FIRE DEPARTMENT • CITY OF NEW YORK

STUDY MATERIAL FOR THE CERTIFICATE OF FITNESS EXAMINATION FOR USE OF FLAMMABLE GASES WITH OXYGEN OR USE OF LPG/CNG FOR HOT WORK OPERATIONS (CITYWIDE) G-60

This book is provided to the public for free by the FDNY.

All applicants are required to apply and pay for an exam online before arriving at the FDNY. It can take about 30 minutes to complete.

Simplified instructions for online application and payment can be found here:

http://www1.nyc.gov/assets/fdny/downloads/pdf/business/fdny-business-cof-individuals-short.pdf

Create an Account and Log in to:

http://fires.fdnycloud.org/CitizenAccess

Important Code Change:
Any hot work operation, including hot work operations using a flammable gas, with or without oxygen and any hot work operation for torch-applied roofing systems must be personally done by a Certificate of Fitness holder.

TABLE OF CONTENT

EXAM SPECIFIC INFORMATION FOR G-60 CERTIFICATE OF FITNESS

Save time and submit application online!

All applicants are required to apply and pay for an exam online before arriving at the FDNY. It can take about 30 minutes to complete.

Simplified instructions for online application and payment can be found here:

http://www1.nyc.gov/assets/fdny/downloads/pdf/business/fdny-business-cof-individuals-short.pdf

Create an Account and Log in to:

http://fires.fdnycloud.org/CitizenAccess

REQUIREMENTS FOR CERTIFICATE OF FITNESS APPLICATION

General requirements:
Review the General Notice of Exam:
http://www1.nyc.gov/assets/fdny/downloads/pdf/business/general-notice-of-exam-cof.pdf

Special requirements for the G-60 Certificate of Fitness:

The applicants who pass **the G-60 Certificate of Fitness exam are NOT REQUIRED to obtain the G-41 Certificate of Fitness** but are allowed to pay the additional $25 fee to obtain the G-41 Certificate of Fitness (starting from 12/15/15).

Application fee (Cash is NO LONGER ACCEPTED):
Pay the **$25** application fee online or in person by one of the following methods:

- Credit card (*American Express, Discover, MasterCard, or Visa*)
- Debit card (*MasterCard or Visa*)
- In person: Personal or company check or money order (*made payable to the New York City Fire Department)*

A convenience fee of 2% will be applied to all credit card payments.

For fee waivers submit: ***(Only government employees who will use their COF for their work- related responsibilities are eligible for fee waivers.)***

- A letter requesting fee waiver on the Agency's official letterhead stating applicant full name, exam type and address of premises; ***AND***
- Copy of identification card issued by the agency

REQUIREMENTS FOR ALTERNATIVE ISSUANCE PROCEDURE (AIP)

No AIP available. This certificate of fitness can only be obtained by passing the computer exam at the FDNY Headquarters.

EXAM INFORMATION

The **G-60** exam will consist of **35** multiple-choice questions, administered on a "touch screen" computer monitor. It is a time-limit exam. It is a time-limit exam. Based on the amount of the questions, you will have **53 minutes** to complete the test. A passing score of at least 70% is required in order to secure a Certificate of Fitness. Call (718) 999-1988 for additional information and forms.

Please always check for the latest revised booklet at FDNY website before you take the exam.
http://www1.nyc.gov/assets/fdny/downloads/pdf/business/cof-g60-noe-study-materials.pdf

Exam site: **FDNY Headquarters,** 9 MetroTech Center, Brooklyn, NY. Enter through the **Flatbush Avenue entrance (between Myrtle Avenue and Tech Place)**.

RENEWAL REQUIREMENTS

General renewal requirements:
Review the General Notice of Exam:
http://www1.nyc.gov/assets/fdny/downloads/pdf/business/general-notice-of-exam-cof.pdf

Special renewal requirements for G-60 COF: None

The FDNY strongly recommends the G-60 COF holders to renew the COF on-line. To learn the simplified on-line renewal:
http://www1.nyc.gov/assets/fdny/downloads/pdf/business/cof-simplified-renewal-short.pdf

QUESTIONS?

FDNY Business Support Team: For questions, call 311 and ask for the FDNY Customer Service Center or send an email to FDNY.BusinessSupport@fdny.nyc.gov

STUDY MATERIAL AND TEST DECRIPTION

About the Study Material

This study material will help you prepare for the examination for the Certificate of Fitness for torch use of flammable gases. The study material includes information taken from the Fire Prevention Code of the Bureau of Fire Prevention. This study material consists of 5 parts. The exam covers the entire booklet and any tables.

Special material provided during the exam: Study Material and booklets are not allowed to be used during the exam. If required for exam, Reference Material will be provided to you by Exam room personnel. Exam computer station will also prompt if reference material is required for your exam.

It is critical that you read and understand this booklet to help increase your chance of passing this exam. The study material does not contain all of the information you need to know to work with a torch. It is your responsibility to become familiar with all applicable rules and regulations of the City of New York, even if they are not covered in this study material. You need to be familiar with the National Fire Protection Association (NFPA) 51B, and Fire Code Chapter 26, Chapter 35, and Chapter 38 which regulate the torch use of flammable gases in order to adequately prepare for the exam.

About the Test

The G-60 exam consists of **35** multiple-choice questions, administered on a "touch screen" computer monitor. It is a time-limit exam. Based on the amount of the questions and reference material provided, you will have **53** minutes to complete the test. A passing score of at least 70% is required in order to secure a Certificate of Fitness. Read each question carefully before marking your answer. There is no penalty for guessing.

Sample Questions

The following questions represent the "format" of the exam questions, not the content of the real exam.

1. Which of the following are allowed to be used/displayed while taking a Certificate of Fitness examination at 9 Metro Tech Center?

I. cellular phone
II. study material booklet
III. reference material provided by the FDNY
IV. mp3 player

A. III only
B. I, II, and III
C. II and IV
D. I only

Only reference material provided by the FDNY is allowed to be used during Certificate of Fitness examinations. Therefore, the correct answer would be A. You would touch "A" on the computer terminal screen.

2. If you do not know the answer to a question while taking an examination, who should you ask for help?

A. the person next to you
B. the firefighters
C. the examiner in the testing room
D. you should not ask about test questions since FDNY staff can not assist applicants

You should not ask about examination questions or answers since FDNY staff cannot assist applicants with their tests. Therefore, the correct answer would be D. You would touch "D" on the computer terminal screen.

3. If the screen on your computer terminal freezes during your examination, who should you ask for help?

A. the person next to you
B. the firefighters
C. the examiner in the testing room
D. the computer help desk

If you have a computer related question, you should ask the examiner in the testing room. Therefore, the correct answer would be C. You would touch "C" on the computer terminal screen.

INTRODUCTION

This document outlines New York City Fire Department regulations for welding, cutting and other torch and hot work operations and equipment. Hot work processes are a necessary part of much construction work and industrial work. However, the improper use is often a major cause of fire, and it can result in loss of life and property.

Certificate of Fitness

According to the Fire Code, a Certificate of Fitness is needed for connecting and disconnecting of LPG containers with a capacity equal to or greater than 16.4 oz or CNG containers with a capacity greater than 8.7 SCF.

When such connecting and disconnecting is performed by a LPG/CNG supplier or distributor, a card or tag must be conspicuously posted at the premises identifying the:

- name and address of the supplier or distributor
- name of the Certificate of Fitness holder,
- number and expiration date of the Certificate of Fitness.

Important Code Change:
Any hot work operation, including hot work operations using a flammable gas, with or without oxygen and any hot work operation for torch-applied roofing systems must be personally done by a Certificate of Fitness holder.

In addition, the following torch operation must be conducted by a qualified Certificate of Fitness:

Operation	Connecting to oxygen container?	Qualified Certificate of Fitness
LPG/CNG Torch operation for torch-applied roof systems	No	G-41, G-42 or G-60
Use of LPG/CNG for asphalt melter	No	G-40, G-42
Use of oxygen and flammable gases or LPG or CNG for any hot work operation	Yes	G-60
Use of oxygen and piped natural gas for hot work operation in jewelry manufacturers and dental lab facilities	Yes	G-61

The Certificate of Fitness holder must keep the Certificates of Fitness upon his or her person or otherwise readily available for inspection by any representative of the Department, at all times while conducting or supervising the material, operation or facility for which the certificate is required.

FDNY Permits

Permits issued by the FDNY are required to conduct the following hot work:

(1) storing, using or handling a flammable gas with oxygen
or
(2) storing, using or handling any flammable gas (e.g. LPG or CNG or acetylene) in excess of 400 SCF.
or
(3) storing, using or handling any oxidizing gas (e.g. oxygen) in excess of 504 SCF (CDA will find out correct SCF)
(4) ARC (electric arc welding) is for any site that needs a Department of Buildings work permit.
(5) use of a flammable gas without oxygen at a construction site where a Department of Buildings work permit is required
(6) use of any open flame in a torch-applied roofing system
(7) public demonstration of hot work, other than in an accredited educational institution or program

For LPG, 400 SCF is approximately 47 lbs. The following table lists the number of LPG containers for the storage, use, handling or transportation, requiring a permit. This permit will be issued by the Fire Commissioner after the location has been inspected and approved as acceptable for such practices.

LPG Container Capacity	Number of Containers Requiring Permit
14.1 oz	54 (23 cylinders on construction sites)
16.4 oz	46 (20 cylinders on construction sites)
20 lbs. (on construction site only).	1
33.5 lbs.	2
40 lbs.	2
100 lbs. (for construction site only)	1

Portable **LPG** containers with a capacity greater than **16.4 oz** and **CNG** containers with a capacity greater than **8.7 SCF** must **NOT** be stored, handled, or used indoors in the following occupancies (as mentioned in the building code):

- residential
- factory and industrial
- educational
- and institutional

except as the commissioner may authorize by rule.

Use of LPG/Propane on an occupied roof requires an affidavit from a licensed professional (Architect or Engineer) stating the roof is constructed of non-combustible material(s).

Any single standard portable LPG container must not exceed 100 lbs. in weight.

Any single CNG container must not exceed 381 SCF.

A LPG/CNG permit will not be issued by the FDNY for a stationary LPG/CNG installation located in an area where access to piped natural gas from a public utility is available.

Example of LPG container with a capacity of 20 lbs	Example of LPG container with a capacity of 100 lbs
	

Types of FDNY Permits

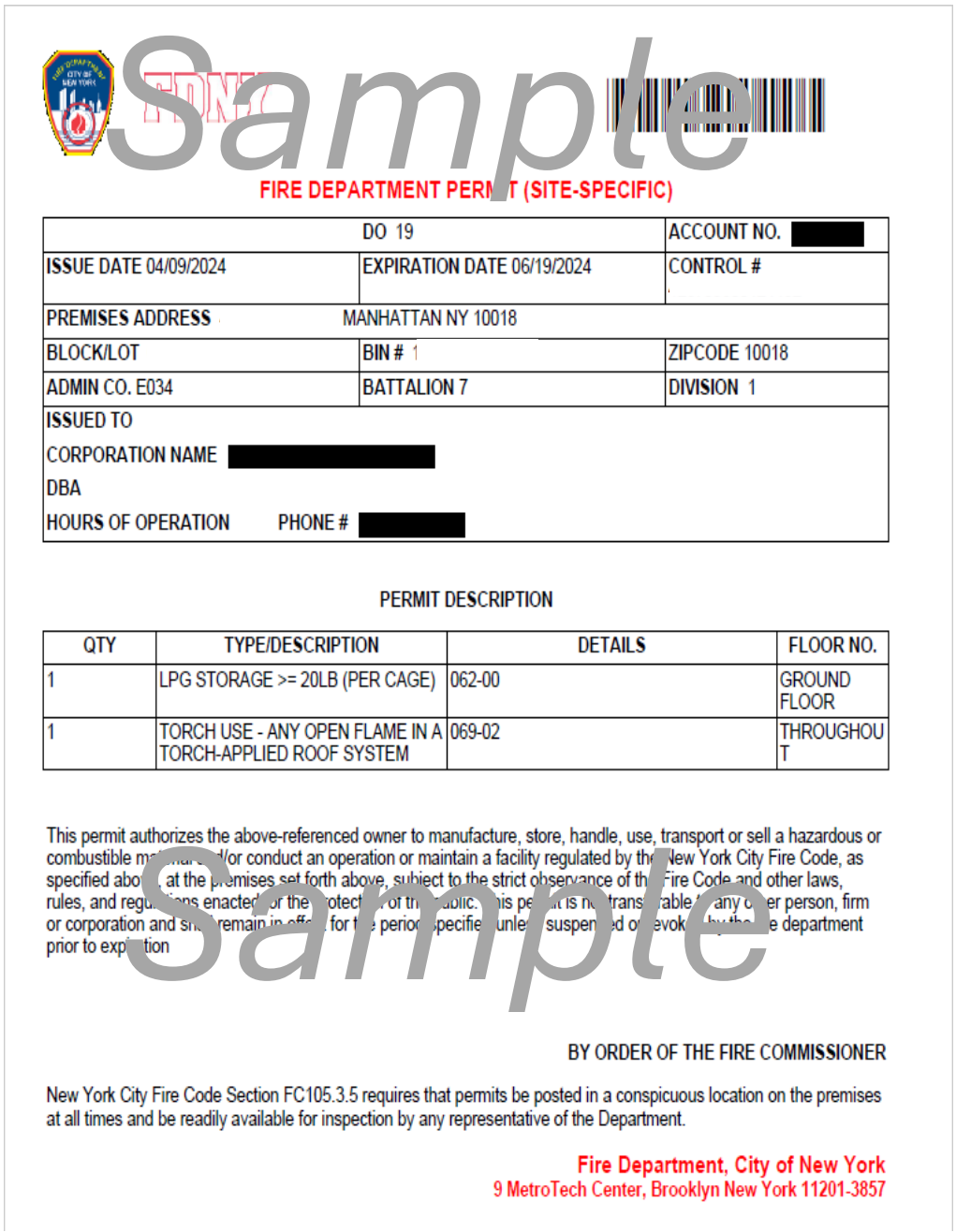
(1) Site-specific permit
This permit allows the permit holder to store, handle, or use flammable gases, to conduct a torch operation at a specific premises or location. A site-specific permit may be permanent or temporary.

All permits are valid for a maximum of 12 months. Every permit or renewal requires an inspection and will expire after twelve months.

Temporary permits may be valid from one day to 12 months depending on the construction or operational need.

For example, a temporary permit could be issued to a construction site and is valid until the Department of Buildings permit expires which can vary. A hot work operation (e.g. construction site or hot work repair) is issued a temporary permit.

