Revised on 10/08/15

FIRE DEPARTMENT • CITY OF NEW YORK

STUDY MATERIAL FOR THE CERTIFICATE OF FITNESS EXAMINATION

G-22

USE OF LPG OR CNG IN POWERED INDUSTRIAL TRUCK OPERATIONS

The new LPG and CNG tests are listed below. Applicants who apply any of the following tests need to read the new study material:

Use of LPG/CNG in Powered Industrial Truck Operations (**G-22**) on **page 1-28 and 46-49**
Use of LPG/CNG at Outdoors Events and Mobile Cooking (**G-23**) on **page 1-28 and 40-43**
Use of LPG/CNG in Emergency Indoor Repair (**G-24**) on **page 1-28 and 50**
Use of LPG in Hot-Air Balloon (**G-34**) on **page 1-28 and 51**
Use of LPG/CNG in Manhole Operations (**G-36**) on **page 1-28 and 44-45**
Storage, Use and Handling Use of LPG/CNG for Tar Kettles, Asphalt Melter and Marking Street Line (**G-40**) on **page 1-28 & page 34-39**
Storage and Handling of LPG/CNG (**G-44**) on **page 1-33**

The relationship between the previous C of Fs and the new C of Fs:

Previous C of Fs	New C of Fs
Use of LPG in Heating Devices (G-96)	For curing heating: S-92 For manhole heating: G-36 For mobile cooking: G-23 For heating device in roofing or street repair: G-40
Use of LPG in HI-LO (Forklifts) (G-22)	Use of LPG/CNG in Powered Industrial Truck Operations (G-22)
Fuel at Outdoors Events (G-23)	Use of LPG/CNG at Outdoors Events and Mobile Cooking (G-23)
Use of LPG in Emergency Repairs (G-96)	Use of LPG/CNG in Emergency Indoor Repairs (G-24)
Use of LPG in Mobile Units (G-96)	Use of LPG/CNG at Outdoors Events and Mobile Cooking (G-23)
Use of LPG for Concrete Drying (G-27)	Portable Fueled Space Heaters at Construction Sites (S-92)
	Use of LPG in Hot-Air Balloon (G-34)
Use of LPG in Manhole Operations (G-36)	Use of LPG/CNG in Manhole Operations (G-36)
Use of LPG in Street Repair Units/Traffic Lines (G-96)	Storage, Use and Handling Use of LPG/CNG for Tar Kettles, Asphalt Melter & Marking Street Line (G-40)
Use of LPG for Tar Kettles (G-40)	
Storage and Handling of LPG (G-44)	Storage and Handling of LPG/CNG (G-44)

All Certificate of Fitness (including previous C of F and new C of F) listed above are renewable and acceptable by the FDNY under its specified category. However, **G-96 test is no longer available (even it is still renewable and acceptable)**. The new applicants who ask for G-96 test should take one of the 5 possible tests based on his/her job requirements:

(1) G-40: possible job functions: roofing, asphalt melter, street repair, marking street line
(2) S-92: possible job functions: Portable fueled space heaters at construction sites
(3) G-23: possible job functions: Mobile cooking
(4) G-36: possible job functions: Manhole operation
(5) G-24: possible job functions: Emergency repairs

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NOTICE OF EXAMINATION

Title: **CERTIFICATE OF FITNESS FOR:**

G-22: Use of LPG/CNG in Powered Industrial Truck Operations

Date of Exam: Written exams are conducted Monday through Friday (except legal holidays) 8:00 AM to 2:30 PM.

REQUIREMENTS FOR WRITTEN EXAM

Applicants who need to take the exam must apply in person and bring the following documents:

1. Applicants must be at least 18 years of age.
2. Applicants must have a reasonable understanding of the English language.
3. Applicant must provide two forms of identifications; at least one identification must be government issued photo identification, such as a State-issued Driver's License or Non Driver's License or a passport.
4. Applicants must present a letter of recommendation from his/her employer. The letter must be on official letterhead, and must state the applicant's full name, experience and the address where the applicant will work. If the applicants are self-employed or the principal of the company, they must submit a notarized letter attesting to their qualifications. For more info: http://www.nyc.gov/html/fdny/html/c_of_f/cof_requirements.shtml
5. Applicants must present a completed application for certificate of fitness (A-20 Form). http://www.nyc.gov/html/fdny/pdf/a20.pdf
6. Applicants not currently employed may take the exam without the recommendation letter. If the applicants pass the exam, FDNY will issue a temporary letter with picture for the job seeking purpose. The C of F card will not be issued unless the applicants are employed and provide the recommendation letter from his/her employer.
7. **APPLICATION FEE:**

   Pay the **$25** application fee in person by one of the following methods:

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

   For fee waivers submit: ***(Only government employees who will use their C of F 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

   A convenience fee of 2.49% will be applied to all credit card payments.

8. **EXAM INFORMATION**

   The **G-22** exam will consist of **25** multiple-choice questions. It will be administered on a "touch screen" computer monitor. It is a time-limit exam. 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://www.nyc.gov/html/fdny/pdf/cof_study_material/g22_st_mat.pdf

9. If all the requirements are meet and pass the exam a certificate will be issued the same day. Applicant who fails the exam will receive a failure report. To retake the exam applicants will need to submit a new application and payment.

RENEWAL REQUIREMENTS

This Certificate of Fitness must be renewed every ***THREE YEARS***. The renewal fee is **$15**. FDNY also reserves the right to require the applicants to take a re-examination upon submission of renewal applications.

You will receive a courtesy notice of renewal 90 days before the expiration date. However, it is your responsibility to renew your Certificate. It is very important to renew your C of F before it expires. Renewals submitted 90 days (up to one year) after the expiration date will incur a $25 penalty in addition to the renewal fee. Certificates expired over one year past expiration date will not be renewed. New exams will be required.

To change a mailing address:

- Submit a letter requesting the change of mailing address and a copy of your C of F with $5.00 fee.

To change a work location,

- Submit a letter from your current employer (on company letterhead) confirming that you are an employee and stating your new work location with a copy of your C of F and a $5.00 fee

To request a replacement certificate:

- Submit a driver's license or passport, social security number, mailing address and a $5.00 fee.

The certificate can be renewed **On-line**, **by Mail** or **in Person**.

- **Renewal online**

If you are an individual, make sure you have your 12 digit Certificate of Fitness Access ID. This can be found on your Renewal Notice. If you do not have your Renewal Notice, your Access ID is your 8 digit Certificate of Fitness number and the last four digits of your social security number. If you are submitting renewals on behalf of a company's employees, the company must be approved by FDNY and have an 8 digit Company Code. To request approval, email pubrenew@fdny.nyc.gov.

Renewal fee can be paid by one of the following methods:

- Credit card (American Express, Discover, MasterCard, or Visa)
- Debit card (MasterCard or Visa)
- E-check

A fee exempted applicants cannot renew online only by mail or in person.

If all the requirements are met, the certificate of fitness will be mailed out within 10 days. For online renewal go to: **https://a836-citypay.nyc.gov/citypay/FDNYCOF**

- **Renewal by mail**

Mail your Renewal Notice (if you did not receive a Renewal Notice, a copy of your certificate), along with your fee payment

Personal or company check or money order (made payable to the NYC

Fire Department)

For fee waivers submit: ***(Only government employees who will use their C of F 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

and if applicable, supporting documents to:

NYC Fire Department (FDNY)
Cashier's Unit
9 MetroTech Center, 1st Floor
Brooklyn, NY 11201

If all the requirements are met, the certificate of fitness will be mailed out within four to six weeks.

- **Renewal in person**

Submit your Renewal Notice (or if you did not receive a Renewal Notice, a copy of your certificate), along with your fee payment by one of the following methods:

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

For fee waivers submit: ***(Only government employees who will use their C of F 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

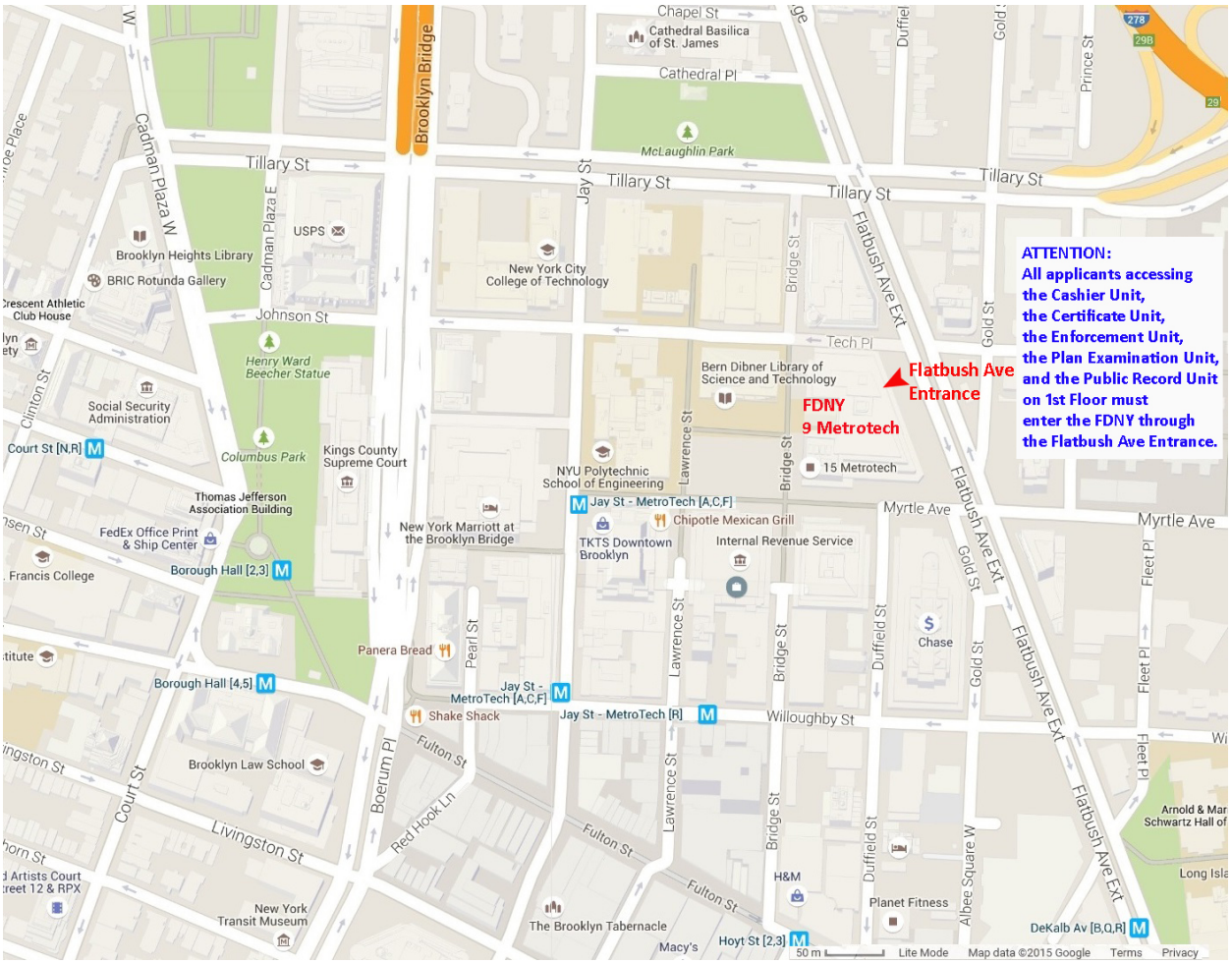
and if applicable, your supporting documents to:

NYC Fire Department (FDNY)
Cashier's Unit
9 MetroTech Center, 1st Floor
Brooklyn, NY 11201

If all the requirements are met, the certificate of fitness will be issued the same day.

A convenience fee of 2.49% will be applied to all credit card payments for original or renewal certificates.

<u>EXAM SITE</u>: FDNY Headquarters, 9 MetroTech Center, Brooklyn, NY. Enter through the **Flatbush Avenue entrance (between Myrtle Avenue and Tech Place)**.



STUDY MATERIAL AND TEST DESCRIPTION

About the Study Material

This study material will help you prepare for 7 examinations for the Certificate of Fitness for different handling and using Liquefied Petroleum Gases (LPG) and Compressed Natural Gas (CNG). The study material includes information taken from the Fire Prevention Code of the Bureau of Fire Prevention. The study material does not contain all of the information you need to know to work with LPG/CNG. 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.

Sample Questions

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. You would touch "C" on the computer terminal screen.

