

Revised January 2026 (Contact/Payment info)

FIRE DEPARTMENT • CITY OF NEW YORK



STUDY MATERIAL FOR THE EXAMINATION FOR CERTIFICATE OF FITNESS
FOR

**Supervision of Distillery Operations
A-21**

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

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

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

Create an Account and Log in to:

<http://fires.fdnyccloud.org/CitizenAccess>

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

ALSO INCLUDED IN THIS BOOKLET YOU WILL FIND THE
FOLLOWING: NOTICE OF EXAMINATION (NOE)

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EXAM SPECIFIC INFORMATION FOR A-21 CERTIFICATE OF FITNESS

Save time and submit application online!

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

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

Create an Account and Log in to:

<http://fires.fdnyccloud.org/CitizenAccess/SAML/NYCIDLogin.aspx>

REQUIREMENTS FOR CERTIFICATE OF FITNESS APPLICATION

General requirements:

Review the General Notice of Exam:

<http://www1.nyc.gov/assets/fdny/downloads/pdf/business/general-notice-of-exam-cof.pdf>

Special requirements for the A-21 Certificate of Fitness: NONE

Application fee must be paid with online submission:

Accepted forms of payment:

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

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

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

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- 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

Each testing opportunity requires a separate application and payment. Retesting on the same calendar day is not permitted.

EXAM INFORMATION

The **A-21** exam will consist of **40** multiple-choice questions, administered on a “touch screen” computer monitor. It is a time-limit exam. Based on the amount of the questions and reference material provided, you will have **68** minutes to complete the test. A passing score of at least 70% is required in order to secure a Certificate of Fitness.

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

EXAM SITE:

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



RENEWAL REQUIREMENTS

General renewal requirements:

Review the General Notice of Exam:

<https://www1.nyc.gov/assets/fdny/downloads/pdf/business/general-notice-of-exam-cof.pdf>

Special renewal requirements. A-21 Certificate of Fitness: None

QUESTIONS?

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

About the Study Material

These study materials will help you prepare for the written examination(s) for the Certificate of Fitness for Distillery Operations. The study materials include information taken from the New York City Fire Code (FC), Fire Department Rules and industry standards. The study material does not contain all the information you need to know in order to perform the responsibilities of supervising distilleries. It is your responsibility to become familiar with all applicable laws, rules and regulations of the federal, state and city agencies having jurisdiction, even though such requirements are not included in this study material. You need to be familiar with the FC Chapter 40 in order to adequately prepare for the exam. It is critical that you read and understand this booklet to help increase your chance of passing the exam.

Introduction

Traditionally the distillery industry has been self-regulated using industry standards instead of Fire Codes. In the past, distilleries had been primarily large-scale operations located in rural or industrial areas. Consequently, although there have been serious distillery fires and accidents, they rarely spread beyond the facility.

Currently a growing number of smaller distilleries are opening and operating in more condensed urban areas. These new businesses are known as 'craft' or 'micro'-distilleries. Smaller distillers must be prepared for the full range of risks in the distilling process and be aware that fires or accidents caused by distilling operations could pose serious risks for other buildings in their immediate area.

There are two major hazards in distilleries: fire, and explosion. Distilleries can produce, process, and/or store flammable materials including ethanol products which is an explosive hazard.

Grain processing in distilleries, especially the milling process, also have a serious fire hazard due to the production of combustible dust and other byproducts of grain which can easily catch fire.

Other potential dangers can include small and large leaks from tanks and distillery equipment such as transfer pumps, pipe work and hoses. An explosion can happen if some of the leaked liquid were to flow into an enclosed space with a nearby ignition source, such as a static charge.

Worst Case Scenario

1. Improper Installation



Fatal distillery explosion due to still pressure

April 2015

A fatal explosion at the Silver Trail Distillery in Kentucky was caused by a still which did not have appropriate safety mechanisms.

A “massive equipment failure” caused an explosion at the Silver Trail Distillery in Hardin County, Kentucky, which subsequently “burned to the ground”.

Second distiller Jay Rogers and his assistant Kyle Rogers were both critically injured in the blast, and Kyle later died as a result of his injuries.

The Kentucky State Fire Marshall has now released a report claiming a “moonshine” still at the distillery was not fitted with the correct pressure relief valve, causing it to rupture.

A report verified that an internal plate had been “tack welded” as opposed to “welded fully around”, causing “immediate over pressurization which ruptured the still bottom and sent it hurtling through the door”.

It was claimed that the pressure valve of the still did not open, since it was too large for the still.

Lesson Learned:

- Only use Licensed Professionals to modify any still.
- Proper welding procedures must be followed (pre and post welding).
- Regularly check/test pressure valve

2. Operation Failure

Vodka distillery explosion injures two workers

November 2017



An explosion at a vodka distillery in Texas where two employees were sent to hospital injured, including one with severe burns.

First accounts had suggested that one of the vodka distillery's propane tanks had exploded, causing the fire. However, subsequently it was discovered that the blast occurred while workers were distilling a product called Michael Berry Moonshine.

According to Dean Hensley, Chief Investigator, the actual cause was found to be "An employee was blending vodka with an electric immersion blender when the fumes ignited, causing an explosion and fire."

Lesson Learned:

- Always check heating elements
- Never use electrical tools while distilling, alcohol processing or bottling
- Always use air driven tools or make sure area is clear of any flammable vapors before using electric tools
- Never leave operating still(s) unattended

Definitions

ALCOHOL STORAGE AREA. Any area outside of the distilled spirits processing area in which raw alcohol, distilled spirits and/or alcohol that is a Class II or Class III combustible liquid is stored.

ANGEL'S SHARE. the alcohol that is lost to evaporation during the storage period when the liquid is being aged in porous oak barrels.

BEVERAGE ALCOHOL. For purposes of FC Chapter 40, ethanol produced for human consumption, regardless of the raw material or process used in its production, including any alcohol-water mixture

Distilled Spirits. A beverage for human consumption that is produced by distillation of alcohol in a still and that is a Class I flammable liquid (typically, at least 16 percent alcohol). For purposes of FC Chapter 40, distilled spirits include all alcohol in a distillery that has been distilled, including process alcohol and finished goods, regardless of whether such distilling is undertaken for the purpose of rectifying, purifying, refining and/or other purpose.

Finished Goods. Distilled spirits bottled or otherwise packaged for retail or wholesale use. Finished goods do not include distilled spirits stored in a barrel for aging.

Process Alcohol. Any beverage alcohol that is a Class I flammable liquid (typically, an alcohol-water mixture with an alcohol content of at least 16 percent), that has been distilled but not yet packaged as finished goods. Process alcohol is typically stored at a distillery in alcohol process tanks and other alcohol processing equipment.

Raw Alcohol. Any beverage alcohol that is a Class I flammable liquid and that is stored, handled or used prior to distilling it at a distillery. Raw alcohol is typically transported in intermediate bulk containers.

CHEMICAL STORAGE BUILDING. A detached prefabricated structure designed and installed and listed for indoor storage of hazardous materials, that is constructed with a fire resistance rating of not less than one hour, which vents to the outdoors, and which is equipped with applicable fire protection systems and spill containment.

CLOSED SYSTEM. The use of any compressed gas, and the use of a solid or liquid hazardous material in equipment or a vessel or system that remains closed during normal operation, such that vapors emitted during the operation of such equipment, vessel, or system are not liberated outside of the equipment, vessel or system and the gas or hazardous material is not exposed to the atmosphere during such operation. Examples of closed systems include hazardous materials conveyed through a piping system into closed equipment or a closed vessel or system.

DISTILLED SPIRITS. See Beverage Alcohol.

DISTILLED SPIRITS PROCESSING AREA. Any area of a distillery in which distilling, alcohol processing and bottling operations are being conducted.

DISTILLERY. Any building or premises designed or used for the manufacturing of distilled spirits, and related storage, handling and use of alcohol. A distillery is characterized by the installation of a still to produce distilled spirits and the conduct of other distillery operations on its premises. A warehouse or liquid storage warehouse used solely for the storage of distilled spirits is not a distillery, provided that such warehouse operation is not conducted in a building containing a distillery, but in a separate building with no openings into the distillery.

Small Distillery. A small distillery is a distillery with one or more stills with an aggregate capacity of not more than 250 gallons (946 L) and an individual still capacity of not more than 125 gallons (473 L), and a total quantity of raw alcohol and distilled spirits stored on the premises of not more than 1,500 gallons (5,678 L). Department approval must be required for any storage, handling and use of grain on the premises for alcohol production, including the quantity of grain and any milling thereof.

Medium Distillery. A medium distillery is a distillery with one or more stills with an aggregate capacity of not more than 1,500 gallons (5,678 L) and an individual still capacity of not more than 750 gallons (2,839 L), and a total quantity of raw alcohol and distilled spirits stored on the premises of not more than 6,000 gallons (22,710 L).

Large Distillery. A large distillery is a distillery with one or more stills with an aggregate capacity of not more than 8,000 gallons (30,280 L) and an individual still capacity of not more than 2,000 gallons (7,570 L), and a total quantity of raw alcohol and distilled spirits stored on the premises of not more than 20,000 gallons (75,700 L).