Example of a permanent FDNY permit



FDNY

Sample

FIRE DEPARTMENT PERMIT (SITE-SPECIFIC)

	DO 19	ACCOUNT NO. [redacted]
ISSUE DATE 04/09/2024	EXPIRATION DATE 06/19/2024	CONTROL #
PREMISES ADDRESS	MANHATTAN NY 10018	
BLOCK/LOT	BIN # 1	ZIPCODE 10018
ADMIN CO. E034	BATTALION 7	DIVISION 1
ISSUED TO CORPORATION NAME [redacted] DBA HOURS OF OPERATION PHONE # [redacted]		

PERMIT DESCRIPTION

QTY	TYPE/DESCRIPTION	DETAILS	FLOOR NO.
1	LPG STORAGE >= 20LB (PER CAGE)	062-00	GROUND FLOOR
1	TORCH USE - ANY OPEN FLAME IN A TORCH-APPLIED ROOF SYSTEM	069-02	THROUGHOUT

This permit authorizes the above-referenced owner to manufacture, store, handle, use, transport or sell a hazardous or combustible material and/or conduct an operation or maintain a facility regulated by the New York City Fire Code, as specified above at the premises set forth above, subject to the strict observance of the Fire Code and other laws, rules, and regulations enacted for the protection of the public. This permit is not transferable to any other person, firm or corporation and shall remain in effect for the period specified unless suspended or revoked by the department prior to expiration

Sample

BY ORDER OF THE FIRE COMMISSIONER

New York City Fire Code Section FC105.3.5 requires that permits be posted in a conspicuous location on the premises at all times and be readily available for inspection by any representative of the Department.

Fire Department, City of New York
9 MetroTech Center, Brooklyn New York 11201-3857

(2) Citywide permit
Such permit authorizes the permit holder to store, handle, use or sell hazardous materials, or conduct an operation on a citywide basis. A citywide permit is valid to temporarily store, handle, use or sell hazardous materials or to conduct an operation at one or more locations subject to the following restrictions:

- The duration of such activity at any individual location does not exceed **30 calendar days** and **all hazardous materials associated with such activity are removed from the location at the end of the workday**. Periods of activity in excess of 30 calendar days at any one location must require a site-specific permit.
- The quantity of hazardous materials being temporarily stored and used does not exceed 5 gallons of gasoline, or 250 gallons of any other flammable liquid, and 300 gallons of any combustible liquid. Storage or use of hazardous materials in quantities exceeding these amounts requires a site-specific permit for each location at which such storage or use occurs.

All permits are not transferable, and any change in occupancy, operation, tenancy or ownership requires that a new permit be issued. The Certificate of Fitness holder is responsible for making sure that all fire safety regulations and procedures are obeyed on the premises. **Permits must be readily available on the premise for inspection by Fire Department representatives.**

Hot Work Program Authorization
A hot work program authorization is required for any project conducted on premises involving hot work operations. Hot work program authorization is NOT issued by the FDNY, it must be signed and issued by the **responsible person**, and it must be available for inspection by any representative of the Fire Department during the performance of the work, and for **48 hours after the work is complete**.

An authorization for hot work operations must not be issued unless the individuals conducting such operations are capable of performing such operations safely.

The operation of gas torches is required to comply with the following FDNY code and rule sections:

- Fire Safety During Construction, Alteration and Demolition: [**FC Chapter 33**]
- Welding and Other Hot Work: **[FC Chapter 35]**
- Flammable Gases: **[FC Chapter 58]**
- Liquefied petroleum gases: **[FC Chapter 61]**
- Fire Prevention During Welding, Cutting and Other Hot Work: **[NFPA 51B, 2013 edition]**
- Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning or Repair" [**NFPA 326**]
- Use of Oxygen and a Flammable Gas in Citywide Hot Work Operations **[Rule 3505-01]**
- Piped Natural Gas and Oxygen Consuming Devices and Installations **[Rule 3509-01]**
- Liquefied Petroleum Gases **[Rule 6109-01]**
- Hot work in Repair Garages [**Rule 3504-01**]

HOT WORK PROGRAM AUTHORIZATION

This authorization is required for any project conducted on premises involving hot work operations. Hot work operation includes cutting, welding, thermit welding, brazing, soldering, grinding, thermal spraying, thawing pipe, cadwelding, installation of torch-applied roof systems or any other similar operation or activity.

An authorization for hot work operations must not be issued unless the individuals conducting such operations are capable of performing such operations safely.

This authorization must be available for inspection by any FDNY representative during the performance of the work and for 48 hours after the work is complete.

Date:	Hot work by ☐ employee ☐ contractor
Location: Building address, room # and/or area of work: _____ _____	Work to be done _____ _____
Time started _____ Time completed _____ **THIS AUTHORIZATION GOOD FOR ONE DAY ONLY**	I verify that the above location has been examined, the pre-hot work checks marked on the checklist below have been taken and permission is granted for this work. Name (print) and signature of the responsible person: _____

◯ The hot work equipment is in good working order.

The hot work area is clear of combustibles and flammable solids:
(35 Feet rule for cutting or welding operation; 25 feet rule for other hot work operation)

◯ Any container or equipment that contains or has contained a flammable solid, flammable liquid or flammable gas is removed.
◯ Explosive atmosphere in area eliminated
◯ Any combustible material and combustible waste is removed or be provided with appropriate shielding.

◯ Exposed construction is of noncombustible materials or, if combustible, is protected.

◯ Openings are protected.

◯ Hot work area floors are clear of combustible waste accumulation.

◯ Fire watch personnel, where required, are assigned.

Fire guard (Name and signature) : _____ Cof # _____ Exp Date:_____

Approved actions have been taken to prevent accidental activation of fire extinguishing systems and detection equipment.

◯ Available sprinklers are in service and operable. Sprinkler system protection must not be shut off or impaired.
◯ Approved precautionary measures must be taken to avoid accidental operation of automatic fire detection systems.
◯ Portable fire extinguishers and fire hoses (where provided) are operable and available.

◯ All persons performing hot work possess certificates of fitness, where such certificates are required

Torch operator (Name and signature) _____ Cof # _____ Exp Date:_____

◯ All persons performing hot work requiring a permit possess a FDNY permit, authorizing such work.

Final Check

◯ Work area and all adjacent areas to which sparks and heat might have spread were inspected 30 minutes after the work was completed and were found fire safe.

Fire guard (Name and signature) : _____ Cof # _____ Exp Date:_____

◯ Second inspection for torch operation using LPG/CNG: work area and all adjacent areas were inspected 1 hour after the work was completed and were found fire safe.

Fire guard (Name and signature) : _____ Cof # _____ Exp Date:_____

DEFINITIONS

ASPHALT MELTER. An approved device designed to heat asphalt, typically for waterproofing operations, that, utilizing a flammable gas or a combustible liquid, generates an enclosed flame that indirectly heats a vessel containing the asphalt.

CERTIFICATE OF FITNESS. A written statement issued by the commissioner certifying that the person to whom it is issued has passed an examination as to his or her qualifications or is otherwise deemed qualified to perform one or more of the following duties, for which such certificate is required by this code or the rules: supervise a facility; conduct or supervise an operation; supervise the storage, handling and/or use of a material; or conduct or supervise emergency planning and preparedness activities.

COMPRESSED GAS. A material, or mixture of materials, that is a gas at 68°F (20°C) or less at 14.7 psia (101 kPa) of pressure; and has a boiling point of 68°F (20°C) or less at 14.7 psia (101kPa) that is either liquefied, non-liquefied or in solution at that temperature and pressure, except that gases which have no other health-or physical-hazard properties are not considered to be compressed until the pressure in the packaging exceeds 41 psia (282 kPa) at 68°F (20°C).

Compressed gases must be classified as follows:

Compressed gases in solution. Non-liquefied gases that are dissolved in a solvent.

Compressed gas mixtures. A mixture of two or more compressed gases contained in a
single packaging, the hazard properties of which are represented by the properties of the mixture as a whole.

Liquefied compressed gases. Gases that, in a packaging under the charged pressure, are partially liquid at a temperature of 68°F (20°C).

Non-liquefied compressed gases. Gases, other than those in solution, that are in a packaging under the charged pressure and are entirely gaseous at a temperature of 68°F (20°C).

COMPRESSED GAS CONTAINER. A pressure container designed to hold compressed gases at pressures greater than one atmosphere at 68°F (20°C).

CNG: Compressed Natural Gas.

CONSTRUCTION SITE. Any location at which a building, structure, premises or facility is undergoing construction, alteration or demolition.

FIRE GUARD: A person holding a Certificate of Fitness for such purposes, who is trained in and responsible for maintaining a fire watch and performing such fire safety duties as may be prescribed by the commissioner.

FIRE WATCH: A temporary measure intended to ensure continuous and systematic surveillance of a building or portion thereof by one or more qualified individuals for the

purposes of identifying and controlling fire hazards, detecting early signs of fire, raising an alarm of fire, and notifying the department.

GENERAL SUPERVISION. Supervision by the holder of any department certificate who is responsible for performing the duties OF A Certificate holder but need not be personally present on the premises at all times.

HOT WORK: Cutting, welding, thermit welding, brazing, soldering, grinding, thermal spraying, thawing pipe, cadwelding, installation of torch-applied system, or any other similar operation or activity.

HOT WORK AREA: The area exposed to sparks, hot slag, radiant heat, or convective heat as a result of hot work.

HOT WORK EQUIPMENT. Electric or gas welding or cutting equipment used for hot work.

HOT WORK PROGRAM. A program, implemented by a responsible person designated by the owner of a building or structure in or on which hot work is being performed, to oversee and issue authorizations for such hot work for the purpose of preventing fire and fire spread.

HOT WORK PROGRAM AUTHORIZATIONS. Authorizations issued by the responsible person under a hot work program allowing welding or other hot work to be performed at the premises.

LPG: (Liquefied Petroleum Gases) A material which is composed predominantly of the following hydrocarbons or mixtures of them: propane, propylene, butane (normal butane or isobutane) and butylenes. Methylacetylene-propadiene mixtures (MAPP-gas) must be deemed to be an LPG.

NFPA: National Fire Protection Association. NFPA develops, publishes, and disseminates more than 300 consensus codes and standards intended to minimize the possibility and effects of fire and other risks.

PERSONAL SUPERVISION. Supervision by the holder of any department certificate who is required to be personally present on the premises, or other proximate location acceptable to the department, while performing the duties for which the certificate is required.

RESPONSIBLE PERSON: A person trained in the fire safety hazards associated with hot work, and in the necessary and appropriate measures to minimize those hazards, who is designated by the owner of a premises to authorize the performance of hot work at the premises.

SCF: (Standard Cubic Feet) Cubic feet of gas at normal temperature and pressure (NTP).

TORCH-APPLIED ROOF SYSTEM: Bituminous roofing systems using membranes that are adhered by heating with a torch and melting asphalt back coating instead of mopping hot asphalt for adhesion.

PART 1. TORCH (HOT WORK) OPERATION

The way a torch is used for Hot work operations is a gas mixture that is manually ignited by the operator as it leaves the torch. The flame itself can reach extremely high temperatures. A high temperature flame is needed to heat the metal.

Majority of the time, it is not the flame that causes a fire. Instead, **it is the thousands of sparks and slag that are generated when using the torch**. The sparks and slag are the sources of ignition in about 60% of all fires in industrial occupancies. This number is greatly reduced when the operators are trained to use the equipment correctly and there are fireguards/watches around to make sure that there is no stray sparks or slag.

A **fire guard** is a person who oversees torch operations. This fire guard or watch makes sure that sparks and slags do not cause a fire in the area of hot work or the floor below. A **portable extinguisher must be within immediate reach to extinguish any potential fires.**

Torch Fire History

Structure Fires Started by Hot Work, by Equipment Involved in Ignition
2010-2014 Annual Averages

Equipment Involved	Fires		Civilian Deaths		Civilian Injuries		Dollar Loss (in millions)	
Welding torch.	1,510	(34%)	8	(63%)	97	(47%)	$115	(40%)
Cutting torch	1,090	(24%)	3	(24%)	38	(18%)	$72	(25%)
Soldering equipment	790	(18%)	0	(0%)	7	(3%)	$20	(7%)
Burner	510	(11%)	2	(13%)	34	(16%)	$30	(11%)
Heat treating equipment	500	(11%)	0	(0%)	31	(15%)	$47	(16%)
Tar pot or tar kettle	40	(1%)	0	(0%)	0	(0%)	$2	(1%)
Power nail gun, stud driver or stapler	10	(0%)	0	(0%)	0	(0%)	$0	(0%)
Total	4,440	(100%)	12	(100%)	208	(100%)	$287	(100%)

The development and popular use of torching down modified roofing began in the early 1980's. Torching rolls of modified bitumen resulted in instant adherence of this waterproof membrane layer, so that installation became quick and easy.

May 10, 1999, a disaster led to the immediate adoption and implementation of rules and code for the use of torches in NYC. Roofers were using propane torches to install modified roofing started a 3-alarm fire that destroyed 30 apartments at 327 West 30th Street in Manhattan, leaving those residents homeless. The operator of the torch and the owner of the roofing company were arrested for reckless endangerment of property.

It looks like a contractor was using a torch improperly, fled the scene and lacked the proper permits for the job.

More than 70% of all co-ops with flat roofs in New York have wood decks and are affected by this code change. Studies showed that between 1994 and 1998, there was an average of 35 roof fires per year. During that time, a well-publicized roof fire also burned down an entire shopping center in the Midwest.

Contractor using illegal torch sparked massive NYC blaze
December 2023
Sunnyside Queens

A contractor illegally using a torch to burn lead paint off a metal door started a massive fire in a Queens apartment building. The worker tried to remove plaster from around the frame when he noticed smoke but then soon spotted small flames on the wood studs and attempted to extinguish it with a bucket of water. The blaze had already extended into the walls and traveled to the attic causing it to spread across the roof. The fire injured 14 people and displaced 160 residents. Eight civilians, four firefighters and two police officers suffered non-life-threatening injuries.

Borough Park building fire caused by 'illegal use of torch'
March 2024
Borough Park, Brooklyn

A massive fire was caused by the use of an illegal torch on a combustible roof.

The FDNY put out a fire that tore through a Borough Park building.

Over 100 firefighters and EMS personnel responded to the fire at the three-story building.

One civilian suffered an injury but is expected to be OK. Sources at the scene say that there was roof work being done at the building and that a roofer was the one who got injured.

Cutting torch causes fire just outside Camden city limits
October 20, 2024
Camden, Arkansas

The fire was reported as being started when someone was using a cutting torch to cut up an old mobile home for scrap.

Initial calls reported the fire as being a woods fire, but was then reported as a structure fire. Camden firefighters were able to contain the fire and wet down the area of woods enough to keep it contained.

There were no reports of injuries from this fire.

Lessons Learned:

- **Always** make sure proper permits and/or Certificate of Fitness is available to perform the work.
- **Always** have a fire guard watching for sparks and slag.
- **Always** have proper fire extinguishers or charged water line to assist in putting out fire.

1.1. Approved Location and Restricted Areas

1.1.1. Hot Work Approved Areas

Hot work may be conducted in the following areas:

1. Areas designed for hot work operations (e.g. jewelry factory).
2. Areas authorized for that purpose by the responsible person at the premises when precautions have been taken in compliance with the requirements of Fire Code (e.g. areas with hot work authorization).

