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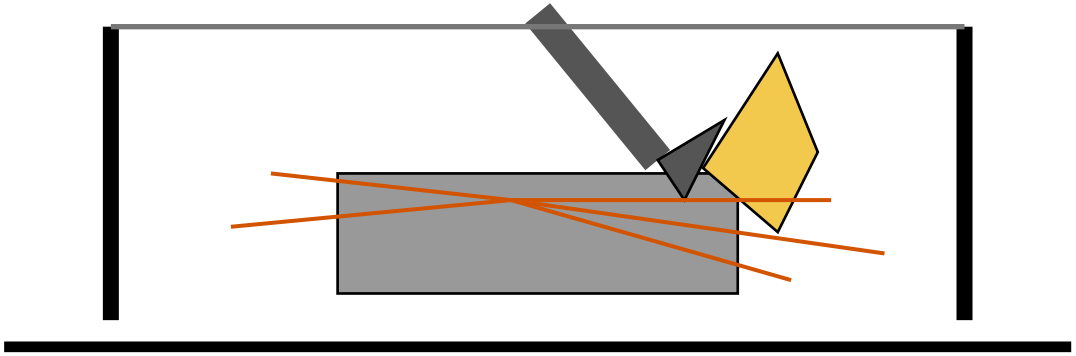
SAFETY IN GAS CUTTING

Practical Course for Oxy-Fuel / Flame Cutting Operations

CONTROL SPARKS • SLAG • HEAT



Remove or shield combustibles; keep suitable fire extinguishing equipment ready.

Prepared by rigzone.ai

Industrial Safety • Energy • Engineering Training

Course purpose: build safe work habits for gas cutting, with emphasis on fire prevention, cylinders, hoses, flashback control, PPE, fumes, and emergency response.

1. Course Overview & Learning Objectives

This course introduces the principal hazards of gas cutting and the controls needed before, during, and after hot work. It is designed as a toolbox-training / awareness course and should be supplemented by site procedures, permits, manufacturer instructions, and competent practical supervision.

By the end of the course, participants should be able to:

• Identify the main hazards associated with oxy-fuel cutting.

• Inspect cylinders, regulators, hoses, torch and connections before use.

• Set up and position gas cylinders safely.

• Explain the purpose of flashback arresters and safe hose management.

• Apply hot-work fire prevention and fire-watch controls.

• Select appropriate PPE and understand fume / ventilation hazards.

• Respond safely to leaks, backfire, flashback, fire, or abnormal cylinder heating.

• Stop work when conditions become unsafe.

Golden rule: If the job cannot be made safe, do not start it. Stop work, isolate the hazard, and obtain competent assistance.

2. Hazards of Gas Cutting

Hazard	Possible consequence	Key control
Fire / hot slag	Ignition of combustibles; burns	Clear/shield combustibles; fire equipment; fire watch where required
Gas leak	Fire, explosion, asphyxiation	Inspect connections; leak-test with approved fluid; ventilate
Flashback	Fire in hose/regulator; cylinder damage	Correct pressures, clean equipment, flashback arresters, competent op
Cylinder failure	Explosion / high-energy release	Secure upright; protect from heat/impact; inspect before use
Fumes	Respiratory irritation or toxic exposure	Ventilation/fume extraction; suitable RPE where required
Radiant heat / sparks	Eye and skin injury	Appropriate eye, face, hand and body protection
Confined-space atmosphere	Fire/explosion/toxic exposure/asphyxiation	Atmospheric testing, ventilation, permit and rescue arrangements