INTRODUCTION

This document outlines New York City Fire Department regulations for the storage, handling and use of Liquid Petroleum Gas (LPG) and Compressed Natural Gas (CNG). LPG/CNG is widely used as a fuel in heating appliances and vehicles. Because they are pressurized and flammable, LPG and CNG are considered as hazardous gases. The document also outlines the special regulations for different LPG/CNG applications in either construction site or other outdoor heating equipment.

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, the name of the Certificate of Fitness holder, and the number and expiration date of the Certificate of Fitness.

Example of LPG container with a capacity of 16.4 ounces (e.g. camping style tank)	Example of LPG container with a capacity of 20 lbs (e.g. BBQ tank)	Example of LPG container with a capacity of 100 lbs

Permit

Storage, handling or use of more than 400 SCF (Standard Cubic Foot) of LPG/CNG needs a permit. For LPG, 400 SCF is approximately 47 lbs. The following table lists the number of LPG containers for storage or use or 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
16.4 oz	46
20 lbs	3
33.5 lbs	2
40 lbs	2
100 lbs	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 defined in the Building code): Residential occupancies, Factory and industrial occupancies; Educational occupancies; Institutional occupancies, except as the commissioner may authorize by rule.

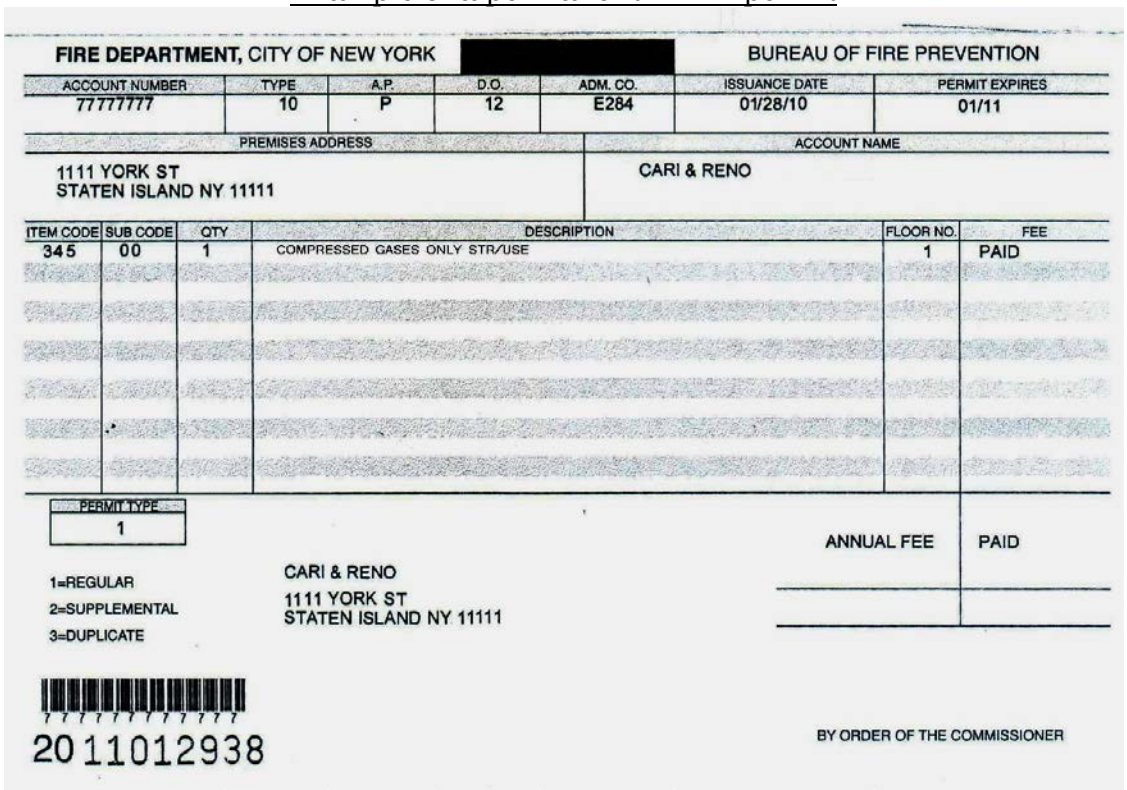
A LPG/CNG permit will not be issued by the FDNY for a stationary LPG/CNG installation located in an area where access to piped natural gas from a public utility is available.

Types of Permits (FC 105.6)

(1) Site-specific permit

Such permit authorizes the permit holder to store, handle, use LPG/CNG or conduct an operation (e.g. manhole operation; tar kettle or asphalt melter; forklift) at a specific premises or location. A site-specific permit may be a permanent permit or a temporary permit. Permanent permits are valid for 12 months only. Every permit or renewal shall require an inspection and shall expire after twelve months. Temporary permit may be valid from one day to 12 months depends on the construction/operation need. For example, a one-week temporary permit may be issued to a construction work which only takes one week; a one-day temporary permit may be issued to a street fair event.

Example of a permanent FDNY permit



FIRE DEPARTMENT, CITY OF NEW YORK [redacted] BUREAU OF FIRE PREVENTION

ACCOUNT NUMBER	TYPE	A.P.	D.O.	ADM. CO.	ISSUANCE DATE	PERMIT EXPIRES
77777777	10	P	12	E284	01/28/10	01/11

PREMISES ADDRESS	ACCOUNT NAME
1111 YORK ST STATEN ISLAND NY 11111	CARI & RENO

ITEM CODE	SUB CODE	QTY	DESCRIPTION	FLOOR NO.	FEE
345	00	1	COMPRESSED GASES ONLY STR/USE	1	PAID

PERMIT TYPE: 1

1=REGULAR
2=SUPPLEMENTAL
3=DUPLICATE

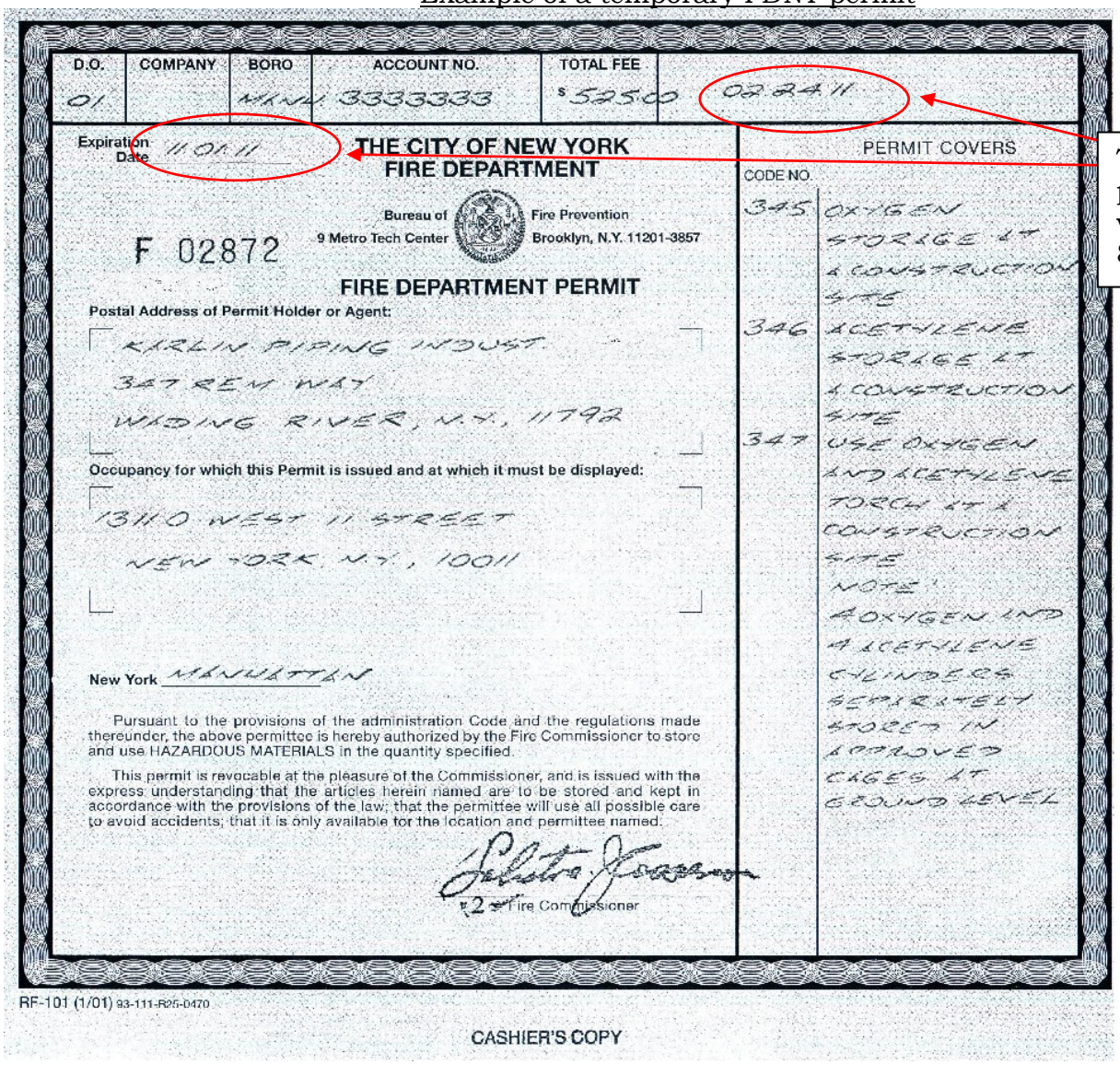
CARI & RENO
1111 YORK ST
STATEN ISLAND NY 11111

ANNUAL FEE PAID

20 11012938

BY ORDER OF THE COMMISSIONER

Example of a temporary FDNY permit



D.O.	COMPANY	BORO	ACCOUNT NO.	TOTAL FEE	
01		MNH	3333333	$525.00	02 24 11

Expiration Date 11 01 11

THE CITY OF NEW YORK
FIRE DEPARTMENT

Bureau of Fire Prevention
9 Metro Tech Center Brooklyn, N.Y. 11201-3857

F 02872

FIRE DEPARTMENT PERMIT

Postal Address of Permit Holder or Agent:
KARLIN PIPING INDUST.
347 REM WAY
WADING RIVER, N.Y., 11792

Occupancy for which this Permit is issued and at which it must be displayed:
1310 WEST 11 STREET
NEW YORK, N.Y., 10011

New York MANHATTAN

Pursuant to the provisions of the administration Code and the regulations made thereunder, the above permittee is hereby authorized by the Fire Commissioner to store and use HAZARDOUS MATERIALS in the quantity specified.

This permit is revocable at the pleasure of the Commissioner, and is issued with the express understanding that the articles herein named are to be stored and kept in accordance with the provisions of the law; that the permittee will use all possible care to avoid accidents; that it is only available for the location and permittee named.

Fire Commissioner

PERMIT COVERS

CODE NO.	
345	OXYGEN STORAGE AT A CONSTRUCTION SITE
346	ACETYLENE STORAGE AT A CONSTRUCTION SITE
347	USE OXYGEN AND ACETYLENE TORCH AT A CONSTRUCTION SITE
	NOTE: 4 OXYGEN AND 4 ACETYLENE CYLINDERS SEPARATELY STORED IN APPROVED CAGES AT GROUND LEVEL

RF-101 (1/01) 93-111-R25-0470

CASHIER'S COPY

This temporary permit is only valid for about 8 months.

(2) Citywide permit
A city-wide permit is valid up to 30 days and all LPG/CNG containers must be removed from the site at the end of each workday. A new application must be submitted if a single job will last more than 30 days.

A site-specific permit must be obtained for LPG/CNG storage, handling and use on a construction site, except that a citywide LPG/CNG permit may be obtained for tar kettle, asphalt melter and torch operations where no reserve storage is needed and LPG/CNG containers are removed from the site at the end of each workday, and the construction work requiring LPG/CNG use is to be completed within 30 days of commencement.

All permits are not transferable and any change in occupancy, operation, tenancy or ownership must require 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. All Permits

and Certificates of Fitness shall be readily available on the premise for inspection by Fire Department representatives.

This booklet consists of seven parts. The test covers the booklet and any tables. **The booklet will not be available during the test. It is critical that you read and understand this booklet to help increase your chance of passing this exam.**

The storage, handling and use of LPG and CNG are required to comply with the following Fire Code and Rules:

- Compressed Natural Gas: **[FC Section 3508]**
- Liquefied Petroleum Gases: **[FC Chapter 38]**
- Liquefied Petroleum Gas Code: **[NFPA 58, 2008 edition]**
- Tar Kettle: **[FC Section 303]**
- Compressed Natural Gas: **[Rule 3507-01]**
- Liquefied Petroleum Gases: **[Rule 3809-01]**

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.