1.1.2. Restricted Hot Work Areas

Hot work must not be conducted in the following areas:

1. Areas where the sprinkler system is impaired. (Exception: On construction sites as long as all precautions have been taken in compliance with the requirements of the Fire Code.)

2. Areas where the standpipe system is impaired. (Exception: Below 75 feet on construction sites as long as all precautions have been taken in compliance with the requirements of the Fire Code.)
3. Areas where there exists the potential for an explosive atmosphere, such as locations where flammable gases, liquids or vapors are present.
4. Areas with readily ignitable materials, such as storage of large quantities of bulk sulfur, baled paper, cotton, lint, dust or loose combustible materials.
5. On board marine vessels or watercraft at a dock that is under construction or repair.

1.1.3 Prohibitions for LPG and CNG

LPG Prohibitions and Exceptions

Description	LPG	Exception
Store, handle or use it in a basement, cellar or other **below grade area**	Prohibited	Emergency indoor Repairs (except in an occupied place of public assembly), manhole operation
Store, handle or use it in, or bring it or allow it into, any residential occupancy, or on any lot containing a building used for a residential occupancy, or any non-residential building	Prohibited for any LPG container with a capacity greater than 16.4 ounces	Emergency indoor Repairs (except in an occupied place of public assembly)
Store the containers on the **roof** of any building	Prohibited	
Handle or use it on the **roof** of any building	Prohibited for any LPG containers with a capacity greater than 16.4 ounces.	Emergency indoor Repairs (except in an occupied place of public assembly)/Asphalt melter
Store, handle or use it in or on **motor vehicles**	Prohibited	Temporary storage incidental to transportation, or as a fuel for generating motive power for a motor vehicle
Store, handle or use it for a stationary installation in any area where access to **piped natural gas** from a public utility is available, except as authorized by the commissioner.	Prohibited	
Store, handle or use it for **space heating or water heating**	Prohibited	Residentially occupied moored vessels
Use **non-metallic pipe**, tubing and components	Prohibited	Construction sites, emergency indoor repairs, manhole operations
Dispense LPG/CNG, fill a container with LPG/CNG, or transfer LPG/CNG from one container to another	Prohibited	

CNG Prohibitions and Exceptions

Description	CNG	Exception
Store, handle or use it in a basement, cellar or other **below grade area**	Prohibited	Emergency indoor Repairs (except in an occupied place of public assembly), manhole operation
Store, handle or use it in, or bring it or allow it into, any residential occupancy, or on any lot containing a building used for a residential occupancy, or any non-residential building	Prohibited for any CNG container with a capacity greater than 8.7 SCF	Emergency indoor Repairs (except in an occupied place of public assembly)
Store the containers on the **roof** of any building	Prohibited	
Handle or use it on the **roof** of any building	Prohibited for any CNG containers with a capacity greater than 8.7 SCF	Emergency indoor Repairs (except in an occupied place of public assembly)/ Asphalt melter.
Store, handle or use it in or on **motor vehicles**	Prohibited	Temporary storage incidental to transportation, or as a fuel for generating motive power for a motor vehicle
Store, handle or use it for a stationary installation in any area where access to **piped natural gas** from a public utility is available, except as authorized by the commissioner.	Prohibited	
Store, handle or use it for **space heating or water heating**	Prohibited	Residentially occupied moored vessels
Use **non-metallic pipe**, tubing and components	Prohibited	Construction sites, emergency indoor repairs, manhole operations
Dispense LPG/CNG, fill a container with LPG/CNG, or transfer LPG/CNG from one container to another	Prohibited	Fill the permanently mounted CNG containers on CNG-powered vehicles

1.2 Responsible Person and Pre-Hot Work Check

For hot work operation with citywide permit, the owner of the premises of the hot work operation areas must be notified in writing by the citywide permit holder **at least 48 hours before** the hot work begins.

For all hot work operations, the owner of the hot work operation areas must make sure that there is a Certificate of Fitness holder that will be the designated responsible person. The COF holder must ensure that the hot work is performed in compliance with the terms and conditions of the permit. The person should inspect the hot work site prior to issuing the hot work program authorization to ensure that it is a fire safe area. He/she also need to periodically monitor the work as it is being performed to ensure there are no fire safety hazards. Hot work operations must be conducted under the personal supervision of the Certificate of Fitness Holder.

Before hot work is authorized and **at least once per day** while the hot work authorization is in effect, there must be a **pre-hot work check** to ensure that it is a fire safe area.

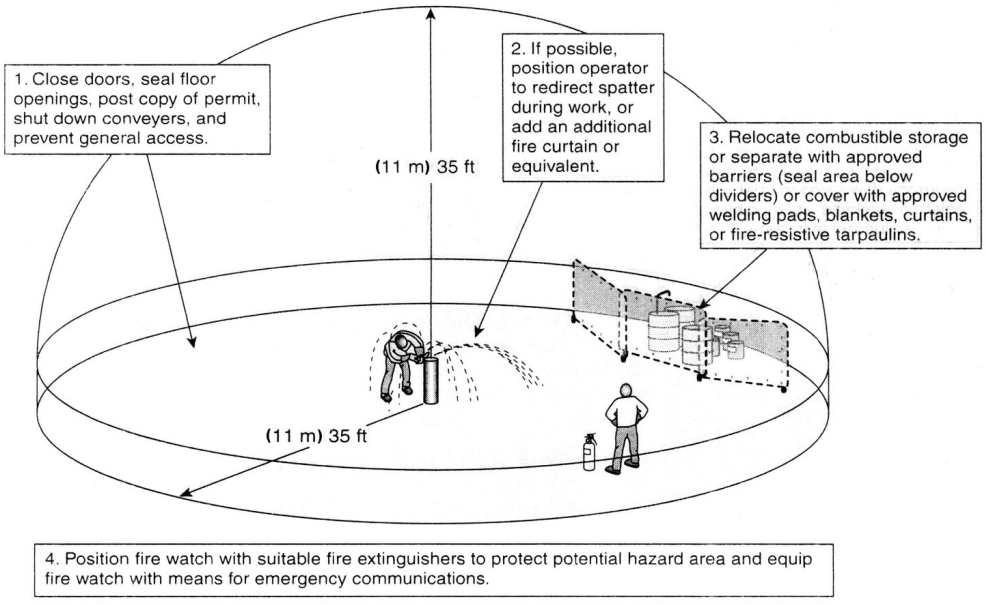
The check reports must be kept at the work site during the work, made available for inspection by a representative of the FDNY, and **maintained on the premises for a minimum of 48 hours after work is complete**.

The daily pre-hot work must verify the following:

1. The hot work equipment is in good working order.

2. The hot work area is clear of combustibles and flammable solids.
   - 35 feet rule for cutting or welding operation

   Hot work operations involving cutting or welding must be conducted at least 35 feet from combustible materials and combustible waste or must be provided with appropriate shielding to prevent sparks, slag or heat from igniting exposed combustibles.



- 25 feet rule for other hot work operation

All other hot work operations must be conducted at least 25 feet from combustible materials and combustible waste or must be provided with appropriate shielding to prevent sparks, slag or heat from igniting exposed combustibles.

3. Exposed construction is of noncombustible materials or, if combustible, is protected.

4. Openings are protected.

5. Hot work area floors are clear of combustible waste accumulation.

6. Fire watch personnel, where required, are assigned.

7. Approved actions have been taken to prevent accidental activation of fire extinguishing systems and detection equipment.

   - Sprinkler protection.

   Sprinkler system protection **must not be shut off or impaired** while hot work is performed. Where hot work is performed close to sprinklers, noncombustible barriers or damp cloth guards must be used to shield the individual sprinkler heads and be removed when the work is completed. If the work extends over several days, the shields have to be removed at the end of each workday.

   - Fire detection systems.

   Approved precautionary measures must be taken to avoid accidental operation of automatic fire detection systems. For example, the fire alarm system (e.g. smoke detectors) may need to be taken out of service during the hot work operation to avoid unwarranted alarms. The date and time the alarm system was taken off-line, the reason for such action, the name and operator number of the person notified at the central station (or other evidence of notification satisfactory to the Department), and the date and time the system was restored to service, must be entered in the alarm logbook in each such circumstance. Fire watch for impairment must be provided when the alarm system is off-line.

8. Portable fire extinguishers and fire hoses (where provided) are operable and available.

9. All persons performing hot work possess certificates of fitness, where such certificates are required.
   - G-60 certificates of fitness is required for torch operations using oxygen, a flammable gas, and torch applied roof system
   - G-61 certificates of fitness is required for torch operations in jewelry factory or dental lab.
   - F-60 certificates of fitness fire guard is required to perform the fire watch for torch operations and/or electric ARC welding at:
     - construction sites
     - on any rooftop
     - in any building or structure, when the hot work operation is conducted by a person holding a citywide permit for torch operations.
10. All persons performing hot work requiring a permit possess a site-specific permit or citywide permit, authorizing such work.

1.3 Fire Safety Requirements

1.3.1 Gas Torch Operation Precautions

Each person must operate only one torch at a time and such torch must not be left unattended while ignited.

The torch equipment should only be used for purposes for which it was intended. It should not be used for any kind of tricks or stunts. This could result in serious or fatal injuries.

1.3.2 Electric ARC Welding Precautions

All electric cables should be properly grounded. They must also not pose a tripping hazard. These cables must not obstruct any means of egress.

Eye protection should be provided and available to anyone in the vicinity of where the operations are being conducted. (PPE, welding screen)

Whenever practicable all ARC welding operations must be shielded by non-combustible or flame-proof screens which protect employees and other persons in the area from direct rays of the ARC.

When the ARC welder has to leave the area or stop operations for any length of time the power supply to the ARC welder must be switched off.

1.3.3 Protection of Combustibles

Areas designed for hot work operations must have floors with noncombustible surfaces. Paper, wood shavings, straw and fabric are examples of combustible materials. Hot work operations involving cutting or welding must be conducted at least 35 feet from combustible materials and combustible waste or must be provided with appropriate shielding to prevent sparks, slag or heat from igniting exposed combustibles.

All other hot work operations must be conducted at least 25 feet from combustible materials and combustible waste or must be provided with appropriate shielding to prevent sparks, slag or heat from igniting exposed combustibles.

Combustible waste must not be allowed to accumulate on floors and other surfaces within the hot work area. Hot work areas must be regularly cleaned and combustible waste removed and disposed of properly.

Combustible materials should be moved to a safe location. If relocation of the combustible materials is not possible, combustibles, openings or cracks in walls, floors, ducts or shafts within 35 feet of the hot work area must be tightly covered to prevent the passage of sparks or slag to adjacent combustible areas, or shielded by metal or fire-retardant guards, or provided with curtains. They may also be wetted down as an added precaution.

Ducts and conveyor systems that might carry sparks to distant combustibles must be shielded, or shut down, or both. If hot work is done near walls, partitions, ceilings, or roofs, ignition of combustibles on the other side must be prevented.

It is unsafe and illegal to perform welding or cutting when supported by or resting on any compressed gas containers. Hot work must not be performed on a container or equipment that contains or has contained a flammable solid, flammable liquid or flammable gas until

the container or equipment has been thoroughly cleaned and purged. Hot work involving cutting, welding or heating of any flammable solid in any form must be conducted only with an approval of the FDNY.

Hot work involving cutting, welding or heating of any flammable solid in any form must be conducted only with an approval of the FDNY.

Partitions segregating hot work areas from other areas of the building must be made of noncombustible construction. In fixed hot work areas, the partitions must be securely connected to the floor such that no gap exists between the floor and the partition. Partitions can help prevent the passage of sparks, slag, and heat from the hot work area.

Special requirement for a repair garage:
The use of a torch within a repair garage located on a property upon which a motor-fuel dispensing facility is situated must be conducted within a fire-rated enclosure (approved by the Building Department). All doors of such enclosure must be fireproof and self-closing.

In a repair garage with a capacity for more than one vehicle, hot work must be completed in a fire-rated enclosure or behind a noncombustible screen that is positioned and of sufficient size to prevent the passage of sparks, slag and heat from the hot work area.

1.3.4 Signage

Where the hot work area is accessible to persons other than the operator of the hot work equipment, visible hazard identification signs must be posted in a conspicuous location to warn others before they enter the hot work area. An example warning sign is shown below.

A copy of the FDNY permit and hot work authorization should be readily accessible for inspection. Copies of completed permits will be maintained in the project files.

All hot work authorizations must be returned to the responsible person upon completion of work for the day to confirm that work in the area has been concluded. This returned authorization must be filed with the FDNY hot work permit section with the appropriate original.

1.4 Fire Watch Requirements

1.4.1 Fire watch

A fire watch must be maintained during any hot work operation. The fire watch must observe the entire hot work area. Hot work conducted in areas with vertical or horizontal fire exposures that are not observable by a single individual must have additional personnel assigned to ensure that exposed areas are monitored.

Persons conducting a fire watch has to keep constant watch for fires with respect to the areas being monitored in connection with hot work operations. **The persons conducting a fire watch must not have other duties. If the fire watch must leave for any reason, all operations MUST stop**

Where hose lines are required, they must be connected, charged and ready for operation. At least one portable fire extinguisher with a minimum **2-A:20-B:C** rating must be provided and readily accessible within a **30 feet** travel distance of the location where hot work is performed and where the fire guards are positioned.

Exception: **There must not be less than one multi-purpose portable fire extinguisher with a minimum 3-A 40-B:C rating for roofing operations utilizing heat-producing systems or other ignition sources.**

Fire watch personnel should be present with a minimum 2-A:20-B:C rating fire extinguisher to perform fire watch during the hot work operations.

1.4.2 Fire guard

The fire watch for torch operations conducted at the following three locations must be conducted by at least one F-60 fire guard:

- **Construction sites.**
- **In any building or structure, when the torch operation is conducted by a person holding a citywide permit for torch operations.**
- **On any rooftop, or in connection with any torch-applied roofing system operation.**

It is important to understand the code-required distinction between a fire watch and a fire guard. Not all individuals responsible to maintain a fire watch must possess an F-60 certificate of fitness.

1.4.3 Fire guard for construction sites and torch-applied roofing systems

It is illegal to install any roofing material using a torch on a roof of combustible construction or in roofing operations on roofs of combustible construction using hot work equipment.

A torch-applied roof system is a roofing system using membranes that are attached by heating with a torch and melting asphalt back coating instead of mopping hot asphalt for adhesion.

It is widely used in US, torch-applied operations can be hazardous to roofers and the public. Improper torch use or careless fire watch has caused many rooftop fires. Fire guards must be on continuous duty during all torch operations on the roof of a building.

At a construction site and torch-applied roofing system operation, every torch operator must also have a person performing a fire watch by a F-60 fire guard.

Exception:

The single fire guard may be designated to conduct a fire watch for more than one torch operation on the same floor or level if each torch operation is not more than 50 feet from the fire guard.