DISTILLERY EQUIPMENT. All devices, equipment and systems designed for the manufacturing, storage and handling of raw alcohol or distilled spirits. It does not include such building systems, commercial cooking systems and other kitchen equipment, and other devices, equipment and systems when they are installed or used outside of the distilled spirits processing or storage area.

Alcohol Process Tank. A flammable liquid storage tank designed or used in a distillery for beverage alcohol processing.

Closed Alcohol Process Tank. An alcohol process tank that is designed to receive and transfer its contents through piping or other means in a manner that does not allow the escape of liquid or vapor under normal operating conditions.

Open Alcohol Process Tank. An alcohol process tank that is designed or used to receive and/or transfer its contents in a manner that exposes the alcohol to the atmosphere and/or allows vapors to be released during alcohol processing under normal operating conditions.

Alcohol Storage Equipment. Any tank or portable container used for the storage of raw alcohol or process alcohol, including intermediate bulk containers and barrels, and storage of finished goods.

Alcohol Storage Tank. Except as otherwise provided with respect to intermediate bulk containers, any vessel having a liquid capacity exceeding 60 gallons (227 L) and designed for stationary installation.

Barrel. A portable wood container also commonly referred to as a cask, that is typically constructed of wooden staves and heads held together by metal hoops. In a distillery, barrels are used to store processed alcohol for a period of months or longer. The barrel typically allows alcohol vapors to escape. For purposes of FC Chapter 40, barrel does not include wax-lined and other barrels designed and used for packaging of finished goods rather than for aging of distilled spirits.

Intermediate Bulk Container. A Department of Transportation-approved portable container, constructed of metal and/or plastic, designed for the shipment of alcohol (excluding finished goods), with a maximum capacity of 660 gallons (2,498 L). Intermediate bulk containers stored, handled or used in a distillery must be deemed to be a portable container even if their capacity exceeds 60 gallons (227 L), provided, however, that an intermediate bulk container of any capacity that is part of a stationary

installation in a distillery or otherwise fixed in place must be deemed to be a storage tank.

Still. Any apparatus designed to produce distilled spirits by separating and condensing alcohol vapors from an alcohol-water mixture to produce a higher proof alcohol. Stills typically consist of a distillation pot, one or more columns, and a condenser, but some stills, such as column stills, are designed to operate without a distillation pot. Where reference is made in this code to the capacity of a still (reflecting the size of the distillation pot), such reference must be deemed to include the equivalent production capacity, as determined by the department, of a column still or other still without a distillation pot.

DISTILLERY OPERATIONS. Distillery operations include any and all operations conducted in a distillery that involve the manufacturing, storage, handling or use of distilled spirits. Distillery operations typically include storage and handling of raw alcohol; distilling; storage and handling of process alcohol; bottling; and storage, handling and (in a distillery serving area) use of finished goods. In distilleries that produce alcohol from grains or other raw materials, distillery operations may also include storage, handling and use of such raw materials and combustible liquids and combustible waste with an alcohol content of less than 16 percent.

Alcohol Processing. The processing of distilled spirits following distillation up to the point of bottling, including blending, gauging, agitating, filtering, flavoring, traditional and alternative aging (including barrel storage), and barrel filling and emptying.

Bottling. Filling and packaging of bottles and other containers with distilled spirits for retail or wholesale use.

Distilling. The production of distilled spirits or other processing of alcohol in a still.

DISTILLERY SERVING AREA. Any area on the premises of a distillery designed or used to accommodate the public, including any tasting area for the on-premises consumption of distilled spirits or other area for serving of food and/or drink and/or conduct of classes, tours and other events.

DISTILLERY WASTE PRODUCTS. Any flammable or combustible liquid, solid or other material that is a by-product or residue of, or otherwise generated in connection with the distillation process or other alcohol processing that will not be used in the finished goods.

DISTILLING. See Distillery Operations.

FORESHOT. initial part of head

GENERAL SUPERVISION. Except as otherwise provided in this code, supervision by the holder of any department certificate who is responsible for performing the duties set forth in FC section 113.2 but need not be personally present on the premises at all times.

HEADS. Initial part of Distillate. Spirits from the beginning of the run that contain a high percentage of low boiling point alcohols and other compounds such as aldehydes and ethyl acetate.

HEARTS. The desirable middle alcohols from a still run.

HIGH-PILED COMBUSTIBLE STORAGE. Storage of combustible materials in closely packed piles or combustible materials on pallets, in racks or on shelves where the top of storage is greater than 12 feet (3,658 mm) in height. High-piled combustible storage also includes certain high-hazard commodities, such as rubber tires, Group A plastics, flammable liquids, idle pallets and similar commodities, where the top of storage is greater than 6 feet (1,829 mm) in height.

HIGH-PILED STORAGE AREA. An area within a building, structure or premises that is designed or used for high-piled combustible storage.

HIGH WINE. The product left after completion of second distillation.

LOW WINE. The product left after completion of first distillation

MASH. any material capable of, or intended for use in fermenting process

MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA. The maximum amount of a hazardous material allowed to be stored or used within an indoor or an outdoor control area.

PERSONAL SUPERVISION. Except as otherwise provided in this code, supervision by the holder of any department certificate who is required to be personally present on the premises, or other proximate location acceptable to the department, while performing the duties for which the certificate is required.

PROOF. The ethyl alcohol content of a liquid at 60°F (15.5°C), stated as twice the percent of alcohol by volume.

PURE ALCOHOL. 100% ethanol, or the amount of such ethanol present in an alcohol solution. E.g.: 100 liters of beverage alcohol at 100 proof contains 50 liters of pure alcohol. The natural product is produced by fermentation of the sugars, using yeast. The sugars may be derived from a wide variety of agricultural products such as grains; grapes; sugar cane; or apples. After the fermentation process, the ethanol is purified by a multiple distillation and rectification process

RICK HOUSE. structure designed solely for storing and aging distilled spirits.

SAFETY DATA SHEET (SDS). A document prepared in accordance with the regulations of the United States Department of Labor, as set forth in 29 CFR Part 1910.1200 or a federally approved state OSHA plan which sets forth information concerning a hazardous material.

STILLAGE/SPENT GRAIN. The grain, fruit, etc residue from the manufacturing of alcohol through distillation.

TAILS. High- boiling point constituents containing a high percentage of fusel oil mixed with alcohol at the end of the run. The last portion of alcohol that is produced from most stills. This portion contains heavier alcohols, a much higher percentage of water and other unwanted by-products which are more water soluble.

Permit Requirements

Permits are required to manufacture, store, handle, use, sell or transport hazardous or combustible materials as well as to conduct any operation or to maintain a facility that requires a permit.

When permits are required, an FDNY inspection will be conducted to determine if the facility complies with all NYC Fire Codes and Rules. All applicable permit fees must be paid prior to any permit being issued. Once a permit is issued, it must be kept on the premises in a designated area and readily available for inspection by any representative of FDNY.

There are two types of permits issued by the FDNY: Site specific and City wide.

Distillery operations require a **Site-specific permit**. This type of permit authorizes the permit holder to manufacture, store, handle, use or sell hazardous materials or combustible materials, or conduct an operation or maintain a facility at a specific premises or location.

Permits are valid for 1 year and are renewable upon inspection of premises.

Design and Installation

A. Facility

Small distillery.

A small distillery can be located in a building or space designed as an F-1 factory occupancy (F-1) (see below for Group Occupancies). The distilled spirits processing areas, alcohol storage areas and barrel storage areas must be constructed with the fire barriers and horizontal assemblies required for factory occupancies

It is possible that such factory occupancy may be located in a mixed-occupancy building, except in any Group E, R-2, I or A, unless preauthorized by the FDNY.

*Group	Occupancy Type
A	Place of Assembly occupancy
E	Educational
F	Factory/Industrial (F-1, F-2) F-1: Moderate Hazard Occupancy F-2: Low hazard Occupancy
H	A high-hazard occupancy H-2: <ul style="list-style-type: none"> • Class I, II or IIIA flammable or combustible liquids which are used or stored in normally open containers or systems, or in closed containers or systems pressurized at more than 15 psi (103.4 kPa) gage • Combustible dusts H-3: <ul style="list-style-type: none"> • Class I, II or IIIA flammable or combustible liquids which are used or stored in normally closed containers or systems pressurized at less than 15 psi (103 kPa) gage.
I	Institutional
R	Residential R-1: Temporary R-2: Multiple dwelling, 3 Family and up R-3: Long Term
<i>*As defined by NYC Building Code Chapter 3</i>	

The maximum allowable quantity in a small distillery must be 750 gallons (2839 L) per control area. An additional 750 gallons (2839 L) of beverage alcohol and flammable beverage alcohol precursors, with an alcohol content by volume of 20 percent or less, may be stored, handled or used per control area.

The total quantity of alcohol stored, handled or used in the combined fire area of a small distillery is limited to 1,000 gallons (3785 L)

Medium distillery.

A medium distillery must be in a high-hazard occupancy, in a Factory building (Group F) unless preauthorized by the FDNY.

The maximum allowable quantity in a medium distillery must be 2,000 gallons (7570 L) per control area. An additional 4,000 gallons (15,140 L) of beverage alcohol and flammable beverage alcohol precursors, with an alcohol content by volume of 20 percent or less, may be stored, handled or used per control area.