3. Before You Cut: Work-Area Safety

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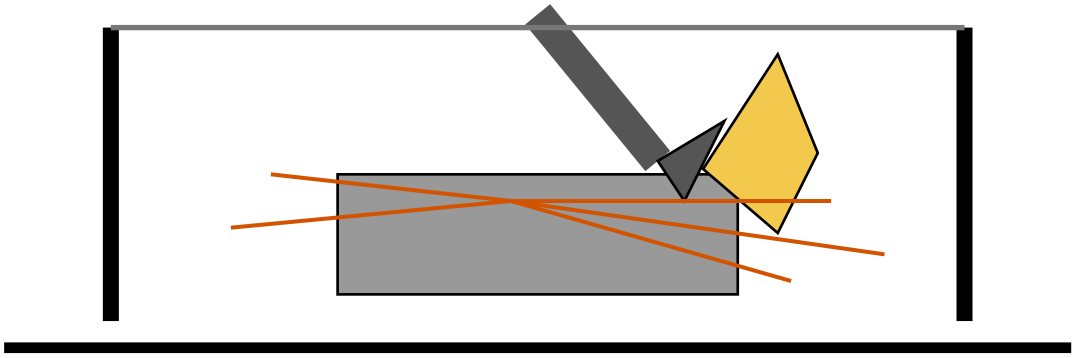


Remove or shield combustibles; keep suitable fire extinguishing equipment ready.

A safe cutting job begins before the torch is lit.

• Use the required hot-work permit / authorization process where applicable.

• Inspect the work area for combustible materials, flammable liquids, gases, dust, coatings and hidden fire paths.

• Move combustibles away from the cutting zone or protect them with suitable fire-resistant barriers.

• Check the opposite side of walls, floors and ceilings for combustible materials or heat transfer risks.

• Keep suitable fire extinguishing equipment immediately available and ready for use.

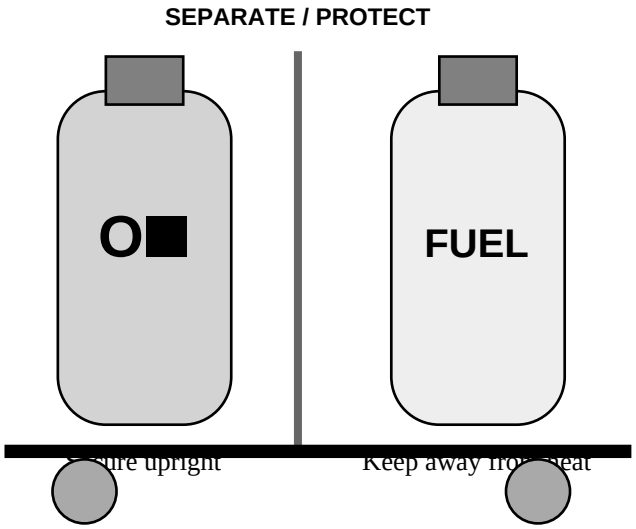
• Provide a fire watch when required by the risk assessment, site procedure or permit; continue monitoring after hot work as required.

• Provide adequate ventilation and assess fumes from coatings, paints, plating or contaminated surfaces.

• For confined/enclosed spaces, follow the site's confined-space entry requirements, including atmospheric testing and ventilation.

Never hot-cut a container, drum, pipe or vessel that may contain flammable or hazardous residues until it has been properly isolated, cleaned, ventilated and tested according to an approved procedure.

4. Cylinders, Regulators & Connections



Cylinder safety

• Keep cylinders upright and secured with a suitable chain, strap, trolley or other approved means.

• Position cylinders where sparks, hot slag and flame cannot reach them; use fire-resistant shielding when necessary.

• Keep oxygen cylinders and fittings free from oil and grease. Do not use oily hands, gloves or tools on oxygen equipment.

• Store and use cylinders in a well-ventilated location and protect them from impact, heat and unauthorized interference.

• Do not use damaged, defective or unidentified cylinders or components.

• Open cylinder valves slowly and use the correct operating method for the gas and equipment.

• Do not use oxygen for cleaning, ventilation or blowing dust from clothing or work areas.

• Use regulators and gauges suitable for the specific gas and service.