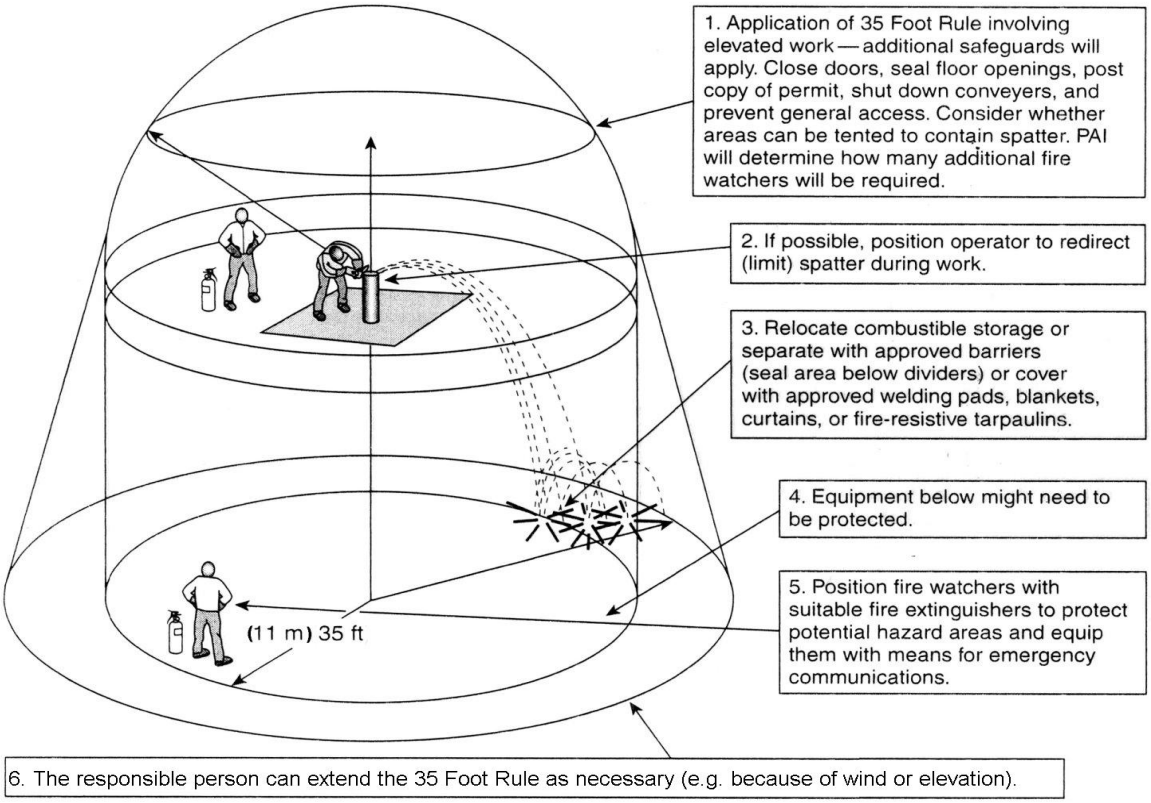
Fire watch on floors below: Additional F-60 fire guards are required to perform fire watch on floor below if the torch operation is being conducted at or near:

- the edge of an unenclosed floor of a building
- a floor opening
- other location where sparks and slag may travel to one or more lower floors or levels.

Fire watch is required for adjoining areas and below to make sure that sparks do not cause a fire on the adjoining areas.

This additional fire guard must conduct a fire watch on each lower floor or level containing combustible surfaces or materials within 35 feet of the area that may be potentially exposed to such sparks or slag.

Prior to starting hot work operations, the fire safety manager or responsible person must inspect the lower floors or levels and take all necessary and appropriate precautions to protect any combustible surfaces and materials that potentially would be exposed to sparks and slag from the torch operation. A certification to that effect must be made on the hot work authorization.



Exception:

1. A fire watch is not required on the floors/levels below a torch operation on a construction site when **ALL** the following conditions are met:
    - the torch operation is not being conducted at or near the edge of an unenclosed floor of a building;
    - the floor upon which the torch operation is being conducted is of noncombustible construction;
    - there are no floor or exterior building openings within 35 feet of the torch operation; AND
    - prior to commencement of the torch operation, the fire safety manager or responsible person conducts an inspection and takes the precautions to protect any combustible surfaces and materials that potentially would be exposed to sparks and slag from the torch operation.

2. If sparks or slag generated by the torch operation are observed to extend beyond 35 feet, potentially exposing lower floors or levels, the torch operation must be immediately discontinued, and the floors or levels below must be inspected for any fire condition.

   If there is any potential exposed surfaces or materials on the floors below from such sparks and slag, noncombustible barriers must be provided, and any other necessary or appropriate precautions must be taken. If such barriers and precautions fail to block the passage of sparks and slag, a fire watch must be established on the floors or levels below.

1.4.4 Time and Recordkeeping requirement

A fire watch must be maintained during any hot work operation. The fire watch must continue for a minimum of 30 minutes after hot work has stopped. he Fire Department, Certificate of Fitness holder, or the responsible person implementing a hot work program, may extend the duration of the fire watch based on the hazards or work being performed.

For any CNG, LPG, or ARC welding hot work operation, **the first inspection must be conducted 30 minutes after hot work has been completed; the second inspection 1 hour after.** This is to make sure that there are no smoldering fires in the building.

The fire guards must complete a signed inspection report. The fire guards or fire watch personnel must complete a signed inspection report (or the logbook). **This report must be submitted to and retained by the person in charge of the torch operations**. The inspection report must be made available to any representative of the Fire Department and should be maintained on the premises for reasonable length of time (e.g. 48 hours) after work is complete.

PART 2. GAS TORCH EQUIPMENT

Gas torches are widely used for different purposes. Gas fuel is used in the equipment to generate a flame to perform heating, cutting welding and brazing. Gas torches utilize two basic types of gas systems: blowtorch (air-fuel) and oxy-fuel.

Example of blowtorch (air-fuel)

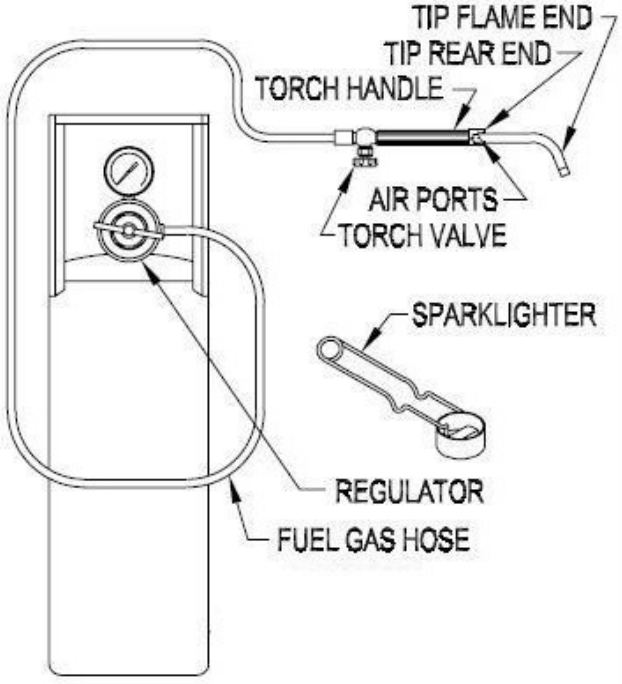
Example of oxy-fuel torch

2.1 Blowtorch (Air-fuel) and Oxy-fuel Torch

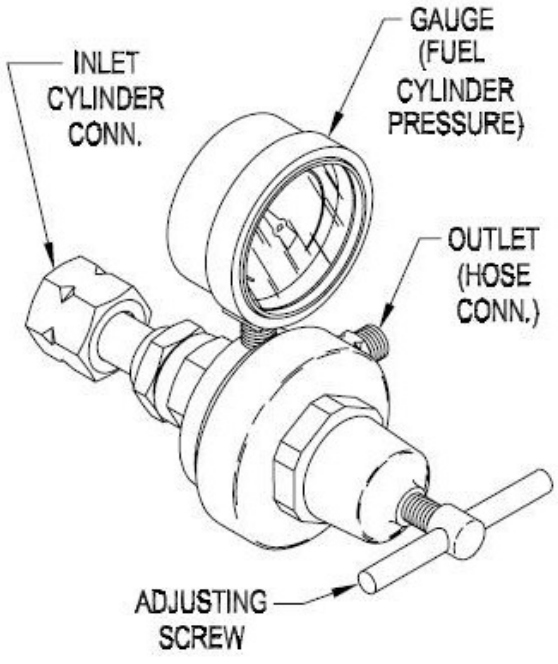
2.1.1 Blowtorch (Air-fuel) torch or single tank torch)

A propane torch is an example of a blowtorch, commonly used in torch-applied roof system. To provide enough oxygen for the torch to burn the fuel cleanly, the system mixes in air from the surrounding environment prior to ignition and while the torch is running. A container holds the fuel, while a tube carries it up to the nozzle. A valve near the nozzle lets in the air as needed.

Fuel and Torch



Regulator



2.1.2 Oxy-fuel Torch

Oxy-fuel or oxygen-fuel gas torches have two separate containers: a pressurized fuel gas container and a pressurized oxygen container. The oxygen cylinder is made of steel and contains 100% oxygen. A mixture of oxygen and a fuel gas is used to generate a flame. The fuel gas is needed because oxygen does not burn by itself.

Oxygen supports combustion and it maintains and controls the flame. In other words, the oxygen intensifies the burning of the fuel gas. For this reason, workers should never use oxygen to blow dirt off their clothes. Even a small spark could immediately ignite clothing and cause serious injury.

Using pure oxygen with the fuel makes the torch flame much hotter than the standard blowtorch torch. For example, Oxy-propane torches can produce about 1,500 degrees Fahrenheit higher than the air-propane torch can generate.

Most common fuel gases used in blowtorches are **LPG** (e.g. butane, propane), **natural gas** (methane) (either CNG or piped natural gas) and **acetylene**. Acetylene is used because compared with the other fuel gases it creates the greatest amount of heat when burned (i.e. 3,000 degrees Fahrenheit higher than an air-propane torch).

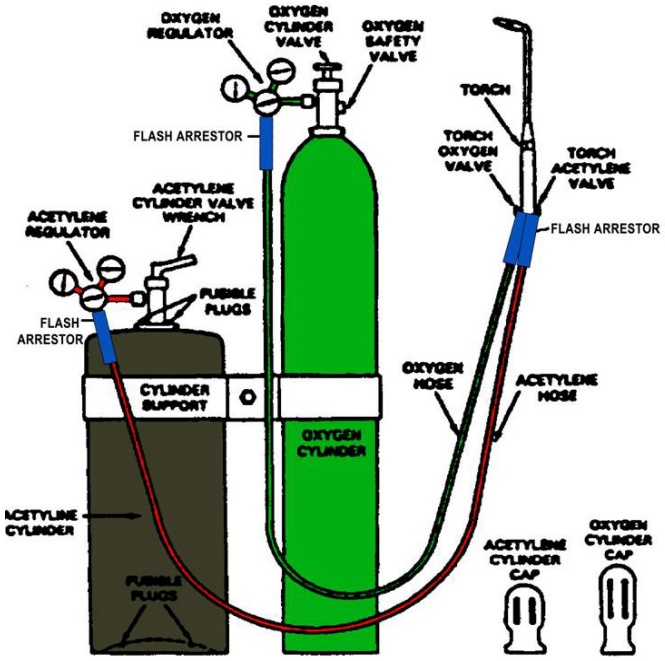
Both gas containers have control valves on the top of the container. The valves control the discharge of gas from the containers. Gas containers also have a protective cap or protective collar. The protective collar is always located on the top of the LPG container. The caps should be screwed on over the valve when the cylinders are not in use. These caps/collars prevent the valves from being damaged.

The oxygen is stored at pressures up to 2200 psi (pounds per square inch). It has a safety disk installed in the control valve connection of the oxygen container. This disk will burst if the oxygen pressure in the cylinder becomes too great. This allows the oxygen to escape into the air and prevents an explosion. The pressure is likely to change if the cylinder becomes hot (e.g. in a fire).

The fuel gas (e.g. propane, natural gas or acetylene) is stored at higher pressures to keep a sufficient amount of fuel available for torch operations. However, it is dangerous to use the fuel gas at pressures above 15 psi, especially for acetylene. For this reason, there is a regulator on each fuel cylinder. The regulator makes sure that the fuel is discharged from the gas container at a safe pressure.

The two gases, oxygen and the fuel gases, are mixed inside the torch. The torch operator controls the mixture of the gases by using valves on the torch. Adjusting the valves controls the shape and intensity of the flame. The oxy-fuel mixture is manually ignited by the operator when it leaves the torch.

An example of a typical oxyacetylene welding system is shown below.



A Typical Oxyacetylene Welding System

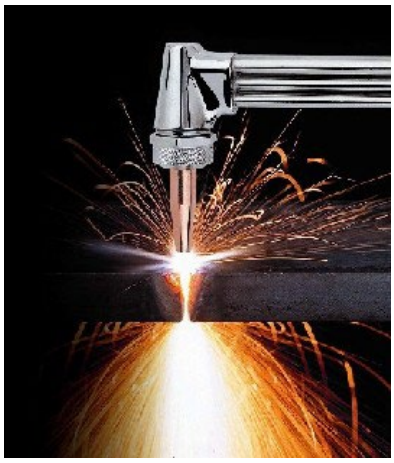
2.2 Different Use of Gas Torches

2.2.1 Welding and cutting

Welding involves joining two or more pieces of metal together. Molten metal is created from an intense heat source.

Unlike welding processes which join two pieces of metal, cutting processes involve separating or severing a piece of metal using intense heat generated to melt the metal.

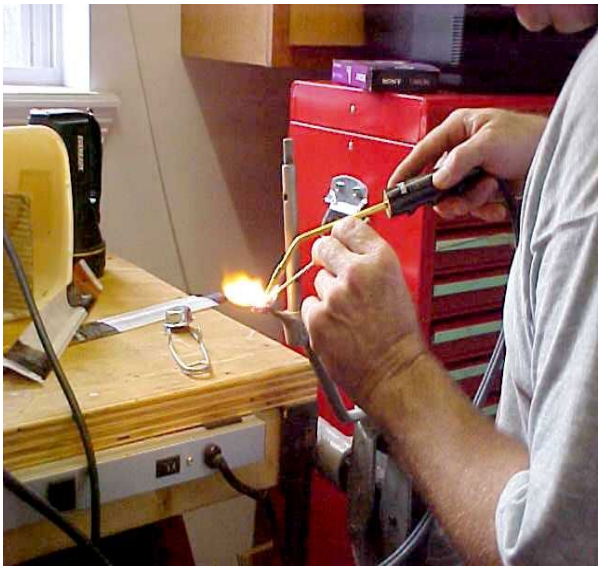
Both welding and cutting processes often include oxygen and fuel gas. Oxy-acetylene generates the highest temperature which can reach up to 6,000 ºF.



A Cutting Torch

A Welding Torch

2.2.2 Brazing and Soldering



Brazing and soldering are similar to welding in that both the base metal and the filler metals are heated to melting and then solidify to form a joint.