The total quantity of alcohol stored, handled or used in the combined fire area of a medium distillery is 2,000 gallons (7570 L). maximum allowable quantity of twice that amount for beverage alcohol and flammable beverage alcohol precursors, with an alcohol content by volume of 20 percent or less

Large distillery.

A large distillery can only be in a building that is classified as a high-hazard occupancy unless preauthorized by the FDNY. This building must be separated and detached from any other building.

The maximum allowable quantity in a large distillery must be 4,000 gallons (15,140 L) per control area. An additional 8,000 gallons (30,280 L) of beverage alcohol and flammable beverage alcohol precursors, with an alcohol content by volume of 20 percent or less, may be stored, handled or used per control area.

The total quantity of alcohol stored, handled or used in the combined fire area of a large distillery is 4,000 gallons (7,570 L) maximum allowable quantity of twice that amount for beverage alcohol and flammable beverage alcohol precursors, with an alcohol content by volume of 20 percent or less.

FC TABLE 4003.3

MAXIMUM STILL CAPACITIES AND MAXIMUM ALLOWABLE QUANTITIES

<u>Distillery Size</u>	<u>Maximum Individual Still Capacity</u>	<u>Aggregate Maximum Still Capacity</u>	<u>Maximum Allowable Quantity per Control Area ^a</u>	<u>Aggregate Maximum Allowable Quantity^b</u>	<u>Additional Storage Allowance per Control Area for Beverage Alcohol and Precursors ≤20% ABV^c</u>	<u>Maximum Aggregate Allowable Quantity of Beverage Alcohol and Precursors ≤20% ABV^d</u>
<u>Small</u>	<u>125 gallons (473 L)</u>	<u>250 gallons (946 L)</u>	<u>750 gallons (2,839 L)</u>	<u>1,500 gallons (5678 L)</u>	<u>750 gallons (2839 L)</u>	<u>1,500 gallons (5678 L)</u>
<u>Medium</u>	<u>750 gallons (2,839 L)</u>	<u>1,500 gallons (5,678 L)</u>	<u>2,000 gallons (7,570 L)</u>	<u>6,000 gallons (22,710 L)</u>	<u>4,000 gallons (15,140 L)</u>	<u>8,000 gallons (30,280 L)</u>
<u>Large</u>	<u>2,000 gallons (7,570 L)</u>	<u>8,000 gallons (30,280 L)</u>	<u>4,000 gallons (15,140 L)</u>	<u>20,000 gallons (75,700 L)</u>	<u>8,000 gallons (30,280 L)</u>	<u>16,000 gallons (60,560 L)</u>

- a. The maximum allowable quantity per control area comprises all raw alcohol and distilled spirits stored on the premises, excluding the amounts of finished goods allowed by FC4005.2.5.
- b. The aggregate maximum allowable quantity comprises all raw alcohol and distilled spirits stored on the premises, excluding the amounts of finished goods allowed by FC4005.2.5. These amounts are reduced in a combined fire area pursuant to FC4003.4.2 to 1,000 gallons (small distillery); 2,000 gallons (medium distillery); and 4,000 gallons (large distillery).
- c. Additional allowance per control area applies to beverage alcohol and flammable beverage alcohol precursors, up to a maximum of 20% alcohol content by volume (ABV), clearly labelled as such in accordance with Federal or other applicable regulations.
- d. Maximum aggregate allowable quantity stored on the premises of beverage alcohol and flammable beverage alcohol precursors, up to a maximum 20% alcohol content by volume (ABV), clearly labelled as such in accordance with Federal or other applicable regulations. These amounts are reduced in a combined fire area pursuant to FC4003.4.2 to 1,000 gallons (small distillery); 4,000 gallons (medium distillery); and 8,000 gallons (large distillery).

Tank and container installation. All tanks and containers in the distilled spirits processing area and all tanks and containers which transfer their contents by piping or are a part of a stationary installation, must be secured to the floor, to prevent movement.

B. Equipment

Distillery equipment must be designed and installed according to FDNY FC Chapter 40 and industry standards.

Equipment used to manufacture, store, handle or use beverage alcohol must be listed or labeled for the intended use, if available.

Note: At FDNY discretion, international or other approved certifications for components which are not listed and labeled by a nationally recognized testing laboratory may be accepted.

Stills.

1. Certificate of Approval

Stills must be issued a certificate of approval in accordance with FC112 (See Appendix) and the rules. On an interim basis, the department may grant a site-specific approval of a still for which a manufacturer has not obtained a certificate of approval upon a satisfactory showing by the permit applicant as to the still manufacturer's design and installation specifications and operational and maintenance requirements.



2. Installation

Stills must be stationary and secured in an approved manner.

3. Heat source

Still heating must use steam, hot water or other approved indirect heating method. Mechanical equipment that use burners, flames or exposed electrical elements, are not allowed.

There must be an emergency shutoff switch at the entrance to the processing area for the heating source.

4. Ingredients.

All liquid and solid ingredients must be suitable for use in the still that has been approved by the department on the Certificate of Approval.

Electrical wiring and equipment.

Electrical wiring and equipment must be installed in accordance with the Electrical Code.



Electrical: Temperature control readings for different parts of still.

Distillery equipment used to manufacture, store, handle or use beverage alcohol must be bonded and grounded to protect against electrical discharge in accordance with the NYC Electrical Code.

Class 1, Division 1 electrical wiring and equipment must be in the distilled spirits processing areas and alcohol storage areas, except where a closed system is being used. Electrical wiring and equipment, for closed system area must be provided as follows:

1. Class 1, Division 1 and Class I, Division 2 electrical wiring and equipment in accordance with FC Table 5703.1.1 (for indoor equipment where flammable vapor/air mixtures could exist under normal operations); and

2. Class 1, Division 1 electrical wiring and equipment in pits and behind containment barriers where flammable vapor cannot dissipate horizontally; and
3. Class 2, Division 1 electrical wiring and equipment in any other area where combustible dust may be present.

Classified Electric Area



Area around which flammable liquid is distilled, dispensed, or mixed.
Flammable liquids produce flammable vapors.

The area around a significant source of alcohol vapors must be free of ignition hazards. (for example, around a still or alcohol pump). All electrical equipment in this area must be properly rated. The area which requires specialized electrical equipment is known as a classified electrical area.

Piping systems.

Piping systems used to transfer Class I liquids, including piping, tubing, valves, pumps, and fittings must be designed, installed and maintained in accordance with FC5703.6 and ASME B31.3, acceptance testing must be completed as described below:

Acceptance testing. Prior to starting distillery operations:

- The still and all piping associated with alcohol processing equipment must be inspected and tested by, or in the presence of, a Certificate of Fitness holder at the time of installation to ensure that the equipment is in good working order; and
- Electrical wiring, equipment and installations must be installed according to construction codes, NYC Building Code and the NYC Electrical Code.
- Piping containing flammable liquids must be labeled and identified in accordance with ASME A13.1.

Label must:

- Indicate the direction of flow
- Be visible from the point of normal approach
- Near valves, flanges, and changes in pipe direction
- Both sides of ceiling, wall or floor penetrations
- Any line entry or re-entry point
- On straight pipe runs
- Every 50 feet



ASME A13.1 Piping label color chart

Powered industrial trucks and other mechanical handling equipment.

Powered industrial trucks must be stored and used in accordance **NFPA 505** and industry standards including:

- Propane forklifts are **never** allowed near still.
- All other mechanical handling equipment must be stored and used in accordance with industry standards.

C. Design of Grain facility.

The space used for grain storage, handling and milling, mashing and fermenting, and/or related operations must meet the requirements below:

- Separation from distilled spirits and alcohol processing areas.
1-hr fire barrier or horizontal assemblies or both except in a combined fire area.as described in the Section A (above).
- Fire protection systems.
Grain storage/handling area must have fire protection systems equal to Section A (above).
- Mechanical equipment.
No mechanical equipment with burners or using other flames or exposed electrical elements, may be installed or used.
- Other alcohol production waste.
Any byproduct or residue generated by grain storage, handling and milling, mashing and fermenting and/or related operations, including combustible liquids, combustible waste and carbon dioxide, must be handled or controlled in a manner appropriate for the level of hazard that it presents. Where the carbon dioxide generated by other alcohol production may exceed United States Occupational Safety and Health Administration safety limits, there must be an oxygen sensor, or other approved or listed device installed.



Operation and Maintenance

Staffing and Supervision

There must be an A-21 Certificate of Fitness holder present at the distillery while there is distilling, alcohol processing and transferring of raw alcohol from a shipping container into distillery equipment.

Distilling of alcohol must be personally conducted by the Certificate of Fitness holder.

There must be at least one other *trained and knowledgeable person* present at the distillery when the quantity of alcohol undergoing distillation or processing is more than 5 gallons (19 L).

Supervision

Distillery installation and operations must be under the personal supervision of a certificate of fitness holder.

Non-distillery staff must be restricted to the distillery serving area and general business operations area.

There must be a trained and knowledgeable person present on the premises when the quantity of alcohol undergoing distillation or alcohol processing exceeds 5 gallons (19 L).