Connection and leak checks

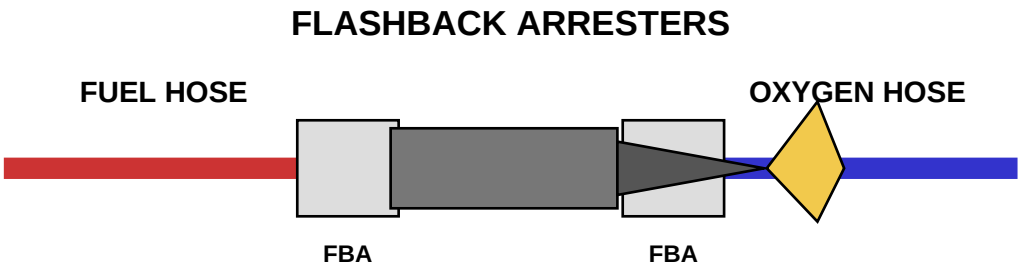
• Inspect hoses, couplings, regulators, torch valves and tips before each shift / use.

• Use approved fittings and hose arrangements; do not improvise connections.

• Leak-test with an approved leak-detection fluid. **Never use a flame to search for a gas leak.**

• Keep hoses away from sharp edges, hot metal, vehicle traffic and pinch points.

5. Hoses, Flashback & Backfire



Install and maintain suitable safety devices; they do not replace safe work practices.

Flashback control

• A flashback is the propagation of flame back into the torch/hose system and can create a serious fire or cylinder hazard.

• Use suitable flashback arresters / flame arresters and non-return devices as specified by the equipment manufacturer and site standard.

• Maintain correct operating pressures and gas flows for the torch and tip.

• Keep tips clean and use the correct tip for the fuel gas and application.

• Do not continue using equipment that has experienced a serious flashback until it has been inspected and declared safe.

• If a flashback occurs, shut off gas supplies if it is safe to do so, evacuate if necessary, and follow the emergency procedure. A cylinder exposed to fire or abnormal heating requires urgent specialist/emergency response.

Backfire vs. flashback

Backfire: a momentary flame/combustion event at the tip, often associated with incorrect adjustment, a blocked/overheated tip, or poor technique. **Flashback:** flame travels into the torch or hose system. Treat abnormal flame events seriously and stop to identify the cause.

6. PPE, Fumes & Ventilation

Protection	Typical requirement
Eyes / face	Suitable cutting goggles or filter protection plus face protection as required by the task
Hands	Heat-resistant leather gloves suitable for hot work
Body	Flame-resistant work clothing; avoid loose or easily ignited garments
Feet	Safety footwear appropriate for hot work and site conditions
Hearing	Hearing protection where noise assessment requires it
Respiratory	Ventilation/fume extraction and RPE where risk assessment requires it

Cutting fumes can be harmful. Contaminants may come from the base metal, coatings, paint, plating, oils or residues. Local exhaust or other ventilation should be selected based on the hazard assessment. Particularly hazardous coatings/metals require specialist controls.

Never assume that an apparently empty tank, drum or pipe is safe to cut. Residual vapour or contamination can ignite or explode.

7. Safe Operating Sequence

Step	Action	Safe practice
1	Plan	Review the job, permit, JSA/risk assessment, equipment requirements and emergency arrangements.
2	Prepare	Clear/shield combustibles, establish barriers, ventilation and fire protection.
3	Inspect	Check cylinders, regulators, hoses, flashback arresters, torch, tip and fittings.
4	Position	Secure cylinders upright and route hoses safely away from heat and traffic.
5	Connect	Use correct fittings and manufacturer-approved setup. Leak-test connections.
6	Set	Set pressures/flows according to the torch and tip manufacturer's instructions.
7	Light & cut	Use an approved ignition device and safe cutting technique. Keep the torch controlled.
8	Monitor	Watch for leaks, abnormal flame, overheating, sparks travelling beyond the work zone or changing cond
9	Shut down	Close supplies, isolate the system and follow the site's hose/regulator depressurization procedure.
10	Inspect	Check the work area for smouldering materials or heat transfer and maintain fire watch as required.

8. Emergency Response

Gas leak

• Stop work and eliminate ignition sources if this can be done safely.

• Close cylinder valves / isolate the supply if safe and trained to do so.