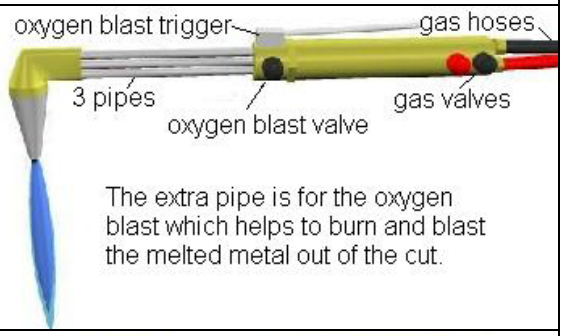
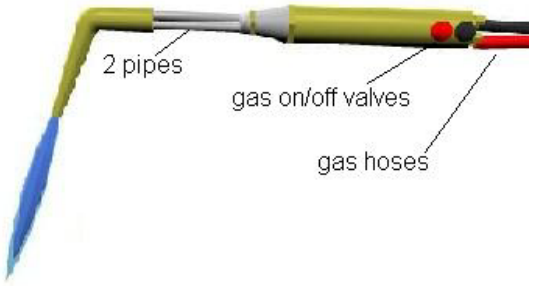
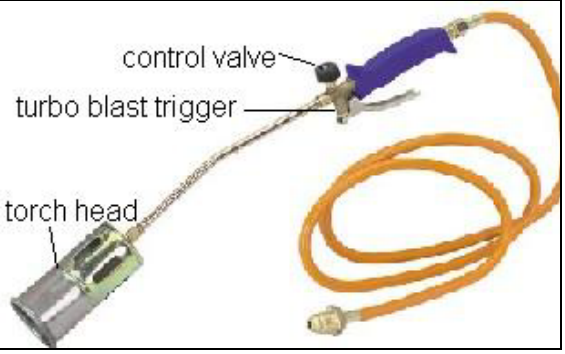
However, soldering and brazing temperatures are typically 840 °F. Soldering or brazing typically involves smaller components to be joined and "softer" metals such as lead, tin or silver.

Manual soldering processes use a hand-held iron to heat the components to be joined and the filler metals. A propane canister torch is often used for small tin-lead soldering jobs. It is a small disposable container of pressurized propane gas, and the container is attached with a reuseable torch.

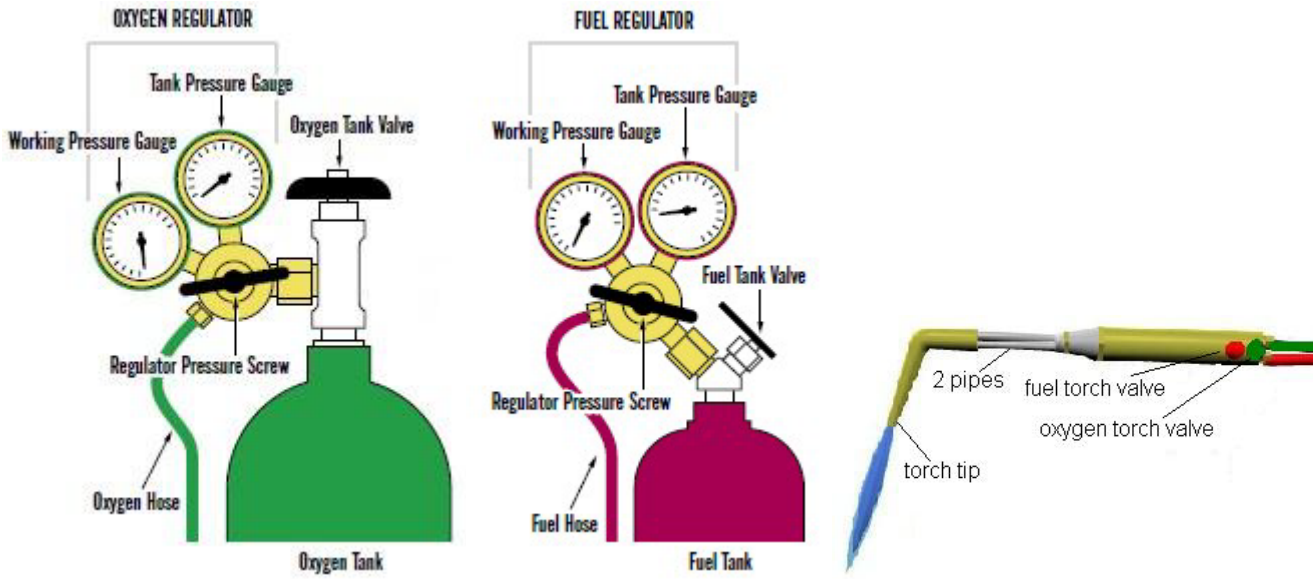
2.2.3 Heavy duty application

Gas torches can also be used for burning weeds, melting ice, or applying tar/asphalt to a roof. The flame is often a diffuse high temperature naked flame. Temperatures can exceed 2000°F.

Table: Examples of different torch

Use	Temperature	Common Torch Types	Sample Picture
Cutting	> 2, 000 °F	Oxy-fuel torch	
Welding	> 2, 000 °F	Oxy-fuel torch	
Brazing and Soldering	Around 840°F	Blowtorch (most common) Oxy-fuel torch (large jobs or jewelry work)	
Heavy Duties	Wild range	Blowtorch	

2.3 Guidelines for Using an Oxygen-fuel Torch

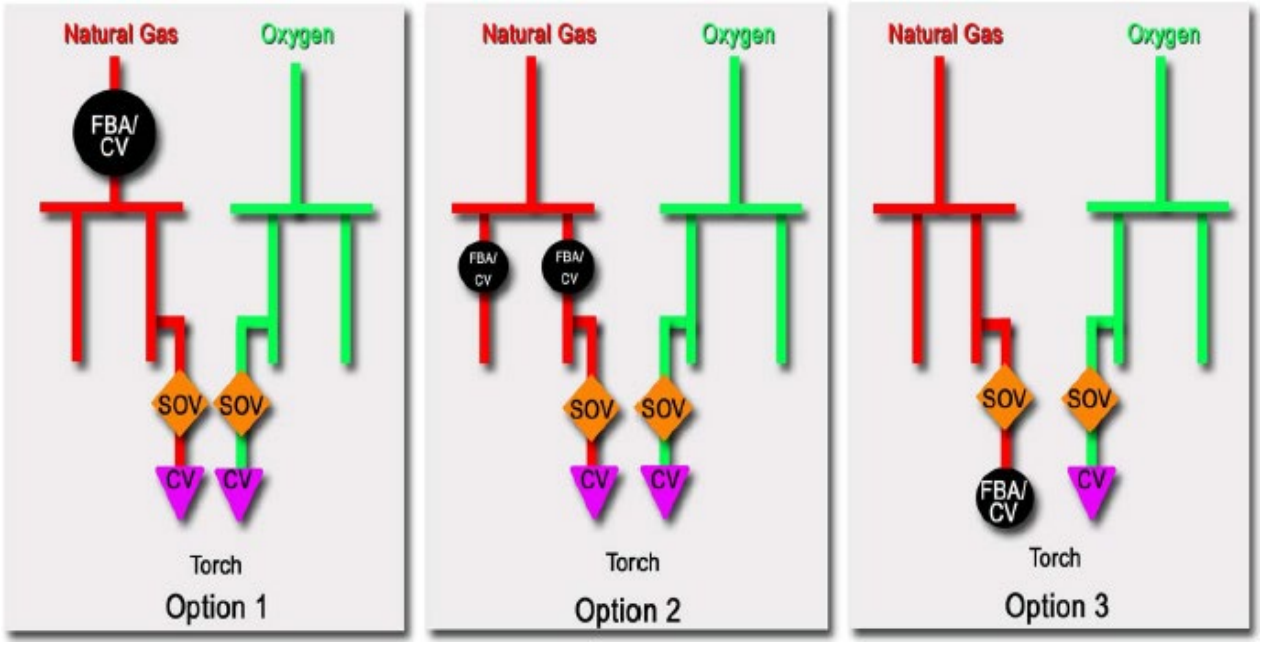


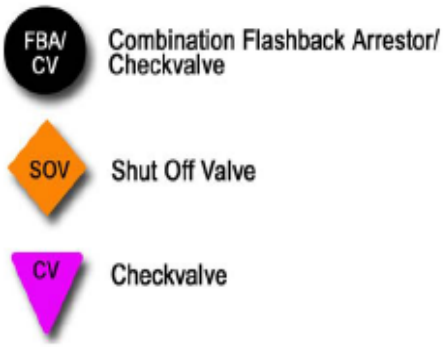
2.3.1 Set Up an Oxy-Fuel Torch

- Make sure that the valves and the regulators are clean.
- Do not over-tighten the regulator nut as this may damage the fitting.

- Oxygen and fuel gas container valves must be accessible to the torch operator or fire guard for immediate shutoff of the gas supply in the event of an emergency.
- Maintain a safe distance between the hot work area and the gas containers to protect the containers from heat, sparks, slag, or misdirection of the torch flame.
- Check for leaks. If any leaks are found, shut the supply valve, DISCONTINUE USE and contact the supplier/manufacturer and take the system out of service.

- If the fuel is piped natural gas, required protective flashback arrestor/check valve material must be installed as one of the following three options:





NFPA 51 offers three Options for placing the required protective flashback arrestor/check-valve in a manifold pipe system:

- Option 1: Put the flashback arrestor at the head end of the gas supply.
- Option 2: Place flashback arrestors in each branch of the manifold.
- Option 3: Places flashback arrestors at each torch.

Additional check valves are required at each torch in Option 1 & 2 and on the oxygen line in Option 3.

Shutoff valves are required on both natural gas and oxygen lines at each torch location.

2.3.2 Turn On an Oxy-Fuel Torch

- Open the gas container valve slowly and allow pressure to stabilize. **An acetylene valve must not be opened more than approximately 1½ turns** and preferable no more than ¾ turns, unless otherwise specified by the manufacturer (ANSI Z49.1, 10.8.4.8, 2005 edition). The acetylene pressure must never be above 15 psi. If more acetylene is needed to supply, the larger torch hose should be used.

- Torch should be ignited by friction devices or other approved methods, should not use matches or other hot works.

- Once the flame is lit, open the fuel valve more and open the oxygen torch valve until the desired flame composition is achieved.

2.3.3 Turn Off an Oxy-Fuel Torch

- If the torch operation is to be discontinued for **a period of 1 hour or more**, the torch valve must be closed and the gas supply to the torch also must be completely shut.

- Turn off the gas torch valves **according to the instructions for the torch you are using.**

- Close both the oxygen and fuel container valves completely.

- Open the torch valves, one at a time, to bleed the hoses. The pressure shown on both pressure gauges should drop to zero. Close the torch valves. Turn both regulator pressure screws counterclockwise until they are loose.

- Disconnect the regulators from the gas containers or disconnect the hoses from the regulators.

2.3.4 Discontinued torch operations.

At construction sites, when oxygen and acetylene torch operations are not in use, including when such operations are finished for the workday, the oxygen and acetylene containers must be removed from the work area to an approved storage area or removed from the premises.

Exception:
Brief interruptions in work of not more than 2 hours, including lunch breaks and coffee breaks.

2.3.5 Special Precautions for Using Oxy-fuel Equipment

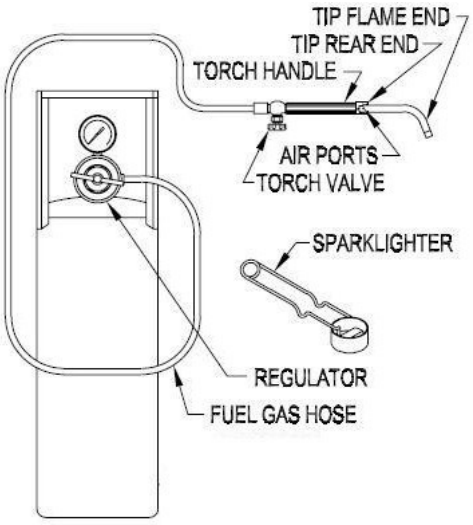
(1) Avoid oil or grease

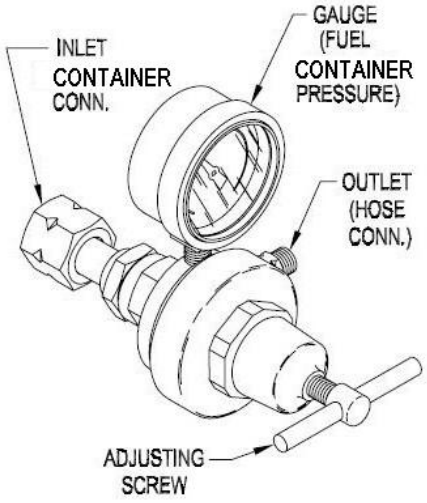
Containers, valves, regulators, hose and other apparatus and fittings for **oxygen must kept free of oil or grease**. Oxygen containers, regulators must not be handled with oily hands, oily gloves, or greasy tools or equipment. The oil and grease are more likely to ignite in the

presence of oxygen. This is because the oxygen intensifies the burning of other materials. The mixture of pressurized oxygen and oil or grease may also cause an explosion.

(2) Never mix gases inside a container
Never attempt to mix oxygen and fuel inside a container. Never attempt to transfer oxygen or acetylene from one gas container to another.

2.4 General Guidelines for Using a Blowtorch





2.4.1 Set Up a Blowtorch

- Make sure that the valves and the regulators are clean.
- Do not over-tighten the regulator nut as this may damage the fitting.
- The fuel gas container valve must be accessible to the torch operator or fire guard for immediate shutoff of the gas supply in the event of an emergency.
- Maintain a safe distance between the hot work area and the gas containers to protect the containers from heat, sparks, slag, or misdirection of the torch flame.
- Check for leaks. If any leaks are found, shut the supply valve, DISCONTINUE USE and contact the supplier/manufacturer and take the system out of service.

2.4.2 Turn On a Blowtorch

- Open the gas container valve slowly and allow pressure to stabilize.
- Open the fuel torch valve a very small amount and light with a spark lighter.
- Torch should be ignited by friction devices or other approved methods. **DO NOT** use matches or other hot works. Use the torch valve to control the size and heat of flame.

2.4.3 Turn Off a Blowtorch

- If the torch operation is to be discontinued for **a period of 1 hour or more**, the torch valve must be closed and the gas supply to the torch also must be completely shut.

- The torch system must be shut down as follows:
    1. Close gas container valve.

    2. Open torch valve and drain regulator and lines. **DO NOT** discharge toward people, flame or source of ignition.

    3. Release regulator adjusting knob fully counterclockwise.

    4. Shut off torch valve. Disconnect torch and regulator, replace the protective cap and plug to the hose end and supply tank respectively for overnight or longer shutdown.