CNG. Compressed natural gas.

COMPRESSED GAS. A material, or mixture of materials, that is a gas at 68°F or less at 14.7 psia of pressure; and has a boiling point of 68:F or less at 14.7 psia that is either liquefied, nonliquefied 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 at 68°F. Compressed gases shall be classified as follows:

Nonliquefied 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.

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

Compressed gases in solution. Nonliquefied 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.

ELECTRIC BARBECUE. Any device designed for heating or cooking food on an open grate cooking surface above exposed heating elements. An electric grill that has its heating elements embedded within a solid cooking surface is not an electric barbecue.

FLAMMABLE GAS. A material which has a boiling point and becomes a gas at 68°F (20°C) or less at 14.7 pounds per square inch absolute (psia) (101 kPa) of pressure which:

1. Is ignitable at 14.7 psia (101 kPa) when in a mixture of 13 percent or less by volume with air, in accordance with testing procedures set forth in ASTM E 681; or
2. Has a flammable range at 14.7 psia (101 kPa) with air of at least 12 percent, regardless of the lower explosive limit, in accordance with testing procedures set forth in ASTM E 681.

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

LIQUEFIED PETROLEUM GAS (LPG). 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) shall be deemed to be an LPG.

OPEN FIRES. The burning of materials wherein products of combustion are emitted directly into the ambient air without passing through a stack or chimney from an enclosed chamber. For the purpose of this definition, a chamber shall be regarded as enclosed when, during the time combustion occurs, only apertures, ducts, stacks, flues or chimneys necessary to provide combustion air and permit the escape of exhaust gas are open.

OPEN FLAME. A flame that is generated by any material or device in a sustained and controlled manner and that is not securely enclosed by noncombustible material, such as a candle that is unenclosed or enclosed in a globe or lantern, or a gas light lantern, but not a flame contained in a

furnace or other similar approved device, equipment or system. Torches operated in accordance with FC Chapter 26 and lighted smoking paraphernalia shall not be considered an open flame.

POWERED INDUSTRIAL TRUCK. A forklift, tractor, platform lift truck or motorized hand truck powered by a lead-acid battery system, a metal hydride hydrogen storage system or an internal combustion engine. Powered industrial trucks do not include farm vehicles or motor vehicles for highway use.

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

TAR KETTLE. A device designed to heat tar, asphalt, pitch or similar materials, typically for waterproofing operations, that, utilizing a flammable gas or a combustible liquid, generates a flame to heat a vessel containing such a material. Tar kettle does not include asphalt melters.

PART 1. COMPRESSED GASES

LPG and CNG are potential hazards because of the pressure within the container, their flammability, and/or their toxicity. The chemical is in gaseous form and pressurized, it can quickly contaminate a large area in the event of a leak.

1.1 Handling, Use, and Storage of Compressed Gas

1.1.1 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.**

In addition, store, handle or use 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. On the other hand, store, handle or use 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
The 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.

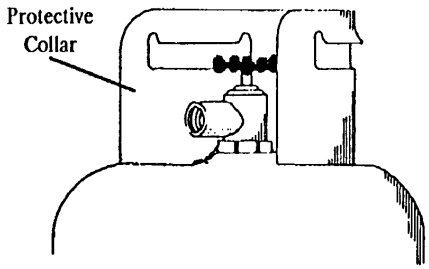
(3) Upright position
All LPG/CNG containers must be secured in an upright position and must not be stacked or stored on shelves. The gas containers should be maintained in an upright position when being used. This is true for both the portable and the manifold system. The gas containers used for on-sites jobs are usually secured on a handtruck. The containers are less likely to be damaged when secured to a handtruck. The handtruck 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, and 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 shall not be used in a cellar, basement, pit or other area below grade. LPG containers shall 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 shall not 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. The 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.

1.1.2 Prohibitions

Description	LPG	Exception	CNG	Exception
Store, handle or use it in a basement, cellar or other **below grade area**	Prohibited	Emergency indoor Repairs (but not allowed in an occupied place of public assembly), manhole operation	Prohibited	Emergency indoor Repairs (but not allowed 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 (but not allowed in an occupied place of public assembly)	Prohibited for any CNG container with a capacity greater than 8.7 SCF	Emergency indoor Repairs (but not allowed in an occupied place of public assembly)
Store the containers on the **roof** of any building	Prohibited		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 Repairs (but not allowed in an occupied place of public assembly)/Asphalt melter	Prohibited for any CNG containers with a capacity greater than 8.7 SCF	Emergency Repairs (but not allowed 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	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		Prohibited	
Store, handle or use it for **space heating or water heating**	Prohibited	Residentially occupied moored vessels	Prohibited	Residentially occupied moored vessels
Use **non-metallic pipe**, tubing and components	Prohibited	Construction sites, emergency indoor repairs, manhole operations, street fair	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		Prohibited	Fill the permanently mounted CNG containers on CNG-powered vehicles

1.1.3 Related Equipment

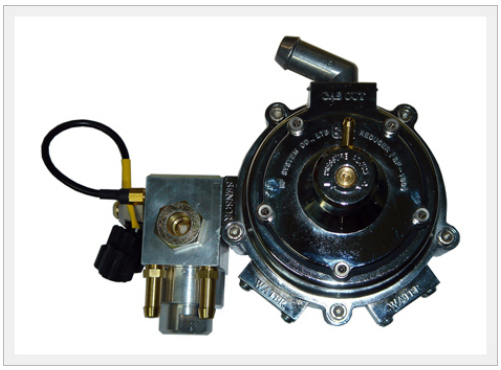
(1) Control valve

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

(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 container 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 below.

A Typical Regulator of LPG Container	A Typical Regulator of CNG Container
	

(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. Generally speaking, 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. (NFPA 58 6.22.3.2)

Piping in systems must be run as directly as is practical from one point to another, with as few fittings as practical. The use of nonmetallic pipe tubing, or hose for permanently

interconnecting gas containers is prohibited. All piping and tubing must be protected against damage by vehicles and by corrosion-causing substance.

1.1.4 Moving Compressed Gas Containers

CNG/LPG containers must not be moved unless the **container's valves are closed**, except when the container is mounted on a motor vehicle for use as a fuel for motive power. **A compressed gas container must not be rolled on its side or its rim**. It must be moved only by using approved lifting equipment. Containers must never be dropped or thrown from any height. Before transporting any compressed gas containers make sure that the valves are tightly closed.

Compressed gas containers should be moved in an upright position, and must be moved using an approved method. Where containers are moved by hand cart, the hand truck or other mobile device must be designed for the secure movement of containers. Carts and trucks utilized for moving compressed gas containers outdoors must be designed so that the containers will be secured against dropping, or otherwise striking against each other or other surfaces. Ropes, chains or slings must not be used to suspend compressed gas containers unless such containers have been designed for such handling. Valves of compressed gas containers must not 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.

Compressed gas containers must be moved using an approved method.

If the compressed gas containers need to be transported between floors, if possible use an elevator (e.g. freight elevator, construction elevator, or passenger elevator when approved), and such elevator shall be occupied by the minimum number of persons.

All compressed gas containers may be transported only in approved vehicles. A FDNY transportation permit issued by the Bureau of Fire Prevention 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.

1.1.5 Separation from hazardous conditions

All compressed gas containers and systems in storage or use shall 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) or whether containers are full or empty, if they are stored at the same location.

Generally, the compressed gas containers shall 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

1.2 GENERAL DESCRIPTION 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 is butane and propane. LPG is often referred to as "Bottled Gas". LPG is 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 shall be under the general supervision of a person holding a Certificate of Fitness.

1.2.1 DESCRIPTION OF LIQUID PETROLEUM GAS

Manufacturing 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). The additive causes LPG to smell like rotten eggs. This odor allows a leak of LPG to be easily detected. LPG is extremely flammable and highly explosive if ignited in an enclosed area. LPG is non-toxic, however, it can cause suffocation. **LPG is heavier than air** and tends to fall to the ground and spread horizontally. The use of LPG in a liquid form is prohibited in New York City, except withdrawing of LPG in liquid form from an LPG container for hot air balloon operations if required by the nature of the operation.

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.

1.2.2 DESCRIPTION OF LPG CONTAINERS

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. **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. Any containers with the bottoms of the skids or runners above the ground should be provided fire-resistive supports. Non-fire-resistive supports are only allowed when the Fire Department permits and the height of the outside bottom of the container does not exceed 5 feet above ground. (NFPA 58 6.6.5.4) LPG is sensitive to temperature change. Very low temperature may inhibit the proper function of the gas. The reason is that LPG vaporizes at the temperature above 24°F-27°F (dependent on the gravity). If the temperature is below the vaporization point, it will not vaporize and it will remain a solid. Different LPG has different vapor temperature because of its different mixture components. For example, propane, the principal component of most LPG, has a temperature of vaporization of -44 °F at atmospheric pressure, but the temperature of vaporization of butane (also at atmospheric pressure) is much higher, +32 °F. As a result, once you need to use any LPG at a temperature below 32 °F, you should consult with the manufacturer for the boiling point of the LPG you use. 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.(NFPA 58 6.19.4.6) An example of a typical LPG container is shown below.

A Typical LPG Container

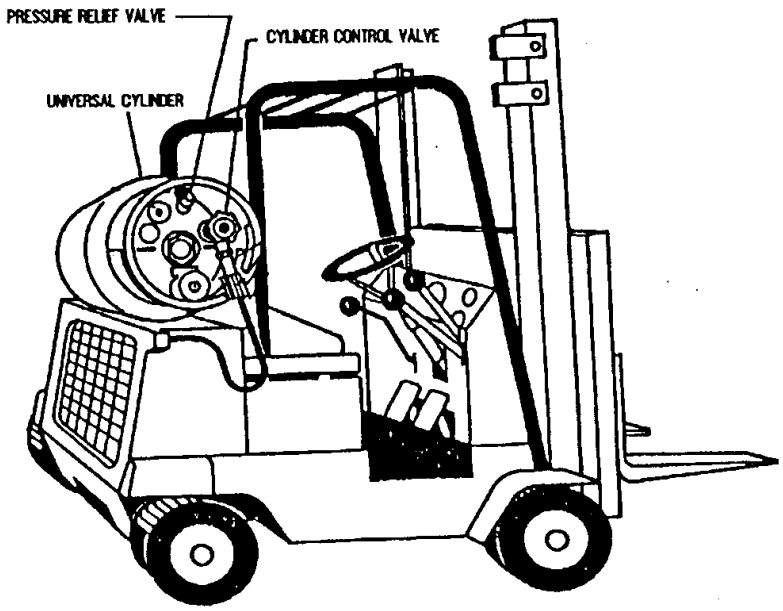
Markings

Several markings are made by stamping, embossing, or using self-adhesive stickers or by spraying onto a form. They may be placed on the flowing parts or their combinations: collar, neck, base, body or a steel plate welded onto the container. LPG Container must be marked with the water capacity of the container in pounds and the tare weight (weight of the container with the valve and surface finish) in pounds. Normally, LPG containers are also marked with the manufacturer's mark; DOT identification number; serial number assigned by the manufacturer; date of the first test (month/year or month-year , e.g. 05/2007 or 5-07); date of the first periodical test. In addition to markings, warning labels must be applied to all LPG containers of 100 lb capacity or less that are not filled on site and they must include information on the potential hazards of LPG.

Two Types of LPG Containers

There are two types of LPG containers. One type is known as the **STANDARD-**type container. A pressure relief valve is installed on the top of the standard LPG container. The pressure relief valve opens when the pressure in the tank becomes too great for safe operation. The valve allows the excess pressure to escape into the atmosphere. The relief valve closes when the pressure in the container returns to a safe level. The relief valve will operate properly only if the container is in the upright position. If the container is not upright, liquid gas will escape from the container. Therefore, **the standard type container must always be kept in an upright position when it is being used or transported**.

The other type of container is called the **UNIVERSAL**-type container (or forklift LPG container). The universal type container may be used either in an upright or a horizontal position. A special pressure relief valve is installed on the universal type container. Universal type containers are used when it is difficult to maintain a standard type container in an upright position. For example, a universal container may be used to fuel a forklift truck. The container is usually strapped horizontally to the rear of the forklift truck as shown below.



