improperly inserted hose ends or using non-specification products
- Risk of gas leaks from shock caused by improperly installed mobile manifolds
- Risk of gas leak from shock caused by improperly installed mobile manifolds
- Risk of gas leak from hose damage due to sparks during welding or cutting
- Risk of fire or explosion from unlocked valves or cocks after work stops
- Risk of explosion from using non-safety-certified products (e.g., self-made compressed air branch pipes)



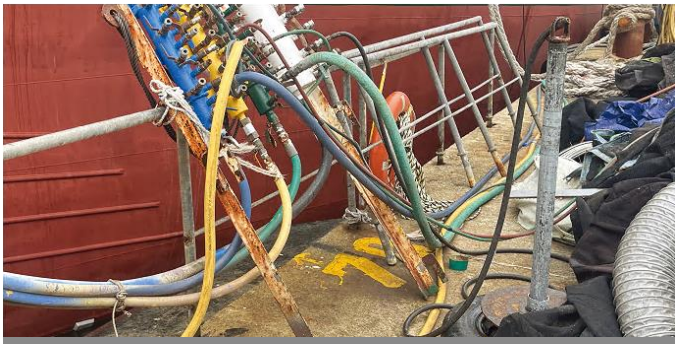
Poor hose connection



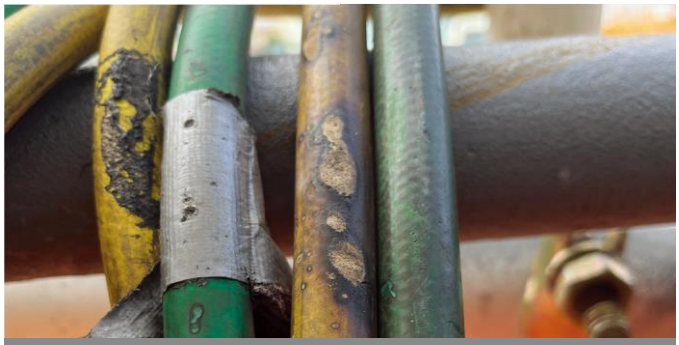
Leaking connection

Cracked/damaged gas hose

Failure to use clamps



Poorly installed mobile manifold



Gas hose damaged by sparks

2 Safety Measures

✓ Use dedicated clamps

• Use dedicated clamps (e.g., hose bands or clips) for the interconnecting fittings of gas hoses.

✓ Check for gas leaks

• Check gas manifolds and hose fittings regularly for leaks using soapy water.

✓ Attach hose seals with the names of the persons responsible

• Attach a name tag on the valve or cock of the gas supply outlet to prevent erroneous operation of the gas supply.

✓ Indicate the direction and gas names

• Indicate the opening and closing direction on the manifold shut-off valves and the gas type on the gas pipe.

✓ When stopping work or leaving the work area

• When stopping or finishing work and leaving the work area, close the valve or cock of the gas supply port and disconnect the nipple.

✓ Install safety devices

• Install safety devices on the main and branch pipes of the gas welding equipment to prevent backfires.

※ For acetylene welding equipment, install safety devices on each blowpipe (unless safety devices are on the main and each branch pipe closest to the blowpipe). Safety devices must also be installed between the generator and gas cylinder when they are separated.

✓ Use dedicated connectors

• To prevent faulty connections, use dedicated connectors that do not connect different branch pipes (e.g., gas pipes) and distinguish them by different colors.

✓ Ventilate when working in confined spaces

• When cutting or welding in confined spaces, ensure sufficient ventilation to prevent fire caused by excessive oxygen emission from the blowpipe.

✓ Safety certification and safety inspection

• When using self-made pressure vessels*, ensure safety through safety certification and manage it through regular safety inspections.

* Fluids or air handling vessels used in chemical or other processes with a design pressure of 0.2 megapascals (kgf/cm2) and a nominal diameter exceeding 150A

3 Risk Assessment (Example)

Hazards	Measures	Rules on Industrial Safety and Health Standards
Risk of fire or explosion from an ignition source in case of combustible gas leak	• Before use, spray soapy water (surfactant) to check for gas leaks at connections. • Regularly test the pressure to check for damage or leaks in the hose or worn parts.	Article 233
Risk of gas leakage from failure to use dedicated clamps when connecting the hose	• Use dedicated clamps (e.g., hose bands, clips) to prevent leaks.	Article 233
Risk of gas leakage from impact when improperly secured mobile manifolds are tipped over	• Install mobile manifolds securely to prevent them from falling.	-
Risk of explosion from using self-made, uncertified pressure vessels	• Obtain safety certification before use and regularly inspect fluids or air handling vessels in chemical or other processes with a design pressure over 0.2 MPa and a nominal diameter over 150A.	Article 36
Risk of fire or explosion from gas leaking from blowpipe with valve not closed after work	• Ensure all valves are closed when stopping or finishing work.	Article 233
Risk of fire or explosion from gas leaking through an unlocked torch after working in confined spaces	• When working in confined spaces with a fire or explosion risk, ensure proper ventilation and close all valves when leaving the area.	Article 233 Article 629 Article 620
Risk of fire from incorrect connection of gas hoses to manifolds	• Indicate gas types on the manifold using colored connectors for easy identification or different sizes and structures to prevent misconnection.	Article 233
Risk of gas leak, fire, or explosion from gas hoses damaged by sparks or flames during welding or cutting	• Take precautions to prevent sparks and flames when welding or cutting, such as using a fire-resistant blanket.	Article 241

Accident Case ① Fire while grinding outfittings inside a cargo tank

Summary

A worker was grinding outfittings inside the ship's cargo tank using an air grinder, unaware that the air and oxygen lines to the mobile manifold were incorrectly connected. The grinder's flames ignited his work clothing due to oxygen leaking from the air hood.

Causes

Oxygen was supplied to the pipe that was supposed to supply air.

- The gas types were not displayed when using gas hoses connected to gas supply valves or cocks, which could lead to incorrect operation.
- The gas types were not displayed, leading to confusion and incorrect connections.
- The mobile manifold color had faded, making it impossible to distinguish between the hose and manifold colors.

Couplings of the same size and structure were used.

- Fittings of different sizes should be used for different gas piping (e.g., oxygen or air) by using connectors with non-interchangeable structures (fittings of different sizes and shapes).

Preventive Measures

Prevent incorrect gas supply

- Label each gas on the manifold and attach user tags. Regularly check, repaint, and maintain the manifold to match the hose color.
- Prevent tampering by using different inlet specifications for each gas supply.

! Accident Case ② Fire during fairing work on a welded area of a block

✓ Summary

While a worker was performing fairing work on a welded area inside a ship block under construction, he checked the opposite fairing and then lit a blowpipe to resume work. At that moment, a fire—presumably caused by excessive oxygen—ignited and spread to his work clothes, resulting in severe burns across his body.

✓ Causes

■ Failure to ventilate for fire prevention in confined spaces

- Ventilation must have been ensured for fairing work with a blowpipe (heating torch) in confined spaces, but no ventilation system was installed.

■ Failure to lock the valve when leaving the site after stopping or finishing work

- The gas supply valve should have been closed when leaving the site after stopping or finishing work

✓ Preventive Measures

■ Ventilate confined spaces

- When working with oxygen gas in confined spaces, install ventilation equipment and ensure continuous ventilation during work.

■ Thoroughly manage blowpipes (heating torches)

- Securely close the blowpipe (heating torch) valve when not in use. Always close the gas supply valve when stopping work or leaving the area.