2.5 Common Problems Occur with Torch Operations

2.5.1 Backfire

This occurs when the flame on the torch goes out unexpectedly. A loud snap or pop may occur when the flame goes out. Sometimes the flame will quickly relight. This happens when the working surface area is hot enough to re-ignite the flame. Backfire may be caused by several things that are easy to fix. The following is a list of some conditions that might cause backfire.

- Touching the nozzle tip against the working surface.
- Overheating the nozzle tip.
- The oxygen and/or the fuel gas is set at the wrong pressure.
- The cutting or welding tip is loose or dirty.
- Dirt on the work surface.
- Kinks or blockages in the hoses.
- The nozzle tip is damaged and not seated properly in the torch head.

If a backfire is noticed the container valves should be closed and the equipment checked for the symptoms listed above. If any dirt or damage is noticed, it should be cleaned or repaired before the equipment is used again.

2.5.2 Flashback

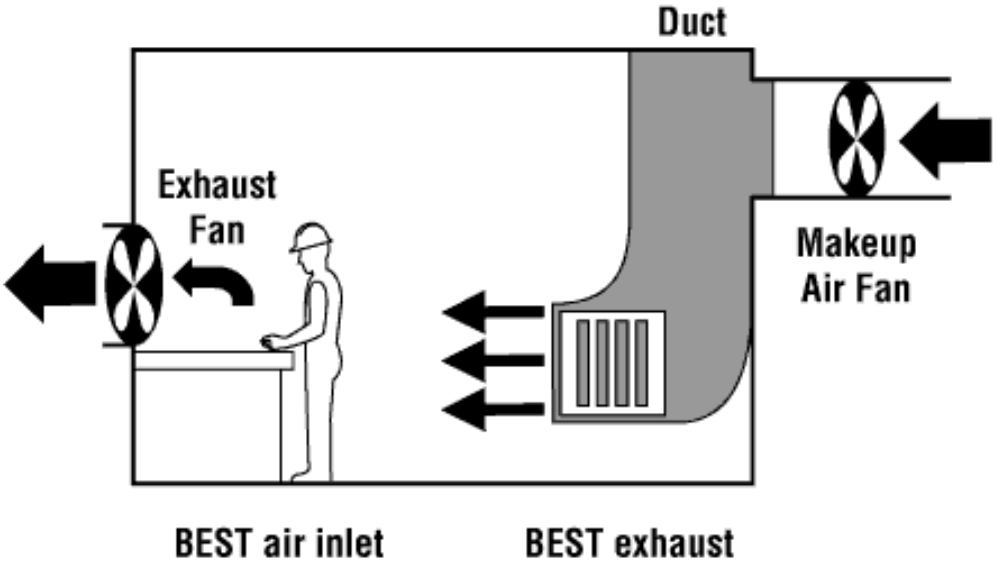
This can occur when the cutting or welding flame burns inside the torch or the hoses. It is usually accompanied by a whistling or hissing noise. As soon as the hissing or whistling is noticed the torch control valves should be closed. Then the fuel gas container valve should be closed. This will allow for the flame to burn itself out, after a few minutes.

Flashback indicates that there is something seriously wrong with the equipment. The equipment should be checked for damage or blockage. Check for the same conditions that might cause backfire. A buildup of dirt may also cause the flashback. This can be a very dangerous situation. Care should be taken to make sure that it is fixed properly. If the equipment is not cleaned and repaired correctly it may result in an explosion. The entire

system should be cleaned and repaired if needed. If the flashback happens again, a qualified technician should repair the equipment.

2.6 Personal Protection

The gas-torch equipment should only be used by the proper Certificate of Fitness holder. Only the equipment approved by the Materials and Equipment Acceptance (MEA) should be used. The work area must be well ventilated, which prevents workers from breathing in dangerous fumes. Exhaust fans may be used to draw fumes away from the work area. An example of a well-ventilated work area is shown below.

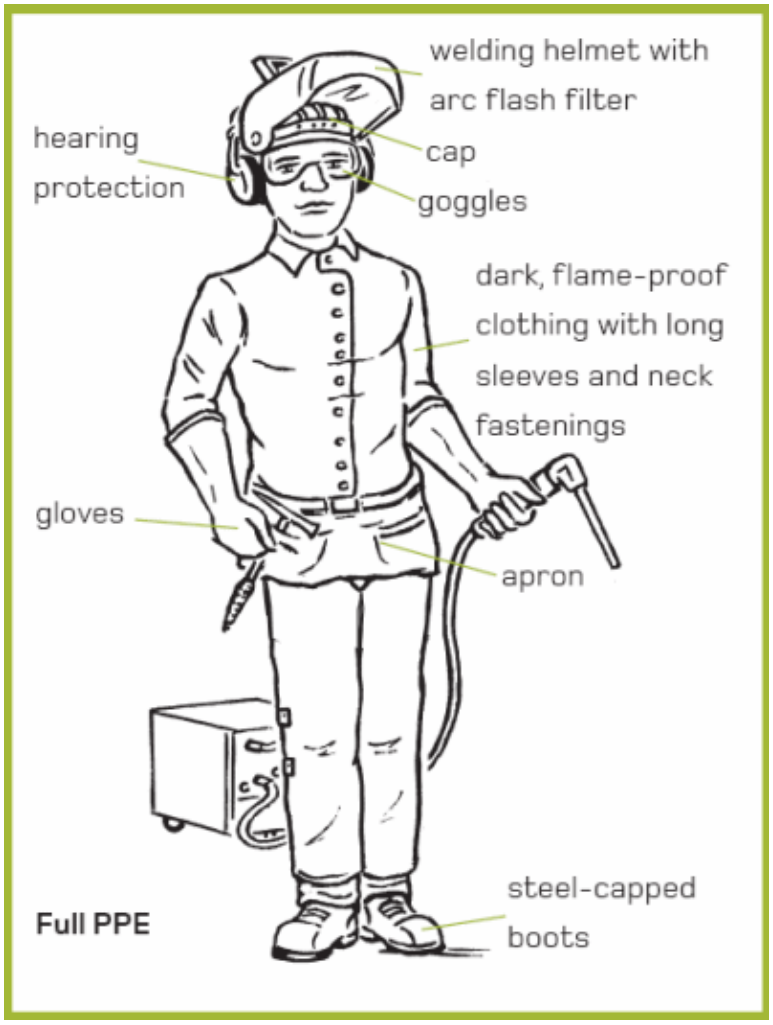


A Well Ventilated Work Area

2.6.1 Personal Protective Equipment (PPE)

Workers must wear flame resistant gloves and aprons, skull caps, helmets or goggles, and safety shoes. Avoid clothing with pockets or cuffs while working. Sparks or slag can catch in cuffs or pockets.

The following picture shows the appropriate safety clothing to wear while cutting and welding.



Frayed clothing is particularly susceptible to ignition and burning and should NOT be worn when welding or cutting.

PART 3. COMPRESSED GAS CONTAINER

The gases used by gas torches are commonly supplied in compressed gas containers, which can pose additional handling and transport hazards. All compressed gases are potential hazards because of the pressure within the container, their flammability, and/or their toxicity. The chemical is in gaseous form, pressurized, and it can quickly contaminate a large area in the event of a leak.

3.1 Handling, Use, and Storage of Compressed Gas

3.1.1 General Guidance

(1) Label all compressed gas containers clearly
The contents of any compressed gas container must be clearly identified. Gas identification should be stenciled or stamped on the container or a label and is typically applied near the neck of the container.

Do not rely solely on the color of the container to identify the contents. Do not use any container that is unmarked or has conflicting marking or labels.

Storage, handling and use of LPG in any equipment used or previously used for natural gas is prohibited in New York City, except as may be authorized by the commissioner on an emergency basis.

Storage, handling and use of CNG in any equipment used or previously used for LPG is also prohibited in New York City, except as may be authorized by the commissioner on an emergency basis.

(2) Do not refill container
Gas containers must be replaced when they are empty. It is illegal to refill gas containers in New York City.

Empty containers must be handled in the same manner as full ones. They should be marked empty, the container valve or regulator tap must be closed and stored separately from full containers.

All empty containers must be promptly removed by vendors. Damaged or otherwise unusable LPG/CNG containers must be promptly removed from the premises and lawfully disposed of.

(3) Upright position
All LPG/CNG containers must be secured in an upright position and should never be stacked or stored on shelves.

Gas containers should be maintained in an upright position when being used. The gas containers used for on-site jobs are usually secured on a hand truck. The containers are less likely to be damaged when secured to a hand truck.

The hand truck permits the gas containers to be moved safely. All gas containers must be secured from tipping over and should be stored in an upright position.
They must be equipped with a pressure regulator designed for the specific gas and marked for its maximum container pressure. You can use appropriate material, such as chain, plastic coated wire cable, commercial straps, etc., to secure gas containers.

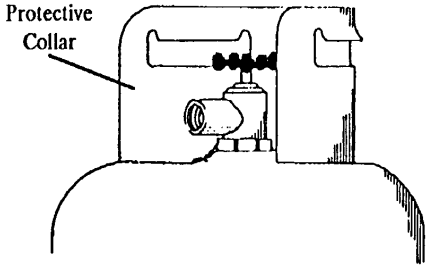
(4) Well-ventilated areas
Indoor compressed gas storage and compressed gas use areas must be located in well-ventilation areas. LPG/CNG containers must not be used in a cellar, basement, pit or other area below grade.

LPG containers must not be used in an above-grade under floor space or basement unless such location is provided with an approved means of ventilation.

> **Exceptions**: Portable LPG containers are allowed to be used to supply approved self-contained torch assemblies. Such containers cannot exceed 16.4 ounces of LPG.

(5) Always replace the protective cap
Most gas containers have a protective cap, LPG containers have a collar. These devices protect the container control valve from physical damage. The protective cap is shaped like an inverted cup. It is screwed on top of the gas container. It must be in place when the gas container is not in use. The protective collar is welded onto the top of the container. The collar extends above the height of the containers control valve.

An example of a container with a protective collar installed is shown below.



A Typical Protective Collar

(6) Away from Temperature and Physical Damage
All gas containers and the related equipment must be protected from extreme temperature and physical damage. For example, gas containers for temporary stationary service must be placed on firm and non-combustible foundation.

High temperatures (e.g. above 125 °F) can cause the pressure inside the container to increase to a dangerous level.

A protective partition must be used to shield the containers that are exposed to hot air blown by a heating appliance. **All containers must be secured in an upright position and must not be stacked or stored on shelves.**

(7) Regular Inspection
The Certificate of Fitness holder must regularly inspect the compressed gas containers, connections, and appliances for leaks. Any damaged containers must be removed from services, repaired and tested by an authorized person.

Quick visual check of compressed gas containers:

- No extreme denting, gouging, or corrosion is on the compressed gas container.
- The container protective cap/collar and the foot ring are intact and are firmly attached.
- The container is painted or coated to minimize corrosion.
- The container pressure relief valve indicates no visible damage, corrosion of operating components, or obstructions.
- There is no leakage from the compressed gas container.
- The container is installed on a firm foundation and is not in contact with the soil.

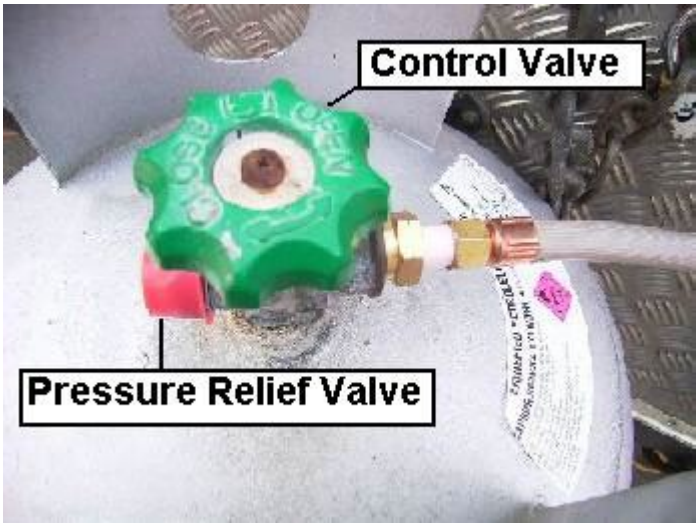
3.1.2 Related Equipment

(1) Control valve and pressure relief valve

A control valve is on the top of each gas container. This valve can be opened or closed to control the discharge of the contents of the gas container. A handle is simply turned to open most gas control valve. **The control valve must be opened by hand.**

A special key is needed to open the acetylene control valve. Adjusting the valves controls the shape and intensity of the flame. **Acetylene valves must not be opened more than 1 1/2 turns.**

Container valves must be closed before moving a gas container, when the torch is not in use, and when the gas container is empty.



The **pressure relief valve** opens to allow the compressed gas to escape into the atmosphere when the pressure is too great in the container. This is a safety mechanism to prevent an explosion caused by the pressure build-up in the container. The relief valve or its discharge system must be designed to minimize the possibility of the entrance of water or dirt.

If you observe or hear any gas leak from the pressure relief valve, call 911 immediately.

(2) Regulator

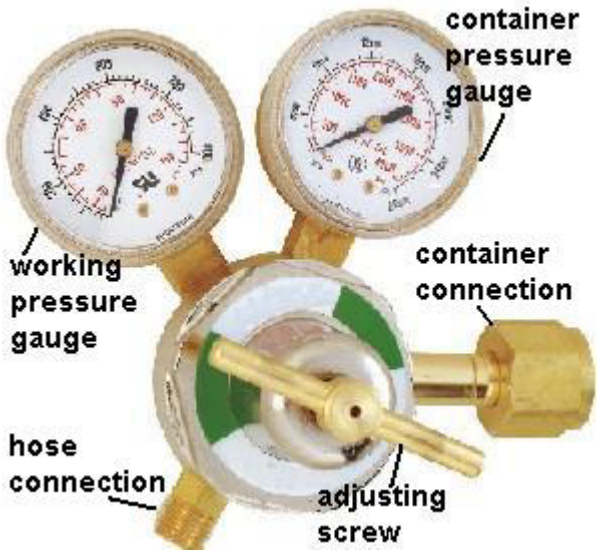
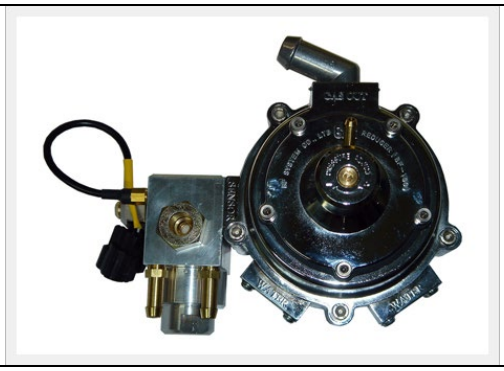
Before the gas containers can be used, a regulator must be attached to each of the control valves. A regulator is one of the most important parts of a compressed gas system.

The purpose of the regulator is to control the flow of gas and lower the pressure from the container to the appliance. The regulator not only acts as a control regarding the flow and distribution of gas, but also as a safety barrier between the high pressure of the gas container and the end use appliance.

Always select the regulators recommended by the manufacturer. Do not interchange regulators between different sizes/types of containers without consulting the manufacture.