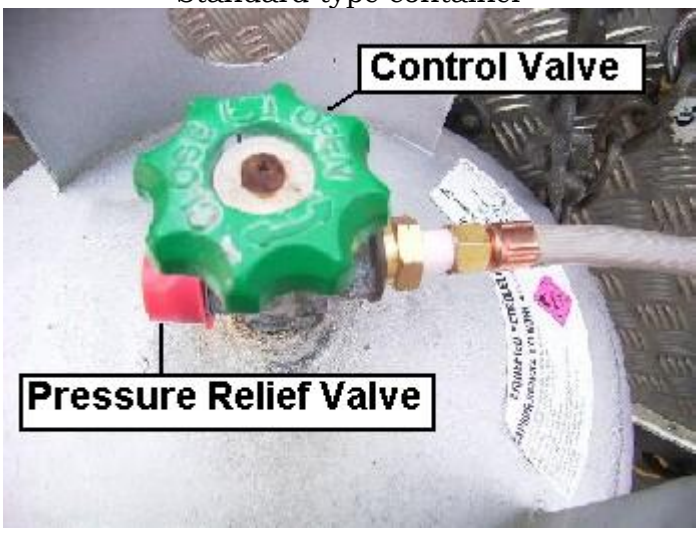
A Typical Forklift Truck

1.3 USING LPG

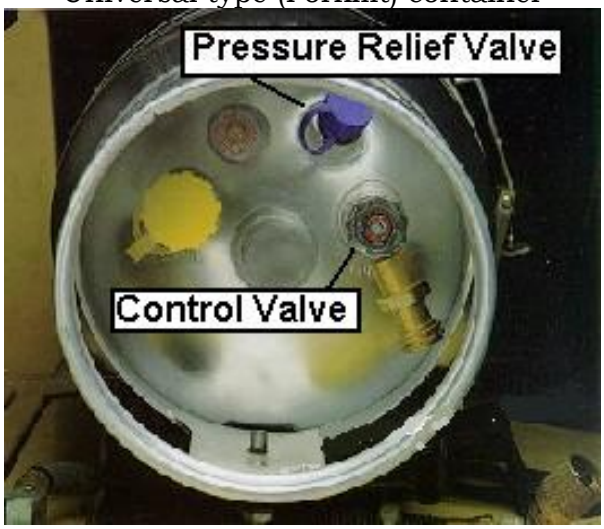
1.3.1 Control Valve and Pressure Relief Valve

The LPG is released from the container by opening the control valve. **The control valve must be opened by hand.** The valve should be opened carefully to make sure that the valve is not damaged. The control valve is opened by turning the valve two full revolutions in a counter-clockwise direction. **The valve must never be forced open by using a wrench.** The valve must not be forced past the fully open position since that might damage the valve.

Standard type container



Universal type (Forklift) container



The **pressure relief valve** opens to allow the LPG 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.

1.3.2 Regulator and Quick Release Connector

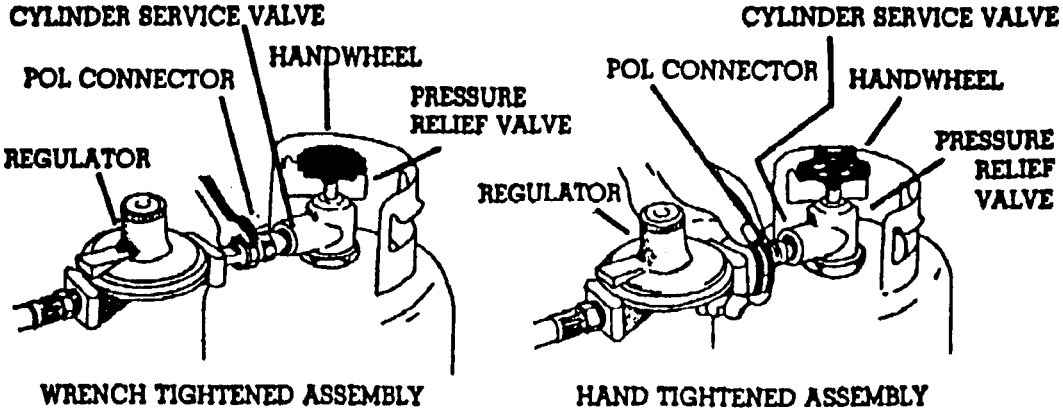
The regulator must be installed before any LPG container is used to fuel any appliance. The Regulator is one of the most important parts of a LPG system. The purpose of the regulator is to control the flow of gas and lower the pressure from the container to the appliance. The regulator not only acts as a control regarding the flow and distribution of LPG but also as a safety barrier between the high pressure of the container and the end use appliance.

Always select the regulators recommended by the manufacturer. Do not interchange regulators between different sizes/types of LPG container without consulting the manufacture. **Do not open the container valve or regulator tap until the regulator is securely attached**.

The regulator controls the discharge rate of LPG from the container. The discharge rate of the regulator is factory-set and should never be adjusted. An example of a typical regulator is shown below.

A Typical Regulator

The regulator is threaded into the control valve at the top of the LPG container. These connections have left-handed threads. They are tightened by turning the assembly counter-clockwise. Some connections may be tightened by hand only. Other connections must be tightened with a wrench. An example of each type of connection is shown below.



A rubber slip connection is prohibited in LPG containers. Flexible nonmetallic hose may be allowed at some applications (e.g. construction sites, emergency indoor repairs, manhole operations, etc.) However, the length of the hose must not exceed 30 feet when the activity is performed outdoors or not exceed 6 feet if the activity is performed indoors. The nonmetallic hose also must be DOT approved hoses designed for a working pressure of not less than 250 psi when the activity is being performed outdoors or 350 psi when it is being performed indoors.

This is designed for a rubber slip which is prohibited.

A quick release connection set may be used to connect the regulator to the control valve. This allows the user to make the connection without the use of tools. An example of a quick release connection set is shown below.

This hose is with a couple-safe quick connect. A is the gas appliance connector which connects to any appliance using LPG. B is the regulator connector designed to fit a gas regulator.

1.3.3 Excess Flow Check Valve

When LPG is used as fuel for forklifts or for other purpose, such as marking traffic lanes or cooking equipment in mobile units, the excess flow check valve must be an integral part of the LPG container. The excess flow check valve acts as a safety device when the control valve is open. It also shuts off the gas supply to the appliance (grill, heater, or forklift) when the regulator is physically damaged. For example, the excess flow check valve will shut off the gas supply if the LPG container falls and the regulator is damaged in the fall. The excess flow check valve may also shut off the gas supply when the container control valve is opened to quickly. The Certificate of Fitness holder is responsible to ensure if the excess flow check is installed by the manufacture. Without an excess flow check valve, the LPG must not be used as fuel for forklifts and must be returned to the supplier.

1.3.4 Regular Inspection

The Certificate of Fitness holder must regularly inspect the LPG containers, connections, and appliances for leaks. The damaged containers must be removed from services, repaired and tested by an authorized person.

Quick visual check of LPG containers must ensure that:

- No extreme denting, gouging, or corrosion is on the LPG 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 LPG container.
- The container is installed on a firm foundation and is not in contact with the soil.
- The inspection results are documented and retained for a 5-year period.

1.3.5 LPG Operation

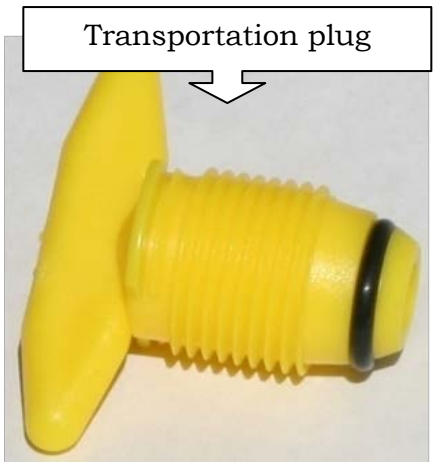
LPG is highly explosive when it accumulates in one area. **As a precaution LPG must only be used in well-ventilated areas**. **The LPG container must not be placed or used underground or in a below grade location**. The container must remain above ground at all times. The special considerations in manhole underground operations are addressed on the page 28-29 of this booklet.

LPG must only be used with LPG appliances which are approved by Nationally Recognized Testing Laboratories (NRTL). Connecting a LPG container to a non-approved appliance could result in serious injury. The Certificate of Fitness holder must be careful when connecting and disconnecting the containers to appliances. Generally, connection and disconnection of LPG containers for use should be performed outdoors. Where LPG use indoors is allowed, the connection and disconnection of the containers must be performed in a well-ventilated area. All valves on the appliance and the container must be closed when changing the container. This prevents the accidental leaking of gas into the atmosphere.

Sometimes LPG is used to for construction related curing and drying purposes. Heaters must only be used in a well-ventilated area and must not be placed on unprotected wood flooring. Heaters used for curing and drying must be located at least 6 feet from the LPG container unless there is integral heater-container unit specifically designed for the attachment of the heater to the LPG container, or to a supporting standard attached to the LPG container, and designed and installed to prevent direct or radiant heat application to the LPG container. The LPG containers connected for use must be adequately supported and braced in an upright position, except when used to power forklifts or other material handling equipment, when they are installed in accordance with the manufacturer's specifications. **All LPG containers must be secured in an upright position and must not be stacked or stored on shelves. Combustible materials must not be located less than 10 feet within any LPG appliance or container.** On the construction sites, if two or more heating-appliance units are located in an unpartitioned area on the same floor, the LPG containers of each such unit must be separated from the containers of any other such unit by at least 20 feet. (NFPA 58 6.19.4.7).

A sign explaining safe handling procedures for LPG should be posted near all LPG appliances. This sign should indicate the following:

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



1.3.6 Move LPG

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All LPG containers should be marked “Flammable” and either “LP-Gas,” or “Propane,” or “Butane.” When being transported, containers must be marked and labeled “Transportation”. The LPG containers must be secured in the upright position. The 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 shall 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 shall be moved to another floor of the building only by freight elevator, construction elevator, or passenger elevator when approved, and such elevator shall be occupied only by those persons engaged in moving the containers. LPG containers with a capacity of 20 pounds or less shall be moved in the same manner, except that they may be moved in building stairwells if such stairwells are unoccupied.

LPG containers may be transported only in approved vehicles. A FDNY transportation permit issued by the Bureau of Fire Prevention is required for each vehicle transporting quantities exceeding 400 SCF (approximately 47 lbs). LPG containers may be delivered only to sites displaying a permit or Letter of Authorization issued by the Fire Commissioner.

1.4 GENERAL DESCRIPTION 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 3508.3)

Processed natural gas is tasteless and odorless. However, before gas is distributed to end-users, it is odorized by adding small amounts of odorants to assist in leak detection. Breathing natural gas in trace amounts is harmless; however, natural gas is a simple asphyxiant and can kill if it displaces 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 chemical.

Natural gas is a flammable gas. It can be hazardous to life and property by explosion. 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. However, when natural gas is confined, such as within a building or other enclosed space, gas concentrations can reach explosive mixtures and, if ignited, result in blasts that could level and destroy buildings. Methane has a lower explosive limit of 5% in air, and an upper explosive limit of 15%. An example of typical CNG containers is shown below.

CNG Containers

The Certificate of Fitness holder must take care when connecting and disconnecting the containers to appliances. Generally, connection and disconnection of CNG containers for use should be performed outdoors. Where CNG use indoors is allowed, the connection and disconnection of the containers must be performed in a well-ventilated area. All valves on the appliance and the container must be closed when changing the container. This prevents the accidental leaking of gas into the atmosphere.

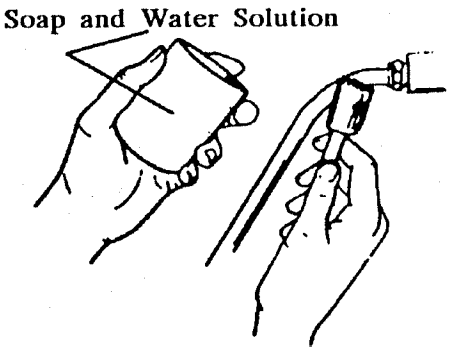
Flexible nonmetallic hose may be allowed at some applications (e.g. construction sites, emergency indoor repairs, manhole operations, etc.) However, the length of the hose must not exceed 30 feet when the activity is performed outdoors or not exceed 6 feet if the activity is performed indoors. The hose must be fabricated of materials that are designed for use with CNG and the hose must be color-coded red.