A-22	Distillery Installation/repair The installation, alteration, repair or servicing of stills and other distillery equipment must be conducted under the personal supervision of a still installation certificate of fitness holder or other person with approved qualifications.
A-21	Distillery Still operator <ul style="list-style-type: none">• Personally conduct still operation and periodic testing of stills• Responsible for the personal supervision distillery equipment other than stills• Present on the premises at all times when distilling and alcohol processing is being conducted.• Personally conduct any distilling and tend to the still at all times when in operation according to industry standards.• present on the premises during the transfer of raw alcohol from a shipping container into distillery equipment.• Responsible for the general supervision of all other distillery operations, including the storage of raw alcohol and distilled spirits <p>Ensure that people not conducting necessary distillery operations are not allowed in the distilled spirits processing areas and alcohol storage areas during distilling or alcohol processing operations.</p> <p>Distillery tours may be conducted in designated locations within such areas, as authorized by the department, and under the general supervision of a A-21 certificate of fitness holder.</p>

Storage

A. Containers

Raw alcohol and distilled spirits must be stored in tanks and containers designed and installed in accordance with FC Chapter 32 and NFPA 30.

Aboveground storage.

In a distillery, raw alcohol, distilled spirits and other alcohol that are classified as Class II or III liquid, must be stored in aboveground storage tanks or aboveground intermediate bulk containers.

Tanks and containers.

Alcohol handled and used during distilling and alcohol processing must be stored in alcohol process tanks.

Tank and container construction. All tanks and containers in which alcohol is stored and handled, except barrel storage, must be constructed of stainless steel and designed in accordance with FC 5704, 5705.2 and 5705.3.

Raw alcohol delivered to a distillery in a plastic intermediate bulk container must be transferred into a stainless-steel storage tank or stainless-steel intermediate bulk container, as soon as possible but no later than end of the workday.

Portable tanks and containers.

Portable tanks and containers that are not required to be secured to the ground must be in a location and way that they can be stable.

Portable tanks and portable containers must not be stacked unless they are designed for stacking purposes. Stackable containers cannot be more than two tiers or 12 feet (3658 mm) above the floor. Powered industrial trucks or other devices, equipment, or systems, designed for moving stackable containers must be used to lift and lower portable tanks and containers.

Open tanks and containers.

Any open alcohol process tank or alcohol storage equipment must have a secure, vapor-tight lid or other similar form of closure. Vapor tight lids and closures must be kept closed at all times when the tank or container contains alcohol or alcohol residue, except when necessary, during handling and processing of alcohol.

B. Storage Location

Storage of:

- *Raw alcohol.*

Raw alcohol must be stored in an alcohol storage area.

Never store raw alcohol in distilled spirits processing areas. Raw alcohol must be transferred from the alcohol storage area to the still.

- *Process alcohol.*

Alcohol process tanks must be used to store process alcohol while in the distilled spirits processing area, except for alcohol temporarily stored in portable containers during processing, and barrel storage.

Process alcohol undergoing aging in barrels must be stored in a separate fire area.

- *Distilled spirits ready for bottling.*

Alcohol process tanks or alcohol storage area must be used to store distilled spirits ready for bottling or other packaging (finished goods).

- *Distillery waste products.*

Any methanol, stillage or other residue that is susceptible to spontaneous ignition or otherwise presents an imminent hazard must be stored in an alcohol storage area or other approved location.

All other distillery waste products, such as materials contaminated with alcohol, must be kept and stored in noncombustible containers in the business operations area, stored in a listed disposal container, and Contents removed and disposed of daily.

- *Finished goods.*

Finished goods may be stored in the general business operations area, distillery serving area, alcohol storage room and barrel storage room.

Finished goods do not count toward the maximum allowable quantity of alcohol allowed in the fire area.

C. Barrel storage.

Barrels must be stored on the floor, in a secure rack of substantial construction in accordance with industry standards, or on pallets (with barrels stored on their flat ends).

The top of stored barrels must not exceed 12 feet (3,658 mm) above the floor. Alternatives to this may be approved by the department based on the location and manner of the high-piled storage as long as barrel handling (including the dropping of a barrel or pallet of barrels) does not present a hazardous condition in the distillery.

Barrels stored above floor level must be located on approved shelves or racks designed and/or listed for barrel storage.

Barrel storage more than 6 feet (1829 mm) above the floor must follow Building Code requirements, the high-piled combustible storage requirements of FC Chapter 32, and distilled spirits industry standards.



Used barrels.

Barrels previously filled with distilled spirits must be handled, stored, and treated the same as full barrels unless they are thoroughly cleaned and purged of all vapors in accordance with industry standards.

Separation and aisles.

- **Aisles** must be a minimum 4-feet-wide (1,219 mm) between adjacent rows of racks and adjacent storage of liquids.
- The **main aisles** must be a minimum of 8 feet (2,438 mm) wide.
- **Additional aisles** must be provided for access to doors, required windows and ventilation openings, standpipe connections, mechanical equipment and switches.
 - These aisles must be at least 3 feet (914 mm) in width, unless greater widths are required for separation of piles or racks.

D. Grain storage

The space used for grain storage, handling and milling, mashing and fermenting, and/or related operations must meet the requirements below:

1. *Separation from distilled spirits and alcohol processing areas.*
Such space must have fire separations that separate the distilled

spirits processing areas, alcohol processing areas and alcohol storage areas.

Combined fire areas

Grain milling **cannot be** done in a distillery operating in a combined fire area. Grain mashing and fermenting may be conducted in the combined fire area. Grain transfer must occur in an enclosed system. There must be a combustible dust collection system for any unenclosed grain handling.

2. Fire protection systems.

Every Distillery must have the following fire protection systems in place:

a. Sprinkler system.

Distilleries must be completely protected by a sprinkler system that has been designed to comply with the NYC Building Code and approved by the NYC Department of Buildings.

For :

- **small distilleries**, the sprinkler system must be designed to be of an extra hazard type.
- **medium or large distilleries**, the sprinkler system must be designed for a high-hazard occupancy.
- **high piled barrel storage areas** must be designed to the specific storage system (solid-piled and shelf storage, rack storage and automated storage) as defined in the NYC Fire Code.
- **combustible dust producing areas** must be designed to comply with NFPA 652 as required by the NYC Fire Code.

b. Fire alarm system.

Distilleries must have a manual and an automatic fire alarm system. If the fire alarm system is part of a building system that provides protection to other occupancies, there must be a separate sprinkler water flow device for the distillery occupancy. The fire alarm system must be monitored by a central station company and activate all alarm notification devices in the distillery.

***Exception:** (for separate water flow device) a small distillery equipped with a smoke detection system.

c. Emergency alarm system.

There must be a gas detection system designed to detect flammable vapors in accordance with FC908 (Appendix C) in the distilled spirits processing area and alcohol storage areas, and in any area of the distillery in which flammable vapors in more than de minimis quantities may be released or accumulate. Such emergency alarm system must activate alarm notification devices throughout the distillery.



3. Mechanical equipment. Mechanical equipment with burners or using other flames or exposed electrical elements, **cannot** be installed or used.

E. Flammable Liquids Cabinet

Liquid storage cabinets

Where the Fire Department requires that liquid containers be stored in storage cabinets, such cabinets and storage must be in accordance with the following:

- The cabinet must be listed in accordance with UL 1275.
- All cabinets must be provided with a conspicuous label in red letters on contrasting background which reads: FLAMMABLE-KEEP FIRE AWAY.
- The door must be well fitted, self-closing and equipped with a three-point latch.
- The bottom of the cabinet must be liquid-tight to a height of at least 2 inches.
- The combined total quantity of flammable and combustible liquids in a cabinet must not exceed 120 gallons.
- Maximum 3 cabinets are allowed to be located in a single fire area, except that in a Group F occupancy (e.g. a factory and industrial occupancy), additional cabinets are allowed to be located in the same fire area if the additional cabinets (or groups of up to 3



cabinets) are separated from other cabinets or groups of cabinets by at least 100 feet.

Quantities not requiring a permit must be stored in approved containers and locations.

Housekeeping

A. Combustible Dust

The dust produced by milling and/or transfer to mashing are considered combustible dust. The distillery must be designed and/or equipped as required by NFPA 652 based on the type and amount of combustible dust that could be generated, including the following safety measures:

1. The space where storage, handling and milling of grain or other combustible dust-producing raw material must be constructed according to the NYC Building Code as a high hazard occupancy and/or
2. The storage, handling and milling of grain or other combustible dust-producing raw material must be conducted in a space separated by fire separations from the distilled spirits processing areas and alcohol processing areas and alcohol storage areas; and/or
3. There must be a mechanical ventilation system to prevent the concentration of combustible dust from reaching explosive levels, in accordance with **EXPLOSION PROTECTION STANDARDS** set forth below:

NFPA 652	Fundamentals of Combustible Dust
NFPA 654	Prevention of Fires and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids

4. Specialized dust collection systems and devices must be provided to reduce the amount of atmospheric combustible dust; and/or
5. Grain or other combustible dust-producing raw material must be stored in suitable containers; and/or
6. There has to be limitations established on the quantity of grain or other combustible-dust producing raw material that can be stored, handled and milled at the distillery at one time.