Do not open the gas container valve or regulator tap until the regulator is securely attached. Regulator connections to gas container valves must be completely free of dirt, dust, oil, and grease. The regulator controls the discharge rate of gas from the container.

Examples of typical regulators are shown as below.

<table>
<tr><td>A Typical Regulator of LPG Container</td><td rowspan="4">A Typical Regulator of Acetylene or Oxygen Container
 
</td></tr>
<tr><td>  </td></tr>
<tr><td>A Typical Regulator of CNG Container</td></tr>
<tr><td>  </td></tr>
</table>

(3) Hose, Piping and Tubing

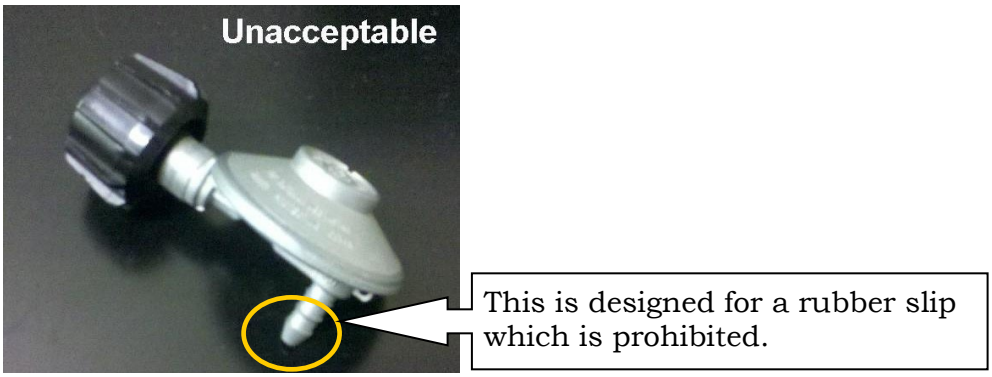
The regulator is also connected to a hose that supplies the gas to the appliance. This hose must be securely connected to the appliance. A rubber slip connections are prohibited.

Only DOT approved hoses designed for a working pressure of 350 psi. are allowed.

Nonmetallic pipe, tubing and components for any installation, appliance or equipment using LPG or CNG is prohibited. However, nonmetallic hose may be allowed at construction sites.

Hoses must be as short as practical protecting from mechanical injury, but they must not be too close to an open flame. Hoses must be protected from physical damage and no hose is allowed to exceed 30 feet.

When the gas containers are used inside buildings, the hose must not pass through any partitions, walls, ceilings, or floors.



Piping in systems must be run as directly as possible from one point to another, with the minimal number of fittings as practical. The use of nonmetallic pipe tubing, or hose for permanently interconnecting gas containers is not allowed.

All piping and tubing must be protected against damage by vehicles and by corrosion-causing substance.

3.1.3 Containers Connected for Use

A single container of oxygen and a single container of flammable gas may be installed on a cart provided that the containers are connected to regulators, equipped with apparatus designed for cutting, welding or other hot work operation, and are otherwise ready for use, and are stored, handled and used in compliance with the following requirements:

1. Carts must be designed and used in accordance with Fire Code (see to *Section 3.1.4 of this booklet, Moving Compressed Gas Containers)*

2. Container valves need a fixed hand wheel, or other approved means by which the flow of gas may be immediately shut down during hot work operations.

3. Container valves must be closed at the end of each workday and whenever work is discontinued or the cart moved.

4. Container valve outlet connections must conform to the requirements of the Compressed Gas Association (CGA V-1).

5. Oxygen and fuel gas containers on the carts must be located at a distance from the hot work area sufficient to protect such containers from heat, sparks, slag, or misdirection of the torch flame, or fire-resistant shields must be provided.

6. A separation distance of 20 feet has to be maintained between such carts.

3.1.4 Moving Compressed Gas Containers

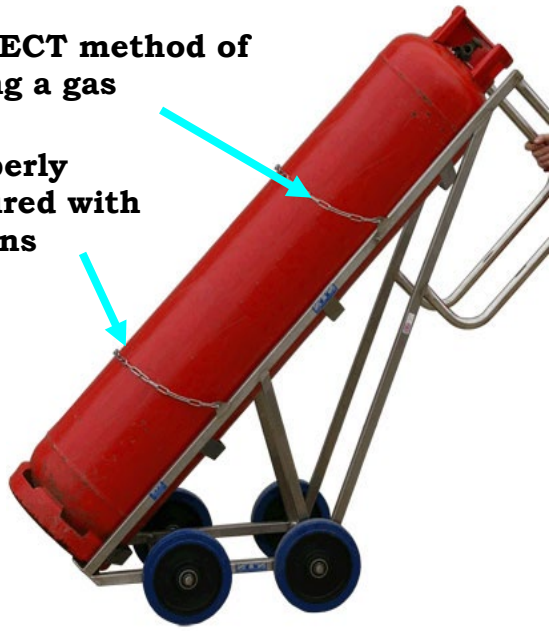
A compressed gas container must not be rolled on its side or its rim. It must be moved only by using approved lifting equipment.

Where removable caps are provided for valve protection, they should be always kept on the containers except when in use.

Do not lift containers by the cap. Valves of compressed gas containers should not be used for lifting.

CORRECT method of moving a gas

Properly secured with chains



Compressed gas containers must be moved using an approved method, in an upright position.

Avoid dragging or sliding containers. Never drop containers or permit them to hit each other or against other surfaces violently.

It may be safer to move containers, even short distances, by using a suitable truck.

Where containers are moved by hand cart, hand truck or other mobile device, the carts, trucks or devices have to be designed for the secure movement of containers.

Carts and trucks used to move materials must not block or be left unattended in any corridor, exit enclosure, or other means of egress.

Incompatible materials **must not** be moved on the same cart or truck.

Carts and trucks utilized for moving compressed gas containers indoors must be designed to provide a stable base for such movement during handling and have a means of restraining containers to prevent accidental dislodgement. Compressed gas containers placed on carts and trucks must be individually restrained.

Carts and trucks have to be designed in a way that allows the operator to safely control movement by providing stops or speed-reduction devices.

Ropes, chains or slings cannot be used to suspend compressed gas containers unless such containers have been designed for such handling and use. Valves of compressed gas containers cannot be used for lifting.

1. Compressed gas container should be used, handled, and stored in upright position, except those designed for use in a horizontal position.
2. Compressed gas containers placed on carts and trucks must be individually restrained.

If the compressed gas containers need to be transported between different floors, if possible, use an elevator (construction elevator at construction sites; freight elevator, in an occupied building).

Only authorized persons are allowed to transport with the gas container. If freight elevator is not available, the passenger elevator should be placed in a manual operation mode.

Compressed gas containers are only allowed to be transported in approved vehicles. An FDNY city-wide permit issued by the Bureau of Fire Prevention's Hazardous Cargo Unit is required for each vehicle transporting quantities exceeding 400 SCF of any flammable gas (e.g., LPG/CNG).

Compressed gas containers may be delivered only to sites displaying a permit or Letter of Authorization issued by the Fire Commissioner.

3.1.5 Separation from hazardous conditions

CNG and LPG and other flammable gases container storage must be located away from the following:

- Electric power lines
- Piping containing flammable or combustible liquids
- Piping containing flammable gases
- Piping containing oxidizing materials

All compressed gas containers and systems in storage or use must be away from materials and conditions that present potential hazards to them or to which they present potential hazards.

It is recommended to group containers according to the type of gas (e.g. flammable, oxidizer) and whether containers are full or empty, if they are stored at the same location.

Fuel gas or oxygen containers in storage must be separated from any combustible materials by a minimum distance of 20 feet. Oxidizing gases must not be stored, used or come in contact with oil, grease, or other petroleum-based products.

Oxygen and acetylene storage areas on the floors on which the torch work is being conducted must comply with the distance to exposure requirements:

- 20 feet from all classes of flammable and combustible liquids, oxidizing gases and readily combustible materials, such as paper and combustible fibers.
- 25 feet from open flames, ordinary electrical equipment or other sources of ignition.
- 50 feet from air-conditioning equipment, air compressors and intakes of ventilation.
- 50 feet from other flammable gas storage.

Compressed gas containers must be kept away from:

- Sources of ignition
- Temperature extremes (Above 125 °F or less than mean low atmospheric temperatures)
- Corrosive chemicals or fumes
- Falling objects
- Public tampering
- Ledges, unprotected platforms, and elevators or other areas where the container could drop a distance exceeding one-half the height of the container

3.1.6 Storing Containers

A permit is required for any storage area storing:

(1) any flammable gas (e.g. LPG or CNG or acetylene) in excess of 400 SCF; or

(2) any oxygen in excess of 504 SCF.

The storage of compressed gases in quantities requiring a permit must be under the general supervision of a proper certificate of fitness holder:

Gas Types	COFs for Supervising the storage of the gases
LPG or CNG only	G-44
Acetylene or other flammable gases (not including LPG/CNG)	G-98
Oxygen or other nonflammable gases	G-46

3.2 Handling and Use of Acetylene Gas

Acetylene gas is a colorless, extremely flammable gas with a garlic-like odor. It is stored as a liquid in containers under pressure. **Copper tubing should never be used to splice the acetylene hose.** The copper tube can react chemically with the acetylene. The reaction may cause an explosion if the tube is subjected to a physical blow.

Use of acetylene generators is prohibited in any hot work operations.

For use in welding and cutting, the working pressure must be controlled by a regulator. You should never set the regulator **above 15 psi as the acetylene will decompose explosively**. Acetylene leaks, no matter how small can have serious consequences.

The acetylene containers have safety plugs installed on the top and bottom of the container. These plugs melt if the container becomes too hot for it to be used safely. The melted plugs allow the gas to escape slowly. This prevents the container from exploding.

3.3 Handling and Use of LIQUID PETROLEUM GAS (LPG)

Liquefied petroleum gas (LP Gas or LPG) is often used as a fuel source. LPG includes propane, propylene, butane, and butylene. The most commonly used LPG are butane and propane.

LPG is often referred to as "Bottled Gas". LPG is often used in domestic, commercial, agricultural, and industrial settings. For example, propane is commonly used for domestic heating, cooking, and fuel for forklifts. Unless otherwise specified, the storage of LPG in quantities requiring a permit must be under the general supervision of a person holding a Certificate of Fitness.

3.3.1 Description of Liquid Petroleum Gas

Manufacturing of LPG is prohibited in NYC. **LPG is naturally colorless and odorless.** It is given an odor by mixing a foul-smelling additive with the gas (additive mercaptan), which causes LPG to smell like rotten eggs, allowing for leaks of LPG to be easily detected.

LPG is extremely flammable and highly explosive if ignited in an enclosed area. LPG is non-toxic but can cause suffocation. **LPG is heavier than air** and tends to fall to the ground and spread horizontally.

LPG is stored under pressure inside specially designed containers. The LPG is usually stored inside the container in a liquid state. Greater amounts of LPG can be stored when it is in a liquid form. For most uses the gas changes into a vapor when it leaves the container. When the gas changes into a vaporous state it expands to 269 times its original volume**. The expansion rate causes liquid LPG to be a much greater fire hazard than a vapor leak.**

A liquid LPG leak can cause an explosion even in an outdoor location. Safety procedures must be strictly followed to reduce the danger a potential unintended release of LPG.

In New York City, LPG must be stored in portable containers which must be approved for use by the Federal Department of Transportation. **LPG Containers must be tested by the DOT approved vendors every five years.** The Certificate of Fitness holder is responsible for ensuring the container's condition including the marked date for statutory testing due. Container due for testing must be sent for testing to ensure that it is safe for use.

The containers are not filled to capacity with the LPG. A vapor space is left in the container to allow for expansion of the LPG. This is necessary because LPG expands when it becomes warmer. The use of LPG in a liquid form is prohibited in New York City.

Standard portable LPG containers are allowed to charge to a maximum of 100 pounds in weight.

When portable containers are moved, they must be secured to a specially designed hand truck. LPG containers and the related equipment must be protected from damage. For example, LPG containers for temporary stationary service must be placed on firm foundation.

LPG is sensitive to temperature change. Very low temperature may inhibit the proper function of the gas. High temperatures can cause the pressure inside the container to increase to a dangerous level.

LPG Containers should never be allowed to reach a temperature exceeding 125 °F. A protective partition must be used to shield the containers that are exposed to hot air blown by a heating appliance.

Any blower-type and radiant-type units must not be directed toward any LPG container within 20 feet.

3.3.2 Safe Handling and Use of Liquid Petroleum Gas

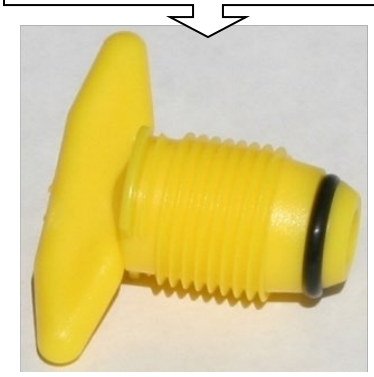
LPG is highly explosive when it accumulates in one area. **As a precaution LPG must only be used in well-ventilated areas**. **The LPG container must not be placed or used underground or in a below grade location**. The container must remain above ground at all times.

A sign explaining safe handling procedures for LPG should be posted near all LPG appliances.

How to handle LPG containers safely

- How to connect all regulators, manifolds, and hoses to containers and appliances
- How to detect LPG leaks safely
- How to start up and shut down the appliance and related equipment
- The names, address, and telephone number of a local supplier
- Emergency number: 911

The LPG containers must always be secured in the upright position. Protective caps or plugs must be in place and container's valve must be closed when the containers are being transported or are not in use.



LPG containers with a capacity of 20 pounds must be provided with transportation plugs that secure gas-tight the container's outlet valve connection. LPG containers with a capacity of more than 20 pounds can only be moved to another floor of the building by freight elevator, construction elevator, or passenger elevator when approved, and such elevator can be occupied only by those persons engaged in moving the containers. LPG containers with a capacity of 20 pounds or less should be moved in the same manner, except that they may be moved in building stairwells if stairwell is unoccupied.

3.4 Handling and Use of Compressed Natural Gas (CNG)

CNG (Compressed Natural Gas) is made by compressing natural gas which is mainly composed of methane. Unlike the LPG, CNG does not liquefy under high pressure, it is stored inside the container in a gas state.

Any single CNG container must not exceed 381 SCF. (Fire Code 5811.3)

Processed natural gas is tasteless and odorless. Before gas is distributed to consumers, it is scented by adding small amounts of chemicals to assist in leak detection.

Breathing natural gas in trace amounts is harmless. Natural gas is an asphyxiant and can kill if it replaces air to the point where the oxygen content will not support life.

It is prohibited to store, handle, use or sell any CNG that has not been satisfactorily odorized with mercaptans or other approved chemicals.

Natural gas is a flammable gas. Natural gas is lighter than air and tends to escape into the atmosphere. It makes CNG safer than LPG once there is a leak in the system.