1.5 CHECK FOR LEAKS

The gas containers, valves, hoses, and related equipment should be inspected 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 attempt 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 and valve outlet.

These areas must be checked using a soap and water solution. **NEVER CHECK FOR LEAKS WITH A FLAME.** 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. **A lighted flame (for example, a match) should never be used when checking a connection for a leak.**



Occasionally, ice or moisture may 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 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.

1.6 PORTABLE FIRE EXTINGUISHERS

A portable fire extinguisher with at least a 10-B:C rating is required at all locations where LPG/CNG is used, stored or transported. The maximum travel distance to the portable fire extinguisher shall be 30 feet from the work location. In case of a 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. **It is recommended that the Certificate of Fitness holder be trained of proper use of portable fire extinguishing.** 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.**

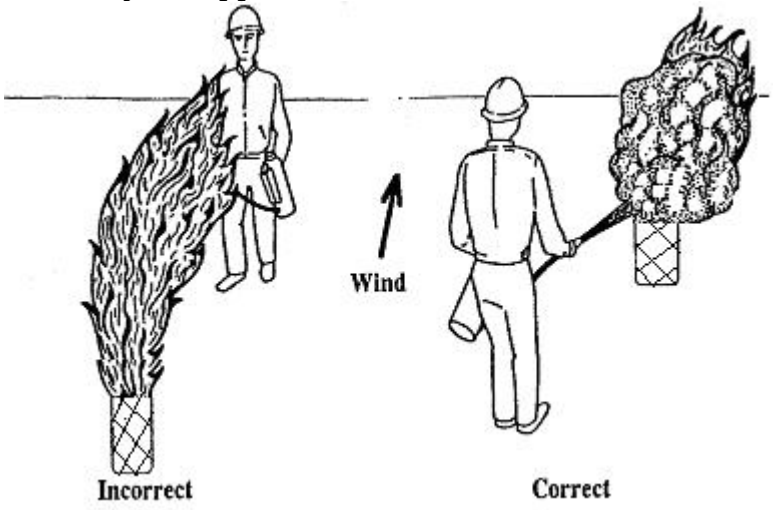
Fire extinguisher in a construction site.

A stackable and portable stand is convenient for temporary extinguisher installation.

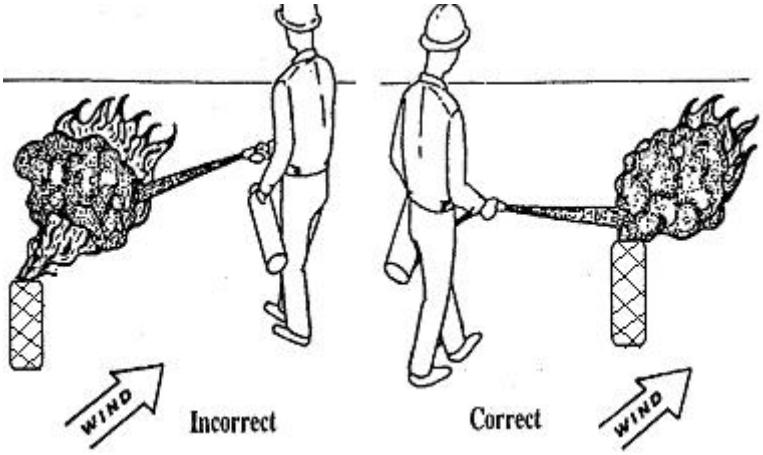
Improper floor placement of Fire Extinguisher.

1.6.1 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 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 is 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 mean time, you should try to control the scene and prevent the fire from 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.

1.6.2 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.

Class K fires from cooking oil fire and are caused by commercial deep fat fryers. Most often occur where cooking media (fats, greases, and oils) are used. Only the class K fire extinguisher is compatible with the wet chemical agents.

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

2-B:C (2BC)	10-B:C (10BC)	20-B:C (20BC), wheeled	3-A:40-B:C(3A40BC), wheeled	6 liter wet chemical Class K Fire Extinguisher

1.6.3 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.

Fire Extinguisher Identification Symbols

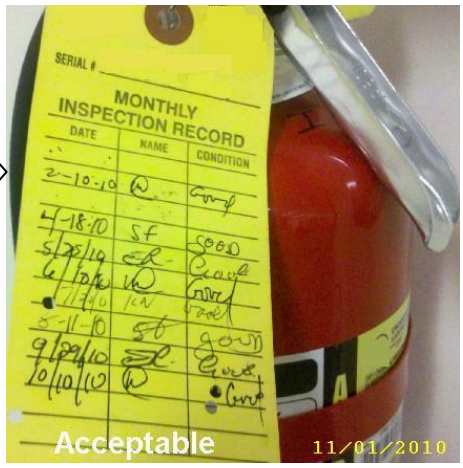
The symbol with the shaded background and the slash indicates when the extinguisher must not be used. The Certificate of Fitness holder must understand these symbols. All fire extinguishers should be kept in good working order at all times.

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.	
K	Cooking media (Vegetable or Animal Oils and Fats)	

1.6.4 Fire Extinguisher Inspections

The extinguishers are required to be inspected monthly. The owner of the premises is responsible to designate a person to perform a monthly inspection. This inspection is a "quick check" that a fire extinguisher is available and will operate. It is intended to give reasonable assurance that the fire extinguisher is fully charged and operable. This is done by verifying that it is in its designated place, that it has not been actuated or tampered with, and that there is no obvious or physical damage or condition to prevent its operation. The information of the monthly inspection record must include the date the inspection was performed, the person performing the inspection, and those portable fire extinguishers found to require corrective action. Such recordkeeping must be either attached to the extinguisher or on an inspection checklist maintained on file. Labels or markings indicating fire extinguisher use or classification or both shall be placed on the front of the fire extinguisher. At least once per year, all fire extinguishers must be maintained by a FDNY approved company and a W-96 Certificate of Fitness holder.

Monthly inspection tag.



1.7 INDOOR AND OUTDOOR STORAGE RULES

No LPG/CNG container is allowed to stored underground or in a below grade location or in a cellar. A valid storage permit is required for any storage area storing LPG/CNG in excess of 400 SCF. The Certificate of Fitness holder is responsible for the safe storage, handling and use of the gas containers. The LPG/CNG storage must be located away from the following: Electric power lines; Piping containing flammable or combustible liquids; Piping containing flammable gases; and Piping containing oxidizing materials. **All empty or in-use gas containers should be counted as full containers. In other words, the quantity of any empty gas container must be subject to the maximum allowable storage quantity.**

1.7.1 General Indoor Storage Rules

Any LPG container with a capacity greater than 16.4 oz and any CNG containers with a capacity greater than 8.7 SCF must NOT be stored inside any residential occupancy and non-residential occupancy or in any building where an outdoor LPG/CNG storage location is available. The authorized LPG/CNG indoor storage room must be used for LPG/CNG storage ONLY. It must be constructed of walls, floors and ceilings having at least a 2 hour fire resistance rating and be constructed with an access door that opens directly to the outdoors. Any delivery and pick-up of the LPG/CNG containers to or from the storage room must be through the outdoors access door ONLY, not through the building. A room must be protected by at least one 10-B/C fire extinguisher affixed to the outside of the storage room or placed at another readily accessible location not more than 30 feet from the room entrance.

Any indoor storage for flammable gas (CNG or LPG) of 3,500 SCF or less must be protected
against damage or injury from falling objects or surrounding activity, and be located not less than:

(1). 10 feet of any combustible materials
(2) 20 feet from all classes of flammable and combustible liquids, oxidizing gases
(3). 25 feet from open flames, ordinary electrical equipment or other sources of ignition.
(4). 50 feet from air-conditioning equipment, air ventilation.
(5). 50 feet from other flammable gas storage.

There may be more than one storage location of 3,500 SCF in a room, provided that each storage location does not exceed 3,500 SCF and the storage locations are separated by at least 50 feet or an approved masonry barrier having a minimum fire resistance rating of 2 hours.

1.7.1.2 Open Fires (NEW 2014 NYC Fire Code)

LPG container storage in Group R-2 and R-3 occupancies shall not exceed **four** containers per dwelling unit, each container having a capacity not exceeding 16.4 ounces of LPG. Storage of such LPG containers in a basement, cellar or other area below grade is *prohibited*.

Portable outdoor barbecues burning charcoal, powered by electricity, or fueled by LPG containers or piped natural gas may be stored and used on any residential premises in compliance with the requirements of this section and the rules. Portable outdoor barbecues burning charcoal, powered by electricity, or fueled by piped natural gas may

be stored and used on any other premises in compliance with the requirements of this section and the rules, except as may be restricted by the Zoning Resolution or the Department by rule or order. Stationary outdoor grills and other outdoor cooking equipment shall be installed in accordance with the Building and Mechanical Codes, and operated and maintained in accordance with this section.

- Only portable outdoor barbecues designed for use with LPG containers with a capacity of 16.4 ounces may be stored or used on the premises of a Group R-2 occupancy.

- Portable outdoor barbecues designed for use with LPG containers with a capacity of 20 pounds or LPG containers with a capacity of 16.4 ounces may be stored or used on the premises of a Group R-3 occupancy. Twenty-pound LPG containers SHALL NOT be stored or used indoors, or on any rooftop or balcony. A maximum of **two** 20-pound LPG containers may be used to fuel a portable outdoor barbecue.

Special requirements for indoor LPG storage capacity: (Fire Code 3809.9; 3809.10)
The maximum indoor LPG storage capacity is **200 lbs** if storage is within buildings accessible to the public. However, if the indoor storage location is not accessible to the public, such as industrial buildings, the capacity can be up to **300 lbs**.

1.7.2 General Outdoor Storage Rules

No more than 2,500 SCF of CNG shall be stored in a pre-existing outdoor CNG storage facility unless such facility complies with the current Fire Code and rule requirements. Outdoor storage of LPG must be limited to not more than **400 lbs** of LPG. (Fire Code 3809.12) All LPG/CNG containers must be stored outdoors in an approved storage enclosure. The enclosure must protect the containers against extreme temperatures, tipping over, physical damage, and tampering. They also must be protected by a metal open fence enclosure at least 6 feet in height, and secured by a locked gate opening outward or a lockable ventilated metal locker of a type acceptable to the Fire Department. Such fence enclosure or locker must be mounted on and secured to a substantial concrete pad at grade level, protected to prevent accumulation of rain and snow.

The enclosure must be located above ground in a well-ventilated area and be protected by at least one 10-B/C fire extinguisher located outside of the enclosure. The required fire extinguisher must be located no more than 30 feet from the storage location. **LPG/CNG containers must not be stored on the roof of any building.**

The LPG/CNG storage must be accessible from the street. The location of **outdoor storage** must comply with the following table. The storage of LPG/CNG at construction sites must follow additional regulations listed in the “storage at construction site” section.

LPG/CNG OUTDOOR STORAGE IF STORAGE IS BETWEEN 100 LBS AND 400 LBS

Type of Outdoor Exposure	Minimum Distance to the Exposure
Any combustible materials (e.g. paper box)	10 feet
The nearest lot line, sidewalk, or building on an adjoining lot	10 feet
Any authorized parking for motor vehicles	10 feet
Any below ground flammable liquid or combustible liquid storage tank in excess of 1,000 gallons.	15 feet
Building openings or any exit access doors, or stairways.	20 feet
Motor vehicle fuel dispenser (e.g. Gas station)	20 feet
Any building occupied as a multiple dwelling	50 feet
Any school, hospital, church, or place of public assembly.	100 feet

Warning signs complying with OSHA requirements must be conspicuously posted at each LPG/CNG installation, storage location or use site. The sign should be read:

(The sign must be at least 10 inches by 14 inches in size and the letters must be at least 2 inches high)

Acceptable:
1. The metal open fence enclosure was secured by a locker.
2. The storage was located in a well ventilated area.
3. Provided with a portable fire extinguisher with at least a 10-B:C ratings affixed to the outside of the storage facility.
4. The required sign was conspicuously posted.

Unacceptable:
The fire extinguisher should be mounted: The clearance between the bottom of the extinguisher and the floor must not be less than 4 inches.

1.8 CONSTRUCTION SITES STORAGE

No LPG/CNG container is allowed to stored underground or in a below grade location. A valid storage permit is required for any storage, handling or use of more than 400 SCF of LPG/CNG. For LPG, 400 SCF is approximately 47 lbs.