Combustible dust created solely by storage, may be considered minimal (for instance in 50-pound (lb) bags or a ‘Super Tote’).

B. Spill Control and reporting

Spill mitigation. Spills of raw alcohol or distilled spirits must be contained and, if possible, promptly diluted by water. There must be a spill kit available and designed for flammable alcohol. The flammable or combustible waste must be disposed of according to local laws, rules and regulations. Floor drains can only be used for collection and/or disposal of spills when approved by the department. The distillery’s spill control (mitigation) and reporting procedures must be detailed in the distillery’s emergency response plan.

In the event of a leak, spill or uncontrolled discharge, all distillery operations, even those unrelated to the spill, must immediately stop. Distillery operations can resume only when the hazard has been completely controlled and the spilled materials has been cleaned and removed.

C. Storage

Packaging materials and other combustible materials cannot be stored in the distilled spirits processing area or barrel storage areas except while in the process of being used.

Distillery Tours

Distillery tours for the public are commonly conducted throughout the United States including NYC. During the tour, distilleries promote their products and provide behind the scenes walkthroughs to the public and offer tastings.

Tours present special concerns as visitors are not employees and do not know distillery safety practices. Mishaps and injuries can be avoided through careful planning.

Tours may be offered at the discretion of the owner with the following conditions:

1. FDNY regulations require that if the distillery is in operation an A-21 (Master Distiller) Certificate of Fitness holder **must be on the premises**, supervising the facility.

2. Tours can be conducted under the general supervision of an A-21 holder. If the distillery is **not** in operation but there is a scheduled tour, COF holder is not required to be on the premises.

Safety on Distillery Tours

Before any tour the facility must be cleaned and safe of any possible hazards. A safe, and clearly designed tour route should be established. Distillery owners should establish a safe number of visitors that can be accommodated on a distillery tour.

Tours should never interfere with distillery operations as there can be hot surfaces and other hazards that can affect the safety of the public.

It is advised that a walkthrough be conducted along the tour route. On this walkthrough look for:

- Broken glass
- loose barrels
- liquids
- or other hazards which can create a dangerous situation.

All hazards must be removed BEFORE allowing the public to enter the facility. It is important to warn the public that safety rules are for their benefit and that they may be asked to leave the distillery if they cannot follow the rules.

Verify the days and hours of the tour and determine whether production will be taking place as it will affect COF coverage.

Tour operators should host a safety meeting with the public in a quiet area to clearly communicate the rules for the tour. Trying to talk over loud sounds can be distracting and prevent clear communication of important information.

It is important to keep the tour group together and ensure that they do not touch any equipment. Keep your eyes on the group to make sure that there is no opportunity for anyone to wander around and touch machinery.

Signage is important. If there are areas that are off limits to the public, it is advised that “NO ENTRANCE” or similar signs are clearly visible. Stairs must also be clearly marked to avoid falling.

If you spot hazardous situations during the tour, address them immediately, and notify your supervisor. If serious or dangerous, it may require the tour being stopped.

Distillery Safety

A. Inspection, Testing and Maintenance

The original equipment manufacturer's manuals for the installation, operation and maintenance of all distillery equipment must be kept on site and made available for inspection by any representative of the department.

All distillery equipment must be periodically inspected, tested and maintained according to the manufacturer's instructions, distilled spirits industry standards, and all applicable laws, rules and regulations.

B. Emergency Response Plan

Distilleries must have and maintain an emergency response plan to address fires; spills, vapor releases distillery equipment alarms and other accidental hazards that may occur. Distilleries can use emergency plans that have been developed in compliance with OSHA or New York State Department of Labor regulations, if the plan meets all FDNY regulations in FC Chapter 40.

The Emergency response plan must include how to address and report fires, leaks and/or spills.

The A-21 Certificate of Fitness Holder must train all distillery staff on how to use and be ready to implement the emergency response plan.

C. Sources of ignition.

Safety precautions must be taken to prevent ignition of flammable liquids or vapors from any potential ignition source, including any heat, friction or electrical current generated in connection with cleaning, maintenance and/or repair work.

Open flames. Open flames, including barrel charring operations, are prohibited in the distilled spirits processing area and other alcohol production areas, except as authorized by the department.

Environmental control. The ambient room temperature and other environmental factors in the distilled spirits processing area and storage areas must remain within limits suitable for safe distilling and alcohol processing operations and alcohol storage.

D. Protection and Best Practice

- Protection from Impact

Distillery equipment that is used to make and store alcoholic beverages, including storage tanks, must be protected from the accidental impact from powered industrial trucks and other mechanical equipment (NFPA 505 and industry standards).

Lighting.

Distilled spirits processing areas, excluding barrel storage areas, must have sufficient lighting to for the safe operation of distillery equipment and visibility of signage.

- **Lightning protection**
Medium and large distilleries that occupy a separate building must have lightning protection in accordance with the NYC Electrical Code and NFPA 780.

- **Explosion control.**
Medium and large distilleries must have explosion control designed in accordance with FC911 to mitigate the impact of an explosion.

MATERIAL	CLASS	EXPLOSION CONTROL METHODS	
		Barricade Construction	Explosion (deflagration) venting or explosion (deflagration) prevention systems
Hazard Category			
Where explosion hazards exist ^a	Detonation Deflagration	Required Not required	Not permitted Required

a. Rooms containing dispensing and use of hazardous materials when an explosive environment can occur because of the characteristics or nature of the hazardous materials or as a result of the dispensing or use process.

- **Exhaust ventilation.**
Exhaust ventilation must be provided in accordance with Section 502.8 of the Mechanical Code in the distilled spirits processing area and alcohol storage areas, and in any area of the distillery in which flammable vapors in more than de minimis quantities may be released or accumulate.

- Best Practice

Still operators must always make sure that still is *completely* shut down prior to any maintenance, including welding or other hot works operations in the area of still.

E. Personal Protection

It is recommended that “hazard assessment” be conducted of each workspace to decide what type of personal protective equipment (PPE) is required.

The hazard assessment should begin with a walk-through of the distillery to determine the proper types of PPE required at the worksite. The workplace should be periodically reassessed for any changes in conditions, including new equipment or that could affect occupational hazards. For specific requirements for PPE, refer to OSHA standards 29 CFR.

Employees should be trained on:

- When PPE is necessary;
- What PPE is necessary;
- How to properly put on and take off, adjust, and wear PPE;
- The limitations of the PPE; and,
- The proper care, maintenance and disposal of PPE.

Emergency Eyewash and shower

An emergency eye wash and shower should be available in the distillery. The emergency eye wash and shower provide on-the-spot decontamination. They allow workers to flush away hazardous substances that can cause injury. Emergency showers can also be used effectively in extinguishing clothing fires or for flushing contaminants off clothing.

When used properly, safety showers and eyewashes improve the medical prognosis and reduce the risk of long-term tissue damage. If delayed or cut short, however, first aid treatment (shower/eyewash) may be less effective, and the full extent of the injury can become problematic.

Industry standards recommend that the location should be no more than 10 seconds travel time from anticipated exposure points. One hundred feet can be traveled in 10 seconds if the workplace has no obstacles. If there are doors or other obstructions present, the distance should be much less.

Emergency showers. Emergency showers are designed to provide a large amount of water at once; enough to encompass the entire body.

Emergency eyewash stations. Emergency eyewash stations are designed to for a controlled flow of water to flush both eyes simultaneously. Eyewash stations are designed to provide an uninterrupted, 15-minute supply of water.

Emergency eye/facewash stations. Similar to the eyewash station, an eye/facewash station, is designed to irrigate both the eyes and face simultaneously.

Some important factors of the Emergency Eyewash and shower are:

- **Initiation:** all emergency shower stations should be able to be operated by one hand and one action. Once water flow has been started it should continue, leaving both hands free.
- **Location:** Location should be clearly marked, well lighted, and easily accessible, i.e., no obstacles, doorways, or turns.
- **Training:** Routine drills are advised. At a minimum, employees should know the location and proper use of eyewashes and showers.

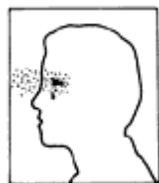
F. Exposure

$$\text{Risk} = \text{Toxicity} \times \text{Exposure}$$

Types of Exposure:



- **Acute exposure** refers to the intake of a single dose or to a series of exposures within a short period of time (e.g. one day). Acute exposures may be referred to as acute dermal, acute oral or acute inhalation poisoning. Usually the effects of acute exposure, if any, will occur within 24 hours.



- **Chronic exposure** is the exposure to chemicals over an extended period of time. Chemicals which have a tendency to accumulate, or which break down slowly in body tissues, usually represent the greatest chronic exposure hazard. Someone who is frequently exposed to low doses of such chemicals may develop symptoms of poisoning long after the first exposure. Chronic exposure may be referred to as chronic oral, chronic dermal or chronic inhalation poisoning.