• Ventilate the area where appropriate and evacuate if there is a significant leak or unsafe atmosphere.

• Do not use electrical switches or other ignition sources in an area where flammable gas may be present unless the equipment is suitable and the procedure permits it.

• Report the incident and have the equipment inspected before reuse.

Flashback / fire

• If safe, close the fuel and oxygen supply valves and follow the site's emergency procedure.

• If the fire cannot be controlled immediately, raise the alarm, evacuate and contact emergency response.

• Do not approach a cylinder that is hot, vibrating, or has been exposed to fire. Evacuate and notify emergency responders.

• After an incident, quarantine affected equipment until it has been properly inspected/repaired/replaced.

Burn / eye injury

• Stop work and obtain first aid/medical assistance according to site arrangements.

• For eye injuries, do not rub the eye; use the site's emergency eyewash/medical procedure.

9. Pre-Job Safety Checklist

■ Hot-work permit / authorization completed where required

■ JSA / risk assessment reviewed with the crew

■ Combustibles removed or protected

■ Fire extinguisher / fire protection available

■ Fire watch arranged where required

■ Cylinders upright, secured and protected

■ Oxygen equipment free of oil and grease

■ Hoses, regulators, torch and tips inspected

■ Flashback arresters / safety devices installed as required

■ Connections leak-tested with approved fluid

■ Ventilation / fume control adequate

■ PPE inspected and worn

■ Confined-space controls and atmospheric testing completed where applicable

■ Emergency contacts and evacuation route known

Knowledge Check

1. Why must oxygen fittings be kept free from oil and grease?

2. What is the difference between a backfire and a flashback?

3. How should a suspected gas leak be detected?

4. What should be done with combustibles near a cutting operation?

5. What should you do if an acetylene/fuel-gas cylinder becomes unusually hot or starts vibrating after fire exposure?

6. Why is ventilation important during flame cutting?

7. Name three items to inspect before lighting the torch.

10. Answer Key, References & Course Note

Suggested answers:

• Oil/grease can create a severe fire hazard in oxygen service.

• A backfire is a short combustion event at the tip; a flashback propagates into the torch/hose system and can threaten equipment and cylinders.

• Use an approved leak-testing fluid; never use a flame.

• Remove combustibles or shield them from heat, sparks and slag; use appropriate fire protection.

• Evacuate and contact emergency responders/site emergency personnel; do not approach or handle a heat-affected cylinder unless directed by competent emergency personnel.

• Ventilation removes or controls harmful fumes and gases produced by cutting and contaminated surfaces.

• Examples: cylinders/valves, regulators/gauges, hoses/couplings, flashback arresters, torch valves, tip condition.

Key references used to prepare this course

• U.S. OSHA, 29 CFR 1926.350 — Gas welding and cutting. ■cite-style reference: OSHA requirements include securing cylinders upright, separating oxygen from fuel gas/combustibles in storage, inspecting torches, keeping oxygen equipment free of oil/grease, and using approved ignition devices.

• U.S. OSHA, 29 CFR 1926.352 — Fire prevention. Controls include removing/protecting combustibles, keeping fire extinguishing equipment ready, and applying additional fire-watch precautions when needed.

• U.S. OSHA, Oil & Gas Well Drilling and Servicing eTool — Hot Work. Highlights isolation of fuel/ignition sources, removal of combustibles, ventilation and appropriate PPE.

• UK HSE, INDG297 — Safety in gas welding, cutting and similar processes. Covers flashback protection, fumes, PPE and safe use of portable oxy/fuel equipment.

• UK HSE, HSG139 — Safe use of compressed gases in welding, flame cutting and allied processes. Provides guidance on compressed-gas hazards, standards, safe operations, training, PPE, fire precautions and equipment maintenance.

Important: This training PDF is an awareness/learning aid, not a substitute for hands-on competency training, site-specific procedures, permits, manufacturer instructions, applicable Saudi regulations, or competent supervision. Always follow the stricter applicable requirement.

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