When natural gas is confined, within an enclosed space, gas concentrations can reach explosive limits and, if ignited, result in explosions that could be catastrophic. An example of typical CNG containers is shown below.

3.5 Check for Leaks

The gas containers, valves, hoses, and related equipment should be visually checked for physical damage. Special care should be taken to identify any defects that may cause a leak.

Any defective components that are discovered must be marked and be replaced before the equipment may be used again.

If any leak of flammable gases or oxygen is detected, move the gas container to an isolated, well-ventilated area away from combustible materials. Post signs that describe the hazard.

The **Certificate of Fitness holder must not try to do any repairs, only take the equipment out of service.** This equipment is very sensitive and must be repaired by the manufacturer only.

After the new container has been connected to the appliance, all connections must be checked for leaks. Most of these leaks occur at the top of the gas container in areas such as:

- the valve threads,
- pressure safety device,
- valve stem
- valve outlet.

These areas must be checked using a soap and water solution. **NEVER CHECK FOR LEAKS WITH A FLAME.** It is extremely dangerous when a leak meets a flame as it could cause catastrophic consequences.

- First make sure that all connections are tight.
- Then open the container valve.
- Each connection is checked by brushing or spraying a soap and water mixture on the connection.

The connection should be checked to see if any air bubbles are present. If no air bubbles are visible there is likely no leak.

However, if bubbles are present there may be a problem with the connection.

The suspected fittings should be disconnected and cleaned. Then the connection is tightened, and the checking procedure is repeated. If the bubbles are still visible, there is a problem with the connection. The fittings should be repaired or replaced before the equipment is used again.

Occasionally, ice or moisture can build up on the regulator. Icy build-up indicates that the compressed gas is leaving the gas container in a liquid state. This is caused by a dangerous defect in the gas container. If there is ice build-up on appliance or connectors, shut off the main control valve of the fuel container, take it out of service, and return it to the supplier immediately. If the ice build-up is on the gas container itself or its control valve, you should call 911 immediately.

PART 4. PORTABLE FIRE EXTINGUISHERS (PFE)

All persons conducting hot work operations or performing fire watch must be trained in the use of portable fire extinguishers and must be capable of extinguishing fires when they are limited in size and spread such that they can readily be extinguished using a portable fire extinguisher.

A portable fire extinguisher with at least a 2-A:20-B:C rating (a minimum 3-A:40-B:C rating fire extinguisher on torch-applied roofing system operations) must be readily accessible within 30 feet of the location where hot work is performed and where the fire guards are positioned. In case of fire, 911 must be called.

In the event of a fire extinguisher has been discharged, a fully charged replacement is required before work can resume. **The C of F holder is recommended to be trained for the use of portable fire extinguisher.** Portable fire extinguishers are important in preventing a small fire from growing into a catastrophic fire, however, they are not intended to fight large or spreading fires. **The trained Certificate of Fitness holders should only consider extinguishing fires when they are limited in size and spread such that they can readily be extinguished using a portable fire extinguisher.** By the time the fire has spread, fire extinguishers, even if used properly, will not be adequate to extinguish the fire. Such fires should be extinguished by the building fire extinguishing systems or trained firefighters only. In case of any fire, FDNY must be notified. Fire extinguishers must be used in accordance with the instructions painted on the side of the extinguisher. They clearly describe how to use the extinguisher in case of an emergency. The Certificate of Fitness holder should be familiar with the use of portable fire extinguishers. When it comes to using a fire-extinguisher just remember the acronym P.A.S.S. to help make sure you use it properly. P.A.S.S. stands for Pull, Aim, Squeeze, Sweep.

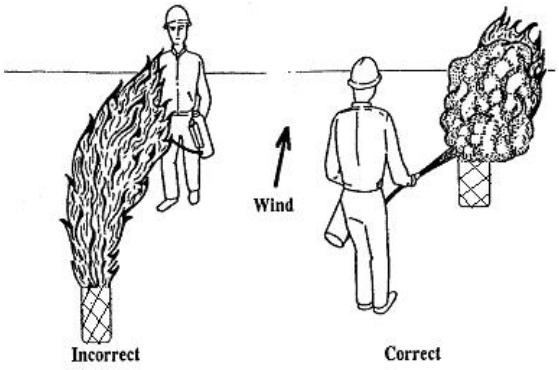
All fire extinguishers must be installed so that the top of the extinguisher is not more than 5 ft above the floor and the clearance between the bottom of the extinguisher and the floor is not less than 4 in. In other words, **no fire extinguisher is allowed to put on floor.**

Fire extinguisher in a construction site.

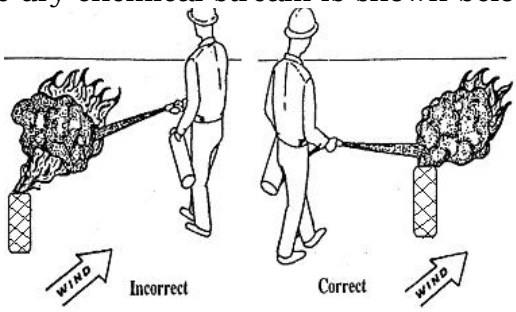
Improper floor placement of Fire Extinguisher.

4.1 Operation Instructions for a Fire Extinguisher

Special care must be taken when extinguishing a gas fire caused by a leak. The easiest way to extinguish the fire is to shut off by using the Emergency Shut Off valve until the flame is extinguished. **In case of any fire, Fire Department must be notified.** The flame must be approached from an upwind direction. This will prevent the Certificate of Fitness holder from being burned by the flames. **Never approach a fire from a downwind direction.** The correct ways to approach a fire are shown below.



The dry chemical stream must be directed toward the point where the flame begins. **Do not direct the chemical stream at the center of the flame.** This will not extinguish the fire. The correct way to direct the dry chemical stream is shown below.



For the piped gas, the gas supply must be shut off first and then call 911. This is safer than allowing the flammable gas (e.g. acetylene or LPG) to leak out. A flammable gas leak could result in a serious explosion if it were ignited. **Never attempt to extinguish the flame unless the gas supply shut. When it is not possible to shut off the gas supply (e.g. the fire is near the control valve or the shut-off valve) and the gas supply is limited (e.g. it is from a cylinder), allow the flame to burn itself out and call 911.** In the meantime, you should try to control the scene and prevent the fire spreading to the surrounding materials. **The trained Certificate of Fitness holders should only consider extinguishing fires when they are limited in size and spread such that they can readily be extinguished using a portable fire extinguisher.** By the time the fire has spread, fire extinguishers, even if used properly, will not be adequate to extinguish the fire. Such fires should be extinguished by the building fire extinguishing systems or trained firefighters only.

4.2 Fire Extinguishers

The Certificate of Fitness holder must be familiar with the different types of fire extinguishers available at the work site. The Certificate of Fitness holder must know how to operate the extinguishers in a safe and efficient manner. The Certificate of Fitness holder must also know the difference between the various types of extinguishers and when they may be used. A description of the classes of fires and the appropriate extinguishers are described below.

Class A fires are caused by ordinary combustible materials (such as wood, paper, and cloth). To extinguish a Class A fire, these extinguishers utilize either the heat-absorbing effects of water or the coating effects of certain dry chemicals.

Class B fires are caused by flammable or combustible liquids and gases such as oil, gasoline, etc. To extinguish a Class B fire, the blanketing-smothering effect of oxygen-excluding media such as CO_2, dry chemical or foam is most effective.

Class C fires involve electrical equipment. These fires must be fought with fire extinguishers that do not conduct electricity. Foam and water type extinguishers must not be used to extinguish electrical fires. After shutting off the electrical equipment, extinguishers for Class A or B fires may be used.

Class D fires are caused by ignitable metals, such as magnesium, titanium, and metallic sodium, or metals that are combustible under certain conditions, such as calcium, zinc, and aluminum. Generally, water should not be used to extinguish these fires.

A multi-purpose dry chemical fire extinguisher may be used to extinguish more than 2 Classes fires. Examples of some fire extinguishers are shown below.

Examples of fire extinguishers

10-B:C (10BC)	3-A:40-B:C(3A40BC)	3-A:40-B:C(3A40BC), wheeled
		

4.3 Typical Fire Extinguishers

Symbols may also be painted on the extinguisher. The symbols indicate what kind of fires the extinguisher may be used on. Examples of these symbols are shown below.

CLASSES OF FIRES	TYPES OF FIRES	PICTURE SYMBOL
A	Wood, paper, cloth, trash & other ordinary materials.	
B	Gasoline, oil, paint and other flammable liquids.	
C	May be used on fires involving live electrical equipment without danger to the operator.	
D	Combustible metals and combustible metal alloys.	D
K	Cooking media (Vegetable or Animal Oils and Fats)	

Fire Extinguisher Identification Symbols

The symbol with the shaded background and the slash indicates when the extinguisher must not be used. The Certificate of Fitness holder must understand these symbols. All fire extinguishers should be kept in good working order at all times.

4.4 Fire Extinguisher Tags

Installed portable fire extinguishers must have an FDNY standard PFE tag affixed. This tag will have important information about the extinguisher. By November 15, 2019, all portable fire extinguishers must have the new PFE tags. The FDNY will only recognize new PFE tags and will be issuing violations to business that have PFE installed without a proper tag.

The color of the fire extinguishers may be changed by the FDNY every few years. The FDNY recommends two ways to verify the tag's legitimacy:

1. Hologram:

A real hologram strip shown on the tag is 3 inches long by ¼ inch wide. Counterfeit tags will NOT have a high-quality silver hologram. The hologram on a counterfeit tag will NOT change color as it is moved against the light.

2. QR code

IF you scan the QR code, it should direct you to the updated FDNY approved fire extinguisher company list. You can use the company list to verify if the company printed on the list is currently approved by the FDNY.

If your PFE tags cannot be verified via these two methods, contact your supervisor. If you suspect your PFE is a counterfeit, contact FDNY immediately by e-mail: Tags.Decal@fdny.nyc.gov

PFE tag (This tag was released for 2021-2023)

Fire Department also issues standard outdoor fire extinguisher tags. If the fire extinguishers may be placed outdoors, the COF holder should ask the fire extinguisher suppliers to provide the outdoor fire extinguisher tags for the fire extinguishers.

The special features of the outdoor tags:

1. The material is durable and tear-resistant
2. Different printings:
    - On the back of the tag, the series number will contain a “D” letter;
    - On the front of the tag, an “O” is printed on the top of the tag (this feature may not be on ALL outdoor tags)

Outdoor PFE tags

4.5 Portable Fire Extinguisher Inspections

MONTHLY

Portable fire extinguishers must be kept in good working order at all times. The extinguishers are required to be inspected monthly. The building owner is responsible to designate a person to perform a monthly inspection, which may or may not be the C-14 Certificate of Fitness holders. This monthly inspection is called a "quick check".

The **QUICK CHECK** should check if:
(1) the fire extinguisher is fully charged;
(2) it is in its designated place;
(3) it has not been actuated or tampered with;
(4) there is no obvious or physical damage or condition to prevent its operation.

The information of the monthly inspection record must include the date of the inspection, the name/initials of the person who did the inspection. This monthly quick check record must be kept on the back of the PFE tag or by an approved electronic method that provides a permanent record.

ANNUALLY

At least annually all Portable Fire Extinguishers must be checked by a W-96 Certificate of Fitness holder from FDNY approved company. After each annual inspection W-96 COF holder will replace the PFE tag. The information of the annual inspection record must be indicated on the new PFE tag.

Part 5: Lithium-Ion Battery Safety

Lithium-ion safety

Lithium-ion batteries are rechargeable batteries found in electric bikes, scooters, cars, laptops, tablets, phones, and many other common household devices.

Lithium-ion battery fires have caused deaths, serious injuries, and devastating damage to property around the city. It's important to follow rules for safe storage, charging, and disposal for these types of batteries.

If you own a lithium-ion powered device or plan to buy one, the FDNY has important safety tips that you should follow. These tips apply to all devices powered by lithium-ion batteries, including phones, tablets, laptops, e-cigarettes, toys, high-tech luggage, and even robotic vacuum cleaners.

Immediately stop using or charging battery and call 911 if you notice:

- **Fire or Smoke**
- **Overheating**
- **Change in color or shape**
- **Odd noises**
- **Leaking**
- **Strange smell**

ALWAYS:

- purchase and use devices certified by a Nationally Recognized Testing Laboratory (NRTL).
- follow the manufacturer's instructions for:
  - charging and storage.
  - correct battery, cord, and power adapter
- keep exit path clear at all times.
- plug directly into a wall electrical outlet for charging.
- keep batteries and devices at room temperature.
- store and/or charge batteries away from anything flammable.
- keep away from heat sources.
- bring batteries to a **NYC Battery Recycling Center.** Visit nyc.gov/batteries for more information.

NEVER:

- use aftermarket batteries or chargers.
- use damaged or altered batteries
- plug into a power strip or overload an outlet.
- overcharge or leave battery charging overnight.
- charge a battery or device under your pillow, on your bed, or near a couch.
- leave e-bikes or e-scooters unattended while charging.
- block your primary way in or out of a room/space with e-bikes, e-scooters, wheelchairs, etc.
- place batteries in Trash or Recycling bin. **It is ILLEGAL.** Visit nyc.gov/batteries for disposal locations and information.

In the event of a Fire, Leave and CLOSE the door. Call 911 once you are in a safe location.

Charging Lithium Ion

Lithium-ion batteries do not have to be fully charged; partial charge is the most suitable.

When **charging more than five (5)** personal mobility devices or their removable batteries, it must be in a **dedicated room with ventilation** and a self-closing door.

For a total battery capacity of 20 kilowatt-hours (kWh), a 2-foot separation between charging batteries is required. For a total battery capacity up to 50 kWh, a 3-foot separation is needed.

Chargers must only be used with a compatible battery pack. The original equipment manufacturer (OEM) charger interplays with the battery pack using the battery management system (BMS). The wrong battery/charger combination may not work safely. For example, the 100% cutoff to prevent overcharging, which damages batteries, may not work which can easily create hazardous conditions such as fires, explosions and/or injuries.

Always check with the manufacturer or retailer of the personal mobility device, an authorized repair shop or a testing laboratory such as Underwrites Laboratories (UL) to see if replacement is recommended or listed and safe for use with that device. Using unauthorized parts, including batteries and/or chargers, may cause damage, fire and possibly void your warranty.

Extinguishing Lithium-ion

Water may not prevent a battery from burning and spreading. Battery cells are known to explode and quickly spread to another battery. It can spread to another devices.

Fire Extinguishers
do not work
on lithium-ion batteries fires.

Unexpected Re-ignition.

Reignition is common. Lithium-Ion Batteries are known to unexpectedly re-ignite (without warning) minutes, hours and even days after all visible fire has been put out.

Lithium-ion batteries can enter an uncontrollable, self-heating state. This can result in the release of gas, cause fire and possible explosion.

These batteries may continue to generate heat even when there is no visible sign of fire. Once heat reaches a certain level fire may reignite on the battery and surrounding area.