Dermal Exposure:

In typical work situations, skin absorption is the most common route of poisoning from chemicals. As long as the chemicals remains in contact with the skin, absorption will continue. Each part of the body differs in the rate at which dermal absorption occurs. The head (especially the scalp and ear canal), the eyes and the genital areas are at high risk. This absorption may occur as a result of a splash or spill when mixing,

loading or using a chemical. It may also result from exposure to residue on equipment, protective clothing or treated surfaces after chemical application. It is also easy to transfer chemical residues from one part of the body to another. When this occurs, the applicator increases the potential for chemical poisoning. The hazard from skin absorption increases when workers are mixing chemicals because they are handling concentrated chemicals that contain a high percentage of active ingredients.

To protect yourself from eye and skin contact or absorption:

- **ALWAYS** wear protective clothing and equipment when using chemicals or repairing contaminated equipment.
- If your clothes become contaminated, change **IMMEDIATELY**. Wash all affected areas of the skin.
- **ALWAYS** change clothes as part of the clean-up after chemical use.
- **ALWAYS** wash and shower after using chemicals.
- **ALWAYS** wear clean clothes at the start of each day during chemical application.
- **ALWAYS** wear eye protection when you measure or mix chemicals.
- **NEVER** wipe your eyes with contaminated gloves or hands.

Dermal First Aid Procedures:

If eye contact occurs - Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

If skin contact occurs - Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

Oral Exposure:

Chemicals can be ingested by accident, through carelessness, or intentionally. The most frequent cases of accidental oral exposure are when chemicals have been taken from their original labeled container and put into an unlabeled bottle or a food container. Workers handling chemicals or application equipment can also consume excessive levels of chemicals if they do not wash their hands properly before eating or smoking. Applicators must never try to clear a spray line or nozzle by blowing on it while holding it to their mouth.

To protect yourself from oral exposure:

- **ALWAYS** store chemicals in their original labeled containers.
- **NEVER** use your mouth to clear a hose or nozzle, or to siphon a chemical.
- **ALWAYS** wash hands after handling chemicals, before eating, drinking, smoking, or using the toilet.

- **NEVER** leave chemicals open or unattended.
- **ALWAYS** avoid splashes or dusts when mixing chemicals.
- **ALWAYS** label the measuring containers used for chemicals.
- **NEVER** put chemicals in an unlabeled bottle or food container.

Oral First Aid Procedures:

If ingested - Immediately call a poison control center or doctor for treatment advice. DO NOT give any liquid to the person. Do not induce vomiting unless told to do so by a poison control center or doctor. Never give anything by mouth to an unconscious person.

Inhalation Exposure:

Lungs may be exposed to chemicals by inhalation of powders, airborne droplets or vapors. Many chemicals give off a vapor when exposed to air. The hazard is greatest in enclosed spaces where there is little air movement. For example, high vapor levels could result from a spill in an unventilated storage area or application in a confined space such as an embalming room. Proper ventilation can greatly reduce vapor levels.

To protect yourself from respiratory exposure:

- **ALWAYS** wear an appropriate and properly fitting respirator:
 - o If it is required on the label;
 - o If chemicals are used or mixed in poorly ventilated areas;
 - o If there is a possibility of inhaling spray droplets, vapor, or powder.
- **ALWAYS** ensure that ventilation is activated in embalming rooms.

Inhalation First Aid Procedures:

If inhaled - Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth if possible. Call a poison control center or doctor for further treatment advice.

G. Safety data sheet (SDS)

Safety data sheet s must be maintained on the premises.

The safety data sheet (SDS) contains specific information about the health and physical hazards of the material used, as well as safe work practices and required protective equipment. It may also describe the material's physical characteristics and procedures that should be followed in case of an emergency. For example, the SDS may list appropriate and inappropriate extinguishing agents. The Certificate of Fitness holder must refer to the SDS when questions arise about how to handle, use, or store hazardous chemicals or materials.

An example of a Safety Data Sheet can be found in Appendix B.

H. Common Hazards in Distilleries

1. Ethanol

One of the chief components of drinking alcohol such as whiskey, brandy, wine, gin, and vodka is Ethanol. Ethanol or ethyl alcohol is a colorless fluid with a characteristic alcohol smell.

Ethanol is **highly flammable** and should not be used near open flames. According to the CDC, ethanol inhalation can cause coughing or headaches. As with all other hazardous materials it is important to read the SDS for ethanol. Ensure to use proper ventilation and personal protective equipment (PPE)

Common first aid practices when in contact with **ethanol** include:

- **Swallowed:** Immediately call a poison center, doctor, hospital emergency room, medical clinic or 911. Do NOT induce vomiting. Rinse mouth.
- **Skin (or hair):** Take off immediately all contaminated clothing. Rinse skin with water/shower.
- **Eye:** Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If irritation persists, get medical attention.
- **Inhaled:** Remove person to fresh air and keep comfortable for breathing.

Get medical attention if you feel unwell.

New York Regional Poison Control Centers (800) 222-1222 (24/7)

In case of fire: Use dry chemical, CO₂, water spray or firefighting foam to extinguish.

2. Carbon Dioxide

In order to create alcohol, starches and sugars are used and converted through fermentation. During this process, carbon dioxide—an odorless, colorless and toxic gas is created.

Different concentrations of carbon dioxide can impact human health. The hazard of carbon Dioxide can be minimized by properly venting areas around the distillery. Because carbon dioxide is heavier than air, it is best to ensure special precautions are taken to vent the lower levels of the work areas.

Common first aid practices when in contact with **carbon dioxide** include:

- **Inhaled:** Remove person to fresh air and keep comfortable for breathing.
- **Skin:** Thaw frosted parts with lukewarm water. Do not rub affected area.

Get immediate medical advice/attention.

3. Fires and Explosions

Ethanol vapor is highly flammable and is one of the main hazards at distilleries. The hazards arise from vapor leaks in the tanks, casks and contributory equipment such as transfer pumps, pipe work and flexible hoses.



Distilleries often contain flammable materials besides ethanol. The grain processing section also has a fire hazard due to the production of grain dust other particles generated in the process. These can easily catch on fire

Common ignition hazards to control can include:

- Open flames
- Torch cutting and welding operations
- Sparks (static, electrical, mechanical, and tool related*)
- Hot surfaces
- Heat from friction
- Radiant heat

*To ensure no sparks it is very important that only non-sparking tools are used in the Distillery. It is recommended that distilleries maintain a non-sparking toolkit with commonly used tools for performing maintenance and operations.



Non-sparking scoop



Non-sparking shovel

It should be noted that dust formed from processing grain and chemical spills can also cause fires or explosions. As such, it's important to practice good housekeeping to avoid the accumulation of combustible waste, debris and/or liquids.

4. Physical Injury and Other Employee Hazards

Distilleries can be an unsafe environment for your workers if you fail to take the proper precautions. There are countless risks you will need to account for, including the following:

- **Chemical hazards.**

A variety of harmful chemical and cleaning products can be found in distilleries. To protect workers, it's important to require personal protective equipment (PPE) including gloves, steel cap boots and liquid proof aprons.

- **Electrocution.**

Distilleries require workers to handle large amount of liquids around powered equipment.

It is important to:

- never run power cables through liquid.
- avoid using extension cords, power boards or equipment with damaged plugs, sockets or cables.
- ground equipment
- use a ground fault circuit interrupter (GFCI) or residual current device (RCD). These tools automatically shut off power whenever they discover that a current is flowing along an unintended path, including through water or a person.

Other COFs that may be in Distilleries

COF	Description
A-35	To Operate and Maintain Air Compressors
C-92	Supervising Storage, Handling, and Use of Flammable or Combustible Liquids
S-95	Supervision of fire Alarm System and Other Related Systems
G-44	Storage/Handling of LPG

Signage

A. Hazard identification signs

The **NFPA 704 signage** must be posted at the entrance of the distilled spirits processing areas, as well as the storage and barrel storage areas.

NFPA 704 Hazard Diamond Sign

There is a requirement for consistent signage with *storage, handling and use* of hazardous materials to alert people, including first responders, to the presence of hazardous materials in a facility. The intent of the signage is to provide an indication of both the *type* of hazardous material present and the relative *degree of harm* that the material may pose. This simplistic system uses symbols, colors and numbers to readily communicate these concerns in a visual manner and recognizes the fact that a material may pose more than one type of hazard.

The basis of the system is a diamond-shaped sign that is divided into four color-coded quadrants. The left-most quadrant is colored blue and represents the *health* hazard posed by the material. The upper quadrant is red in color and indicates the relative *fire* hazard. The right-most quadrant is yellow and conveys the relative potential for *reactivity* of the material. The last quadrant, at the bottom, is white in color and serves to convey “*special*” or “*specific*” information such as “W” for use no water.