The Certificate of Fitness holder is responsible for the safe storage and use of the gas containers. The LPG/CNG storage must be located away from the following: Electric power lines; Piping containing flammable or combustible liquids; Piping containing flammable gases; and Piping containing oxidizing materials. **All empty or in-use gas containers should be counted as full containers. In other words, the quantity of any empty gas container must be subject to the maximum allowable storage quantity.**

LPG/CNG containers must be stored in a storage enclosure and must be approved by FDNY. The enclosure must protect the containers against extreme temperatures, tipping over, physical damage, and tampering. They also must be protected by a metal open fence enclosure at least 6 feet in height, and secured by a locked gate opening outward or a lockable ventilated metal locker of a type acceptable to the Fire Department. Such fence enclosure or locker must be mounted on and secured to a substantial concrete pad at grade level, protected to prevent accumulation of rain and snow. Warning signs complying with OSHA requirements must be conspicuously posted at each LPG/CNG installation, storage location or use site. The sign should be read as the one on page 24.

The Certificate of Fitness holder is responsible for the safe storage, handling and use of the LPG/CNG containers. Only LPG/CNG containers in use are permitted inside a building under construction. No extra containers may be located in the building while work is in progress. Generally, LPG/CNG containers are not allowed to be stored inside any unoccupied building overnight and should be taken outside at the end of each work day. However, there are circumstances when the Department may allow this. **Any indoor storage of LPG/CNG containers should be approved by the Fire Department prior to commence such storage. LPG/CNG containers must not be stored on the roof of any building.**

The maximum allowable quantity of LPG and CNG on construction sites:

	LPG	CNG	Note
Single outdoor storage enclosure	2500 pounds	21,500 SCF	The distance between two locations on a construction site must be at least 50 feet.
Single indoor storage location	1250 pounds	10,625 SCF	The distance between two locations on a construction site must be at least 70 feet.
Total capacity on a construction site	5000 pounds	42,500 SCF	

Any single standard portable LPG container must not exceed 100 lbs in weight. Any single CNG container must not exceed 381 SCF. All empty or in-use gas containers should be counted as full containers. In other words, the quantity of any empty

gas container must be subject to the maximum allowable storage quantity. All LPG/CNG containers, full or empty, and which are not in use must be stored in an outdoors storage enclosure located at least 25 feet away from the building under construction. The storage enclosure must be kept securely locked when not in use. Flammable and combustible materials must be kept at a safe distance from the enclosure and must be located at least 50 feet from such enclosure. It must be located at least 50 feet away from any building occupied as a multiple dwelling**,** and at least 100 feet away from any subway entrance, exit, vent or other opening and also at least 100 feet away from any school, hospital, church, or place of public assembly. All indoor storage must be at least 10 feet away from any flue, stairwell or elevator shaft.

Each construction site storage enclosure shall be equipped with at least one 40-B/C rated, wheeled, fire extinguisher. Such fire extinguisher must kept outside of the storage facility or placed at another readily accessible location not more than 30 feet from the storage facility.

PART 2. STORAGE, USE AND HANDLING USE OF LPG/CNG FOR TAR KETTLE, ASPHALT MELTER AND MARKING TRAFFIC LINES

2.1 FDNY PERMIT

A FDNY permit is required to store, handle or use a tar kettle or an asphalt melter.

2.2 TAR KETTLE

Tar kettle is designed to heat tar, asphalt, pitch or similar materials before it can be used for construction purposes, typically for waterproofing operations or street repair. Tar kettle does not include asphalt melters. It shall be unlawful to store, handle or use tar kettles that utilize flammable liquid as a fuel.

The operation of a tar kettle that requires a permit shall be under the personal supervision of a person holding a Certificate of Fitness.

Tar kettles must be equipped with tight-fitting lids. Tar kettle must not be moved when the heat source of the tar kettle is operating, except when the tar kettle is in the process of patching road surfaces. The LPG/CNG containers must be protected against physical damage and the heat generated by the kettle heater. This is achieved by placing the LPG/CNG container behind a heat shield. The shield prevents radiated heat and flames from reaching the container. The LPG/CNG must be located at least 10 feet from the burner. (Fire Code 303.3) This is important because the pressure of the gas in the container could increase to a dangerous level. Each tar kettle must also be equipped with metal covers. These covers are used to smother potential fires. Tar kettle must not be located within 20 feet of any combustible material, combustible building surface or any buildings opening. Tar kettles must be within a controlled area identified by the use

of traffic cones, barriers or other approved means. Tar kettle should not be utilized inside of a building or structure. (Fire Code 303.2)

The following regulations must be followed when using LPG/CNG to heat a tar kettle:

(a) A tar kettle may be used outdoors <u>only.</u>
(b) A tar kettle must NOT be used on any roof of a structure.
(c) LPG/CNG Container valves must be closed when burners are not in use.
(d) A gas regulator and excess flow valve must be installed on all heating devices. A shut off valve must also be installed on the LPG/CNG container.

- A fire was sparked by a kettle when the tar kettle was used on the roof of Northside Piers tower in Brooklyn. (Sep. 2007)
- No tar kettle is allowed to be used on roof according to the 2014 NYC Fire Code.

The tar kettle must be continuously supervised by a Certificate of Fitness holder. The holder must be within 100 feet of the kettle, have the kettle within sight and have unobstructed access to the kettle. He/she is responsible for the safe operation of the equipment. He/she must also make sure that all safety regulations are observed. (Fire Code 303.4)

2.3 ASPHALT MELTER

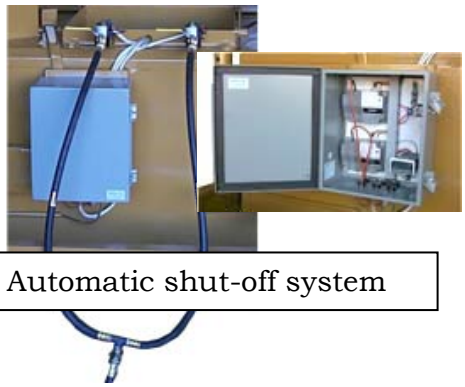
Asphalt melters (or rubberized asphalt melter) are approved device designed to heat asphalt, typically for waterproofing operations. It utilizes LPG or CNG (Compressed

Natural Gas) to generate an enclosed flame. **The use of CNG fueled asphalt melters shall be operated in the same manner as LPG fueled tar kettles.** Only the LPG-fueled asphalt melters may be utilized on the roof of non-combustible construction in accordance with NYC Fire Rules. It shall be unlawful to store, handle or use tar kettles that utilize flammable liquid as a fuel. In summary, the asphalt melter must be designed to

(1) be constructed of noncombustible materials
and
(2) be equipped with tight-fitting lids
and
(3) utilize an enclosed flame indirectly
and
(4) provide with a thermostatic control
and
(5) provide with an automatic shut-off to limit the temperatures.

Thermostatic control

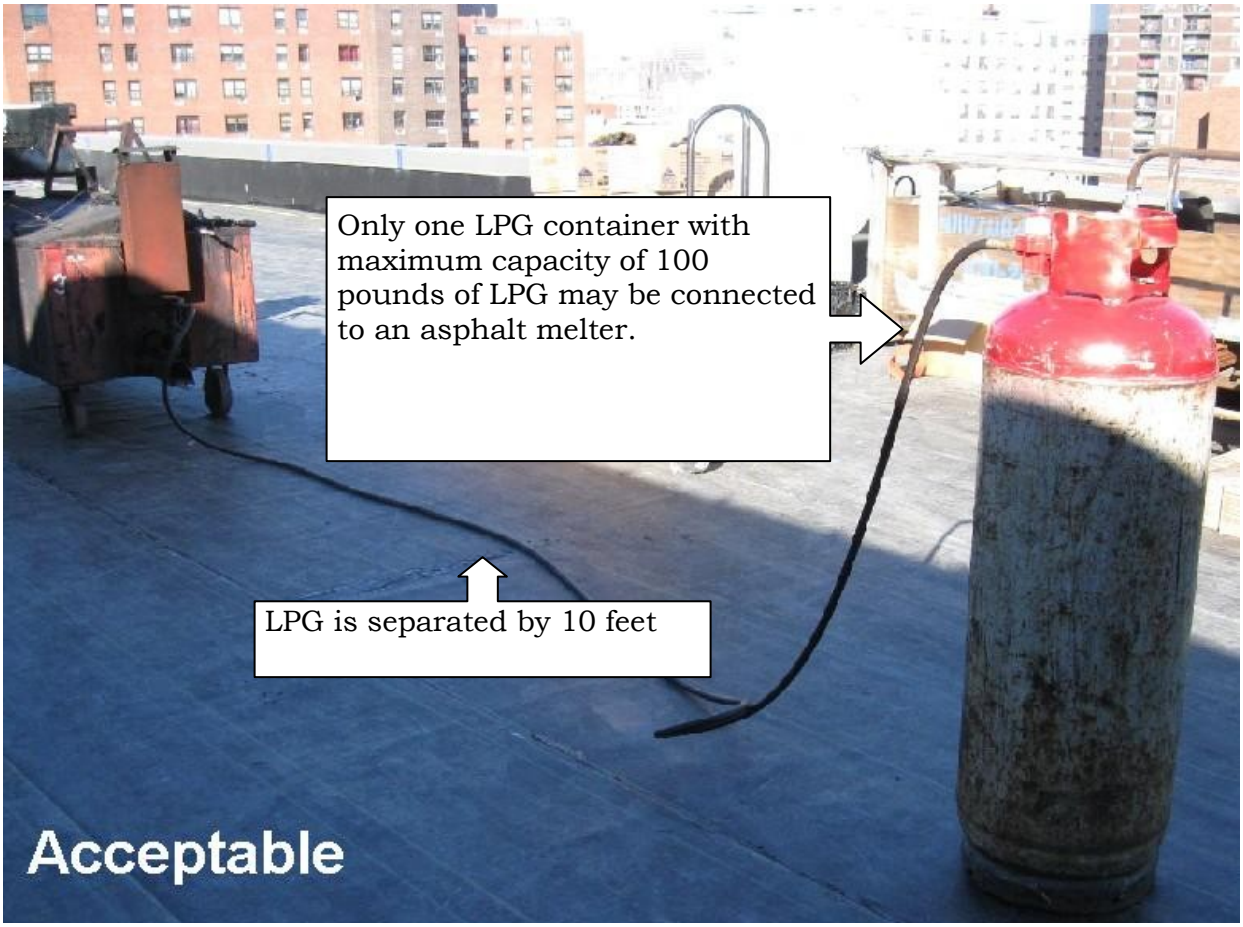
These devices help user to ensure the temperature of the asphalt not exceed 425°F or 50°F below the flash point of the asphalt.



Automatic shut-off system

If any one of the above requirement is not met for the heating device, it may be categorized as a tar kettle instead of an asphalt melter.

The melter cover must be designed to close automatically.



2.2.1 Hot-mop roofing using asphalt

An asphalt melter must only be used on non-combustible roofing operation. Asphalt melters shall not be located within 20 feet of any combustible material, combustible building surface or any building opening and within a controlled area identified by the use of traffic cones, barriers or other approved means. Asphalt melters shall not block means of egress, gates, roadways or entrances.

Roofing mops must be stored outdoors. When soaked with asphalt the mops are easily ignited. All roofing mops must be thoroughly cleaned after use. They must be kept at least 20 feet away from all sources of ignition. The procedures of hot-mop operation should be done as the follows:

Mop hot asphalt onto the surface of roof and the waterproof material.

Dispense hot asphalt from the melter.

LPG asphalt melter may be used on roof of non-combustible construction in accordance with NYC Fire Rules. Following requirements must be complied with:

(a) The maximum capacity of the asphalt melter must not exceed 200 gallons of asphalt, or such lesser amount as may be safely supported by the roof structure.
(b) 2 asphalt melters maximum on a roof.
(c) The Certificate of Fitness holder responsible for the personal supervision of asphalt melters shall be provide with a cellular phone as means for immediate emergency notification.
(d) Only LPG containers connected for use shall be kept on the roof.

Asphalt melters shall not be transported or otherwise moved when the heat source for the kettle or melter is operating. The asphalt melter must always be operated under the personnel supervision of a G-40 Certificate of Fitness holder. He/she is responsible for safe operation of the equipment and he/she must make sure that all safety regulations are followed including wearing appropriate personnel protective equipment.

An operating asphalt melter requiring a permit shall be under the personal supervision of a person holding a G-40 certificate of fitness. The certificate of fitness holder shall be within 100 feet of the melter, have the melter within sight and have unobstructed access to the melter. Ladders and other obstacles shall not form a part of the route between the certificate of fitness holder and the melter. The certificate of fitness holder shall not have to climb or descend a ladder or circumvent any obstacle to gain access to the melter.