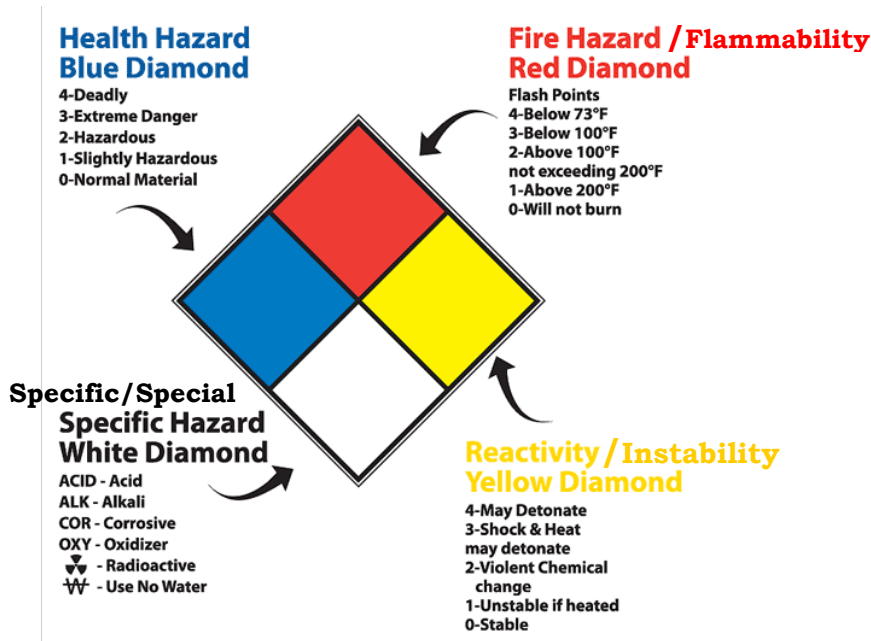
The diamond-shaped sign is required by the FC to be conspicuously displayed at the entrance to locations where hazardous materials are stored, handled and used, and on stationary containers and aboveground tanks that contain hazardous materials **in quantities requiring a permit**.

Note: The signage requirement also applies to locations where hazardous materials are dispensed.

The numbering system that is used to for the hazards of a material uses a scale of 0 through 4 for each of the three hazard types (health, fire and reactivity). A number is placed in each box, specific to the material at hand. In each quadrant, a “0” represents the lowest hazard concern and “4” represents the highest degree of hazard posed by a material. For instance, a “0” in the upper quadrant indicates a material that will not burn, while a “4” in the same quadrant indicates a gaseous material that will burn very easily. 1,2, and 3s represent increasing

levels of hazard in all categories, such as the “2” that is present in the “health” quadrant of the example. This indicates that the material is a moderate hazard and not necessarily deadly upon exposure.

NFPA 704 HAZARD DIAMOND SIGN EXPLANATION



Sign with Hazards Indicated

(Ethanol)

Warning signs must be made of durable material. Signs warning of the hazard of flammable liquids must have red, black or white lettering on a contrasting background and must read: DANGER—FLAMMABLE LIQUIDS.



B. No Smoking

It is unlawful to smoke in a distillery. “No-Smoking” signs must be posted conspicuously at approved locations throughout the facility including where hazardous materials are stored, handled or used

Lithium-ion safety


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

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

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

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

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

ALWAYS:	NEVER:
<ul style="list-style-type: none">• purchase and use devices certified by a Nationally Recognized Testing Laboratory (NRTL). • follow the manufacturer's instructions for:<ul style="list-style-type: none">• charging and storage.• correct battery, cord, and power adapter• keep exit path clear at all times.• plug directly into a wall electrical outlet for charging.• keep batteries and devices at room temperature.• store and/or charge batteries away from anything flammable.• keep away from heat sources.• bring batteries to a NYC Battery Recycling Center. Visit nyc.gov/batteries for more information.	<ul style="list-style-type: none">• use aftermarket batteries or chargers.• use damaged or altered batteries• plug into a power strip or overload an outlet.• overcharge or leave battery charging overnight.• charge a battery or device under your pillow, on your bed, or near a couch.• leave e-bikes or e-scooters unattended while charging.• block your primary way in or out of a room/space with e-bikes, e-scooters, wheelchairs, etc.• place batteries in Trash or Recycling bin. It is ILLEGAL. Visit nyc.gov/batteries for disposal locations and information.

**In the event of a Fire,
Leave and CLOSE the door.**



Call 911 once you are in a safe location.

Charging Lithium Ion

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

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

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

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

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

Extinguishing Lithium-ion

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



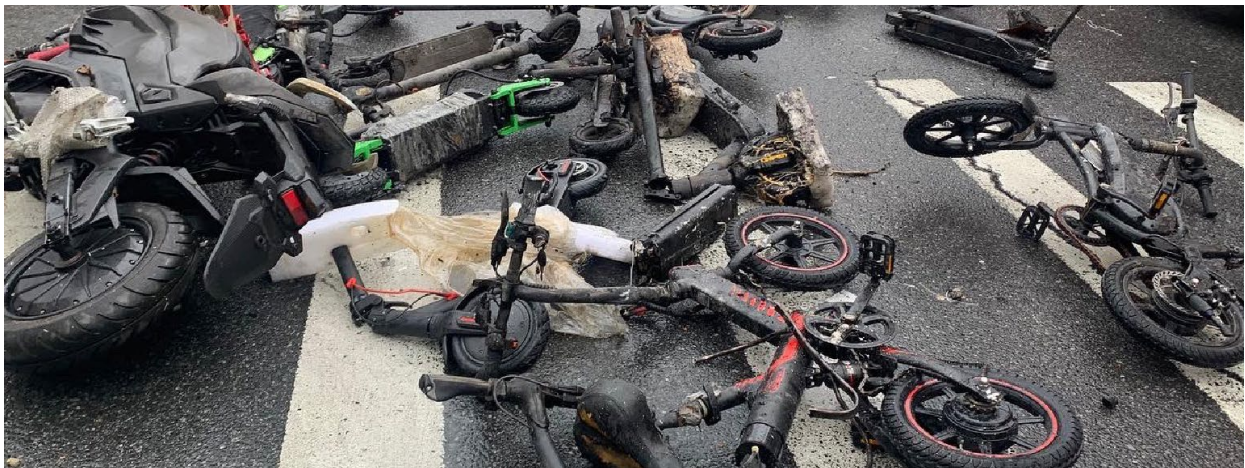
Fire Extinguishers
do not work
on lithium-ion batteries
fires.

Unexpected Re-ignition.

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

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

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



Fire Extinguishers

In areas where flammable or combustible liquids are stored, handled and used, including dispensing, in quantities requiring a permit, the portable fire extinguishers (PFE) must be provided in accordance with the table below

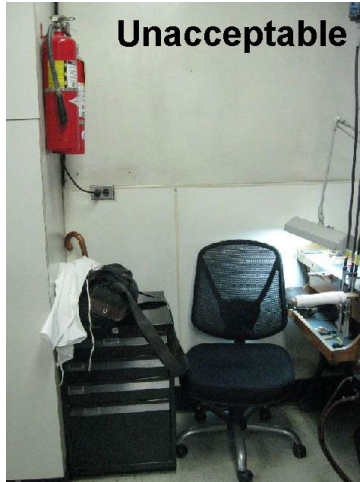
Most Distilleries are considered an “Extra(high)” hazard and must follow the travel distance for the extinguisher rating stated below*

Type of Hazard	Basic Minimum Extinguisher Rating	Maximum Travel Distance ^d to Extinguishers (feet)
Light (Low) ^a	5-B	30
	10-B	50
Ordinary (Moderate) ^b	10-B	30
	20-B	50
*Extra (High) ^c	40-B	30
	80-B	50

- a. Light(low) hazard occupancies consist of fire hazards having normally expected quantities of Class A combustible furnishings, and/or the total quantity of Class B flammable typically expected to be present is less than 1 gal in any room or area.
- b. Ordinary(moderate) hazard occupancies consist of fire hazards having normally expected quantities of Class A combustible furnishings, and/or the total quantity of Class B flammable typically expected to be present is between 1 gal to 5 gal in any room or area.
- c. Extra(high) hazard occupancies consist of fire hazards having normally expected quantities of Class A combustible furnishings, and/or the total quantity of Class B flammable typically expected to be present is more than 5 gal in any room or area.
- d. The travel distance is intended to be the actual walking distance along a normal path of travel to the extinguisher.

Location

Fire extinguishers must be located in conspicuous locations where they will be readily accessible and immediately available for use. These locations must be along normal paths of travel. Fire extinguishers having a gross weight 40 pounds or less must be installed so that the top of the extinguisher is not more than 5 ft above the floor. Hand-held fire extinguishers having a gross weight exceeding 40 pounds must be installed so that their tops are not more than 3.5 feet above the floor. The clearance between the floor and the bottom of installed hand-held extinguishers must not be less than 4 inches. In other words, **no fire extinguisher is allowed to be on the floor.**








(1) For the fire extinguisher having 40 pounds or less, its top must not be more than 5 ft. above the floor
(2) The fire extinguishers must be accessible and unobstructed.

(1) The bottom of the fire extinguisher must be at least 4 in above the floor.
(2) The fire extinguisher must be properly mounted.












Classes of Fire Extinguishers

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)	

A **Multipurpose dry chemical** fire extinguisher may be used to extinguish Class A, B, or C fires.