2.4 MARKING TRAFFIC LINE

LPG/CNG may be used to fuel the heating kettle for paint used to mark traffic lines or to do street repair. LPG storage and use on any motor vehicle for the purpose of marking traffic lanes must be limited to 4 containers and CNG must be limited to a total capacity of 3.400 SCF. **Per LPG containers must not exceed 100 lbs. per single CNG container must not exceed 381 SCF.** The vehicle must be registered with and approved by the Fire Commissioner.

The gas container or tank must be:

(1) installed on the motor vehicle in a manner that will protect it from physical damage;
(2) installed to prevent their jarring loose and slipping or rotating
(3) securely mounted in a manner so that it is not subject to wear while the vehicle is in motion.

The Certificate of Fitness holder must:
(1) personally supervise the truck used to mark traffic lines
(2) make sure that all safety regulations are obeyed
(3) make sure that all safety devices, vents, connecting lines, chains, and guards are kept in good condition and working order.

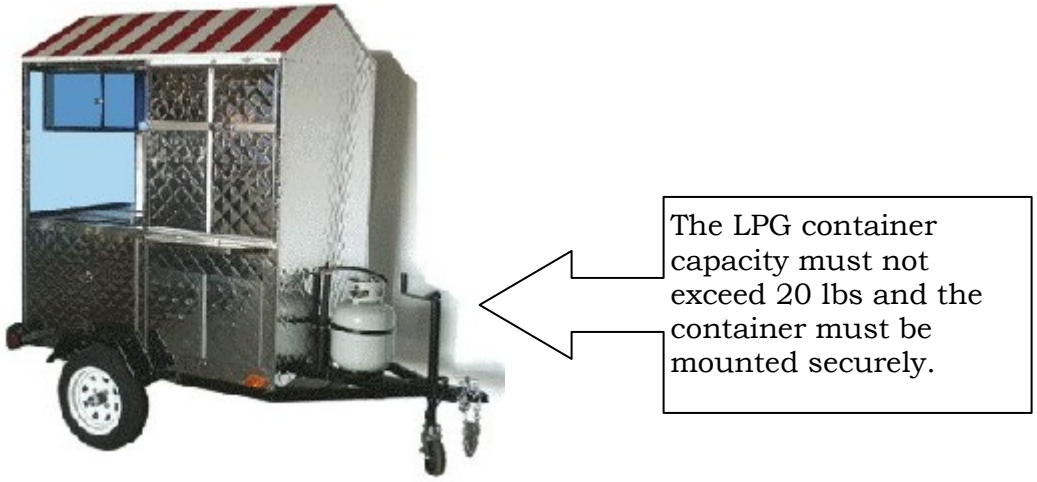
2.5 FIRE SUPPRESSION

At least one 3-A:40-B:C rated fire extinguisher must be within 25 feet of each asphalt melter/tar kettle. One more 3-A:40-B:C rated fire extinguisher is needed on the roof being covered. For the kettle used for marking traffic lines or doing street repair, at least one 20-B:C rating fire extinguisher must be provided.

PART 3. LPG/CNG USED TO FUEL COOKING EQUIPMENT AT OUTDOORS EVENTS

3.1 MOBILE COOKING USES

Mobile food units containing hot plates and other LPG/CNG cooking equipment, including mobile kitchens and catering vehicles, must be limited to 2 LPG containers or 2 CNG containers. Non-motorized food units (e.g. push cart or stand) must have a container capacity not exceeding 20 lbs for LPG, or not exceeding 170 SCF for CNG. Valves must be closed when the mobile food unit or its cooking equipment is not in use.



The location of any mobile food units must comply with the following table.

LPG/CNG MOBILE FOOD UNIT

Type of Outdoor Exposure	Minimum Distance to the Exposure
Any combustible materials (e.g. paper box)	2 feet
Any flammable gas storage, including another mobile food unit equipped with LPG/CNG containers	5 feet
Any subway vent or other opening, except a subway entrance or exit	5 feet
Any subway entrance or exit	10 feet
Any vent or fill line of any flammable liquid storage tank	10 feet
Any building, except as follows:	2 feet
Any below-grade building opening, including any door, openable window or intake or exhaust vent	5 feet
Any building of wood frame construction	10 feet
Any building entrance	20 feet
Any building occupied as a multiple dwelling	10 feet
Any school, hospital, church, or place of public assembly	10 feet

All mobile food units that are motor vehicles may never be left unattended in a public area nor within 50 feet of the property line of any building occupied as a multiple dwelling, any school, hospital, church, or place of public assembly, or any subway entrance, exit, vent or other opening. Gas containers must be mounted securely on the vehicle or within the enclosing recess or cabinet. All LPG/CNG container valves, appurtenances, and connections shall be protected to prevent damage from accidental

contacts with stationary objects, from loose objects, stones, mud, or ice thrown up from the ground or floor, and from damage due to overturn or similar vehicular accident. Where containers are located on the outside of a vehicle, weather protection must be provided. (NFPA 58 6.23.3.4)

3.2 COMMERCIAL ESTABLISHMENTS

LPG/CNG storage, handling and use for cooking and oil burner ignition in commercial establishments must be limited to the LPG containers with a capacity not greater than 16.4 ounces or the CNG containers with a capacity not grater than 8.7 SCF unless the container is connected for use in a stationary installation. All LPG/CNG devices and equipment must be installed by a licensed plumber. Flexible metallic hoses and tubing which are designed for use with LPG/CNG may be acceptable, but the length of hose or tubing does not exceed 6 feet.

3.3 STREET FAIRS AND SIMILAR OUTDOOR PUBLIC GATHERINGS

It is prohibited to store, handle or use CNG at bazaars, carnivals, street fairs and similar outdoor events, including public gathering places. The storage, handling and use of LPG at street fairs and similar outdoor gatherings shall be under the personal supervision of a person holding a certificate of fitness.

LPG storage, handling, and use in connection with any street fair, bazaar, concert, festival, or other similar outdoor public gathering must be limited to 2 LPG containers per device or equipment, each not greater than 20 lbs. A separation distance of 5 feet must be maintained between LPG containers connected for use to LPG device. All LPG containers must be located at least 50 feet away from the property line of any building occupied as a multiple dwelling, any school, hospital, church, or place of public assembly, or any subway entrance, exit, vent or other opening. There must be a person responsible for the operation of each LPG device or equipment, one person can not operate more than one LPG device.

A separation distance of **5 feet** must be maintained between LPG containers connected for use to LPG device.

Nonmetallic hoses may be used at a street fair or other similar outdoor public gathering where LPG containers are stored, used and connected. However the length of the hose should not exceed 6 feet and the hose should be designed for a working pressure of not less than 250 psi.

The area surrounding the LPG equipment must be kept clean at all times. No combustible materials may be stored next to the LPG containers and related equipment. LPG containers must be at least 2 feet from any combustible material. All garbage and waste materials must be stored in a covered container. The waste container must be designed to prevent accidental ignition of the collected waste materials. The waste container must not be overflow and should be emptied regularly.

The Certificate of Fitness holder must inspect each device, equipment of system and incidental storage area prior to commencement of use **each day** to make sure they are all in good working order. A record of such inspection must be maintained either at a central location for all concessionaires, or at each concession area and must be available for inspection by any Department representative.

Sometimes conditions prevent strict compliance with the guidelines outlined above. In such cases the Fire Commissioner may modify or waive some of the required safeguards. If special circumstances arise the Fire Commissioner's office should be notified. Applications for modifications and waivers will be dealt with on an individual basis.

3.3.1 Deep fat fryers

Deep-Fat Fryers are cooking vessels designed for the frying of foods in several inches or more of hot oil.

The frying range is generally between 325 to 375 F (160 to 190 C.) It is best to use fats such as peanut oil or beef tallow, which have very high smoke points. Oils such as sunflower oil have low smoke points; when heated to high, at best they will give the food a burnt taste; worst case scenario they may burst into flame.

Location
Deep fat fryers shall be separated from any adjacent cooking equipment that uses an open flame by at least 16 inches. In lieu of such separation distance, a 16-inch high by ⅛-inch thick steel baffle permanently attached to the longer of the two adjacent cooking appliances may be used. The baffle shall extend to the full depth of the cooking equipment to which it is attached.

High-limit controls
Deep fat fryers shall be equipped with an independent high-limit control in addition to the adjustable operating control (thermostat). Such high-limit control shall be designed and arranged to shut off the fuel supply, including electrical energy, when the fat temperature reaches not more than 475°F, 1 inch below the liquid surface.

3.4 FIRE SUPPRESSION

3.4.1 Mobile Cooking

Each mobile food unit must be provided with a portable fire extinguisher with at least a 2-B:C rating, which must be mounted away from the heat source. If the mobile food

units are motor vehicles, they must be provided with a portable fire extinguisher with at least a 20-B:C rating.

3.4.2 Street Fairs and Similar Outdoor Gathering Events

Each concessionaire's area, or the location in which LPG is being stored, handled or used, must be provided with a portable fire extinguisher with at least a 10-B:C rating.

Naturally, a malfunctioning and/or misused deep fryer poses a serious fire risk, especially with gas-powered deep fryers. Furthermore, putting water on oil fires will cause a fire boilover and aggravate the situation.

Portable fire extinguishers
Portable fire extinguishers shall be readily available for use in the cooking area but in any event no further than 30 feet of travel distance from the commercial cooking equipment.

Deep fat fryers
When a deep fat fryer is installed in a cooking area, Class K portable fire extinguishers shall be provided as follows:
1. For up to four fryers individually having a maximum cooking medium capacity of 80 pounds and a maximum surface area of 6 square feet: One having a minimum 1½ gallon capacity.
2. For every additional group of up to four fryers, individually having a maximum cooking medium capacity of 80 pounds and a maximum surface area of 6 square feet each: One additional Class K portable fire extinguisher having a minimum 1½ gallon capacity.
3. For individual fryers having a maximum cooking medium capacity exceeding 80 pounds or 6 square feet in surface area: Provide Class K portable fire extinguishers in accordance with the portable fire extinguisher manufacturer's recommendations.

PART 4. LPG/CNG USE IN MANHOLE OPERATIONS

LPG/CNG containers may be used to fuel appliances used at manholes or similar underground structures. The entire work site must be personally supervised by a Certificate of Fitness holder.

Flammable liquids and vapors often accumulate in manholes or other below ground locations. They accumulate because they are heavier than air and tend to fall to the lower ground level. They may be highly explosive and easily ignited. These liquids and vapors may also be toxic or suffocating. The vapors pose a serious threat to the safety of those working in the manhole. The worker must be protected against these liquids and vapors. Various detection devices are often used to determine whether a danger from vapor or liquids is present. When dangerous vapors are detected, work may not begin until the vapors are reduced to safe levels.

Sparks or any overheating can cause a large fireball because of high concentrations of carbon monoxide and neoprene gas in manhole. The ignition can be sudden and explosive.

Any people or objects catches a manhole explosion can be seriously injured or damaged.

The Certificate of Fitness holder must purge the manhole of dangerous vapors. Several powerful fans may be used to blow the gases away from the work location. These fans may also be used to ventilate the manhole while work is being conducted. The work area is then tested to determine the concentration of dangerous vapors in the manhole. The area must be flushed of combustible liquids. Only when the work area is purged of dangerous vapor and liquids may work begin. The area should be checked periodically while work is in progress. The area should be ventilated until work is completed.

Tests must be conducted to determine the oxygen content in the manhole. Special equipment is used to assess the oxygen content. Under no circumstances should a worker be sent into a manhole if the oxygen content is below 19.5%. The only exception to this rule is when a worker is wearing a self-contained breathing apparatus. Test should be repeated as often as necessary to maintain safe working conditions.

Hot Work Fire Safety Requirements

Hot work operations involving cutting or welding shall be conducted at least 35 feet (10 668 mm) from combustible materials and combustible waste or shall be provided with appropriate shielding to prevent sparks, slag or heat from igniting exposed combustibles. All hot work operations shall be conducted at least 25 feet from combustible materials

and combustible waste or shall be provided with appropriate shielding to prevent sparks, slag or heat from igniting exposed combustibles.

Containers

The LPG/CNG containers must be supported to prevent accidental movement. The LPG/CNG containers or heaters must not be brought into the manhole. The LPG/CNG containers and heaters must be kept at least 6 feet from the manhole opening. Only two LPG containers with a maximum capacity of 33½ pounds or two CNG containers with a maximum capacity of 285 SCF can be used for each manhole work. Nonmetallic hoses may be used at manhole operations where the portable LPG/CNG containers are stored, used and connected. However the length of the hose should not exceed 30 feet and the hose should be designed for a working pressure of not less than 250 psi. In addition, the nonmetallic hose used to connect the appliance and the **CNG container** must be color-coded red.

LPG/CNG containers must be removed from the job site at the end of the work day unless they are stored overnight in a locked steel tool cart. The tool cart must have a door at least ¼ inch thick that is locked at all times and have be well-constructed for ventilation. The LPG/CNG containers shut-off valves must be unobstructed and readily accessible in the tool cart. The following two signs must be permanently affixed attached to the cart:

6-IN DOT PLACARD 1075 for LPG	**6-IN DOT PLACARD 1971 for CNG**	**No Smoking for LPG/CNG**
Must be affixed to 2 opposite exterior walls of the cart	Must be affixed to 2 opposite exterior walls of the cart	Must be affixed to the cart in a conspicuous location

The location of the tool cart must comply with the following table.

Table. tool cart location

Type of Outdoor Exposure	Minimum Distance to the Exposure
The nearest lot line, sidewalk, or building on an adjoining lot	10 feet
Any vent or fill line of any flammable liquid or combustible liquid storage tank	15 feet
Any aboveground flammable liquid or combustible liquid storage tank	20 feet
Any building occupied as a multiple dwelling	50 feet
Any school, hospital, church, or place of public assembly.	100 feet

PART 5. USE OF LPG/CNG IN POWERED INDUSTRIAL TRUCK OPERATIONS

5.1 LPG/CNG POWERED INDUSTRIAL TRUCK OPERATIONS

Forklift, tractors, and similar powered trucks are commonly used in modern business and industry. For example, they are used in many warehouses and in building sites to move heavy objects from one location to another. In addition to obtain the Certificate of Fitness, all operators should be trained and certified in the safe operation of forklifts in accordance with the *manufacturer's recommendations*, *Occupational Safety and Health Standards governing Powered industrial trucks (OSHA CFR 1910.178)*, *American National Standards Institute law governing Vehicle-Mounted Elevating and Rotating Aerial Devices (ANSI 92.2)*.

A Typical LPG Forklift Truck	A Typical CNG Forklift Truck

Many of these trucks are fueled by LPG/CNG. LPG/CNG is a convenient and economical way to fuel the truck. The trucks are fueled using a removable LPG/CNG container. Only one LPG/CNG container may be installed on a truck. The maximum capacity of the LPG container is 40 pounds and the maximum capacity of the CNG container is 340 SCF.

The LPG/CNG container or tank must be installed on the truck in a manner that will protect it from physical damage. The LPG/CNG container must be installed to prevent their jarring loose and slipping or rotating. The LPG/CNG container must be securely mounted in a manner so that it is not subject to wear while the vehicle is in motion. For this reason, chains should not be used to secure the LPG/CNG container to the LPG/CNG powered industrial truck.

Any hose 60 inches in length or less must not be stainless steel wire braid construction. (NFPA 58 11.12.3) The nonmetallic hose must be as short as practical and be made of materials resistant to the action of LPG/CNG.

The LPG/CNG powered industrial truck must be used and parked in well-ventilated areas. The truck must never be left unattended in a public area nor within 50 feet of the property line of any multiple dwelling, any school, hospital, church, or place of public assembly, or any subway entrance, exit, vent or other opening. Whenever the truck is parked, the LPG/CNG container shut-off valve must be closed. The truck may not be parked in areas of excessive heat. The excessive heat may cause the pressure inside the LPG/CNG container to increase to a dangerous level. For example, the CNG powered industrial truck must be parked and the CNG containers connected or disconnected not less than 25 feet away from open flames or other hear or ignition sources or other hazardous conditions. Every forklift must be equipped with one 2-B:C rated fire extinguisher. The extinguisher is commonly attached to the roll bar at the rear of the truck.

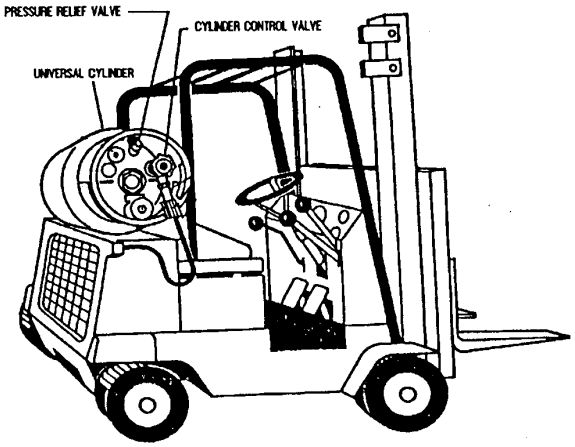
The containers can only be changed by a Certificate of Fitness holder. All sources of ignition within 15 feet must be extinguished when replacing the LPG container. LPG Containers should be replaced only in an outdoor location or in a well-ventilated area. The LPG container valves, hoses, and related equipment should be inspected for physical damage before replacing the container. Special care must be taken to identify any potential defects that may cause a leak. Any defects that are discovered must be taken care of by repairing or replacing the defective part before the truck may be used again.

5.2 SPECIAL NOTES FOR FORKLIFT USING LPG CONTAINERS

The LPG powered industrial truck must NOT be used or parked in the basement or cellar of any building. Several features are installed on the truck to make sure that the LPG is used safely. The truck is fitted with a pressure relief valve, excess flow valves, gauges (e.g. fixed liquid level gauge), and a regulating valve. An automatic shut off valve may also be installed on the LPG container. This valve shuts off the gas supply to the truck when the flame goes out. The fixed liquid level gauge indicates the maximum filling level on the LPG container. It may be read when the container is in either a horizontal or vertical position. It is used to make sure that the LPG container is not overfilled. It also acts as an easily read fuel gauge.

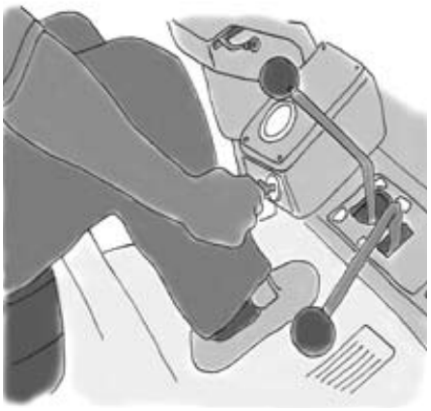
Usually universal type LPG containers are used to fuel such powered industrial trucks. Unlike the standard LPG containers, the universal containers are mounted in either a

vertical or horizontal position. A universal LPG container fueling a forklift truck is shown below.



A Typical Forklift Truck

Procedures for exchanging forklift LPG containers:



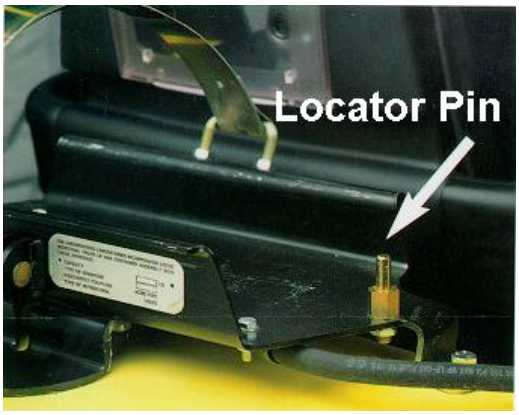
The following procedures are the general procedures for exchanging LPG containers. **It is always best to follow the manufacture's instructions for the forklift you are using.**

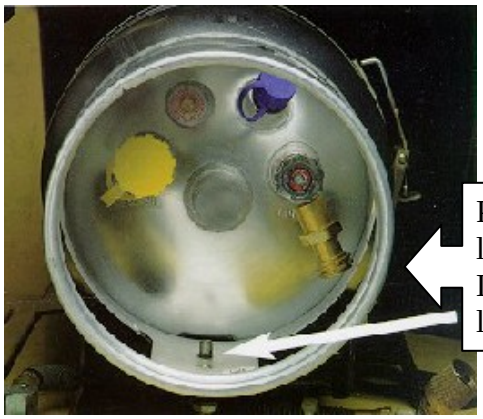
1. Turn the forklift engine off and set the parking brake. Always wear proper protective equipments (PPE) which includes gloves and eye protection when performing propane activities, including connecting or disconnecting a LPG container.

2. Close the LPG container valve (clock-wise), turning it until it is securely closed. Loosen the hose connection to the tank by hand, keeping in mind it will turn in the opposite direction of a normal connection. Never use a wrench or metal tool on these connections; they should be hand-tightened only.

3. Remove the LPG container from forklift, using proper lifting techniques. Use a cart to transport the LPG container to the LP storage area. Exchange the empty LPG container for a full container, being certain to place the empty container in the designated area. The empty container must be returned to the supplier.

4. Lift the filled LPG container using proper lifting techniques and place it on the forklift with the locating pin properly inserted through the locating pin hole in the LPG container's neck ring.





Place the bracket locator pin in the LPG container locator hole.

5. Secure the restraining straps in place and make sure the LPG container is properly secured.

6. Make sure the hose is not cut or chafed. Connect and tighten the quick connect fittings. The connection should only be secured by hand, be certain to get a tight and secure seal. Slowly turn on the LPG container valve. Check for leaks using an approved leak-detector solution. If a leak is detected, turn the valve off and check the hose connections.

7. Make sure the hose or LPG container does not extend beyond the forklift's sides or rear. Make sure the LPG container is properly secured against movement or displacement. Start engine and resume operation.

PART 6. USE OF LPG/CNG IN EMERGENCY INDOOR REPAIRS

LPG/CNG may be used indoors (**except in an occupied placed of public assembly)**, for the purpose of performing an emergency repair. For example, LPG/CNG needed when repairing damaged phone communication systems. LPG/CNG use and containers must be always under the constant supervision of the Certificate of Fitness holder. LPG/CNG containers must NOT be stored within the building, and must be removed from the emergency repairs site at the end of each workday. No LPG container with a capacity greater than 16.4 oz or CNG containers with a capacity greater than 8.7 SCF is allowed to be left unattended.

The use of LPG/CNG containers for emergency repairs within the building is limited to: (1) 2 LPG containers of 20 pound capacity each; or (2) 2 CNG containers of 170 SCF capacity each. Nonmetallic hoses may be used at emergency indoor repairs where the portable LPG/CNG containers are stored, used and connected. However the length of the hose must not exceed 6 feet and the hose for LPG should be designed for a working pressure of not less than 350 psi or the hose for CNG must be fabricated of materials that are designed for use with CNG and the hose for CNG must be color-coded red.

A single LPG container with a capacity not greater than 16.4 oz or a single CNG container with a capacity not greater than 8.7 SCF may be used below grade for emergency indoor repairs, provided that the container is not left unattended.

PART 7. USE OF LPG IN HOT AIR BALLOON

There is a possibility of propane fires or explosions from leaks when operating LPG in a hot air balloon. When LPG is used for hot air balloon operations, the storage, handling and use of LPG, including any reserve storage incidental to use, must not exceed a total of 300 pounds. The burner and fuel system are operated in accordance with the FAA (Federal Aviation Administration) Flight manual and manufacturer's instruction. The entire operation must be continuously under the personal supervision of an FAA (Federal Aviation Administration) license holder and a Certificate of Fitness holder. LPG may be used in liquid form if required by the nature of the operation. Nonmetallic hoses may be used at hot air operations, however the length of the hose should be as short as practical and the hose should be designed for a working pressure of not less than 350 psi. The hot air balloon must be provided with a portable fire extinguisher with at least a 10-B:C rating. Hot air balloon operations must be at least 20 feet away from any storage, handling, or use of flammable liquids or combustible liquids or other flammable gases.

Hot air balloons must be secured in an approved manner by not less than a three-point tie down during LPG operations and when ever the balloon is filled with hot air. LPG containers must not be left unattended. LPG must be removed from the site at the conclusion of each day's hot air balloon operations, and must not be left at the site overnight. The LPG storage area must be provided with a portable fire extinguisher with at least a 10-B:C rating.

Smoking is prohibited on the balloon or within 25 feet of any LPG storage, handling or use.

2 dead and 11 injured in a hot air balloon fire:
A fuel line became disconnected from a propane tank causing the explosion. In addition, there was no emergency shut-off valve to stop the propane from expanding and catching fire.