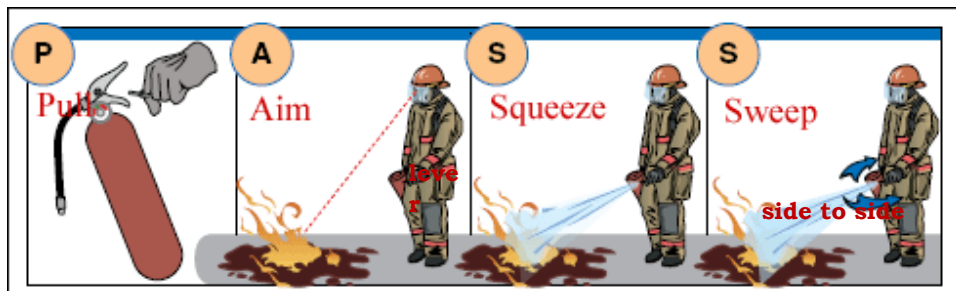
Typical Symbols Painted on Fire Extinguishers

The symbol with the shaded background and the slash indicate when the extinguisher must not be used. Symbols may also be painted on the extinguisher. The symbols indicate what kind of fires the extinguishers may be used on. The COF holder and watch person must understand these symbols. Examples of these symbols are shown below.

			Suitable for Class B and Class C fires but not Class A
			Suitable for Class A fires but not Class B or Class C
			Suitable for Class A and Class B fires but not Class C

Generally, operation instructions are clearly painted on the side of the fire extinguisher. They clearly describe how to use the extinguisher in case of an emergency. An example of these instructions is shown below.

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 or watchperson 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.** An example of these instructions is depicted in the picture below.



In case of any fire, 911 must be called.

Portable Fire Extinguisher Inspections

MONTHLY

The portable fire extinguishers are required to be checked monthly. The owner of the business is responsible to select a person to do a monthly inspection. This monthly inspection is called a "quick check".

The **QUICK CHECK** should check if:

- (1) the fire extinguisher is fully charged;
- (2) it is in its designated place;
- (3) it has not been actuated or tampered with;
- (4) there is no obvious or physical damage or condition to prevent its operation.

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

ANNUALLY

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

Portable Fire Extinguisher tags

Installed portable fire extinguishers must have an FDNY standard PFE tag affixed. This tag will have important information about the extinguisher. The FDNY only recognizes the FDNY standard PFE tags and will issue violations to business that have PFE installed without a proper tag.

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

1. Hologram:

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

2. QR code

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

Revised January 2026 (Contact/Payment info)

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



PFE tag (This tag is released for 2021-2023)
Tag colors and year will change every few years for security purposes

Appendix A.

CERTIFICATE OF APPROVAL

Conditions of approval. The department may set forth in the certificate of approval conditions on the approved purpose or use of such article, equipment

or device, or type, class or kind thereof, as may be necessary in the interest of public safety. The department may include under a single certificate of approval more than one type, class or kind of article, equipment or device of a similar design or common characteristic.

Markings. Each article, equipment or device, or type, class or kind thereof, for which a certificate of approval has been issued must have the number of such certificate plainly stamped or otherwise affixed upon it.

List of acceptable laboratories, articles and devices. A current list of all testing services and laboratories acceptable to the department for the purpose of testing articles, equipment and devices, and a current list of all acceptable articles, equipment and devices must be maintained by the department and made available for public inspection.

Application. Applications for a new or renewal certificate of approval required by the provisions of this code or the rules must be made to the department, in such form and detail as the department may prescribe, including such information and documentation as the department may require. An application for a certificate of approval must include complete drawings of and specifications for the article, equipment or device for which approval is sought and, unless the department determines that it is impracticable, the article, equipment or device itself must be attached to or submitted with the application. The department may require that the article, equipment or device be examined, tested or demonstrated at the applicant's expense in a manner prescribed by the department, including examination and testing by a testing laboratory acceptable to the department. In those instances where a testing or performance standard is not prescribed by this code or the rules, the article, equipment or device or type, class or kind of article, equipment or device must have been examined and tested in a manner acceptable to the department.

Issuance. The department may grant an application for a certificate of approval upon a determination that the application article, equipment or device is designed for the purpose for which it is to be used and can be safely operated in accordance with this code, the rules and other applicable laws, rules and regulations.

Term of certificate. Every certificate or renewal thereof granted by the commissioner must be for a period as specified therein, not to exceed 3 years, and must expire at the end of such period unless the department approves its renewal.

Time for submission of renewal applications. Applicants may apply for renewal during the period from 60 calendar days prior to a certificate's expiration date to not more than 1 year after such date. The commissioner must not renew certificates that have been expired for more than 1 year. Applicants holding such certificates must apply for an original certificate and comply with all the original certificate requirements.

Renewal. Certificate renewals must be at the discretion of the department in the interest of public safety. The department may reevaluate the design and safety of the article, equipment or device in light of changes in applicable laws, rules or regulations, new technology, and safety concerns arising from the use of the article, equipment or device.

Expired certificates. It must be unlawful to install articles, equipment or devices authorized by a certificate after the term of such certificate has expired.

Certificate revocation and suspension. The department may, at any time, revoke or suspend a certificate for good cause. The certificate holder must be afforded notice and an opportunity to be heard prior to any such suspension or revocation except that, in the circumstance of an imminent threat to public safety, such notice and opportunity to be heard may be given promptly after such revocation or suspension.

Maintenance on premises. A copy of the certificate of approval must be maintained at the premises for review by persons installing, operating or maintaining the approved article, equipment or device, and for inspection by any representative of the department.

Appendix B.

SAFETY DATA SHEET

Creation Date 09-Jul-2009

Revision Date 07-Jan-2022

Revision Number 7

1. Identification

Product Name Ethanol, Anhydrous (Histological)
Cat No. : A405-20; A405F-1GAL; A405P-4
Synonyms Grain alcohol, denatured; Ethyl alcohol, denatured; Ethyl hydroxide, denatured.
Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company

Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 798-7100

Emergency Telephone Number CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Carcinogenicity	Category 2
Reproductive Toxicity	Category 2
Specific target organ toxicity (single exposure)	Category 2 Category 3
Target Organs - Central nervous system (CNS), Optic nerve, Respiratory system.	

Label Elements

Signal Word
Danger

Hazard Statements
Highly flammable liquid and vapor
Causes serious eye irritation
Suspected of causing cancer
Suspected of damaging fertility or the unborn child

Ethanol, Anhydrous (Histological)

Revision Date 07-Jan-2022

May cause damage to organs
May cause drowsiness or dizziness



Precautionary Statements

Prevention

Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Wear eye/face protection
Do not breathe dust/fume/gas/mist/vapors/spray
Do not eat, drink or smoke when using this product
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting equipment
Use only non-sparking tools
Take precautionary measures against static discharge

Response

IF exposed or concerned: Get medical attention/advice

Skin

IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower

Eyes

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention

Fire

In case of fire: Use CO2, dry chemical, or foam for extinction

Storage

Store locked up
Store in a well-ventilated place. Keep cool

Disposal

Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)

Repeated exposure may cause skin dryness or cracking

Other hazards

Poison, may be fatal or cause blindness if swallowed. Vapor harmful. CANNOT BE MADE NON-POISONOUS.

WARNING: Cancer and Reproductive Harm - <https://www.p65warnings.ca.gov/>.

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Ethyl alcohol	64-17-5	90-95
Methyl alcohol	67-58-1	3-5
Methylisobutyl ketone	108-10-1	1-3
Ethyl acetate	141-78-6	1-2
Solvent naphtha (petroleum), light aliphatic	64742-89-8	1

4. First-aid measures

Ethanol, Anhydrous (Histological)

Revision Date 07-Jan-2022

General Advice	If symptoms persist, call a physician.
Eye Contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.
Skin Contact	Wash off immediately with plenty of water for at least 15 minutes. If skin irritation persists, call a physician.
Inhalation	Remove to fresh air. If not breathing, give artificial respiration. Get medical attention if symptoms occur.
Ingestion	Clean mouth with water and drink afterwards plenty of water.
Most important symptoms and effects	None reasonably foreseeable. Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	Water spray, carbon dioxide (CO ₂), dry chemical, alcohol-resistant foam. Water mist may be used to cool closed containers.
Unsuitable Extinguishing Media	Water may be ineffective, Do not use a solid water stream as it may scatter and spread fire
Flash Point	13.9 °C / 57 °F
Method -	Estimated
Autoignition Temperature	362.8 °C / 685 °F
Explosion Limits	
Upper	18.0 vol %
Lower	3.3 vol %
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical

Flammable. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Containers may explode when heated. Vapors may form explosive mixtures with air.

Hazardous Combustion Products

Carbon monoxide (CO). Carbon dioxide (CO₂).

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
3	3	0	N/A

6. Accidental release measures

Personal Precautions	Use personal protective equipment as required. Ensure adequate ventilation.
Environmental Precautions	Should not be released into the environment.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable, closed containers for disposal.

7. Handling and storage

Ethanol, Anhydrous (Histological)

Revision Date 07-Jan-2022

Handling Wear personal protective equipment/face protection. Ensure adequate ventilation. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation.

Storage. Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat, sparks and flame. Incompatible Materials. Strong oxidizing agents. Acids. Acid anhydrides. Acid chlorides. Peroxides. Alkali metals.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Ethyl alcohol	STEL: 1000 ppm	(Vacated) TWA: 1000 ppm (Vacated) TWA: 1900 mg/m ³ TWA: 1000 ppm TWA: 1900 mg/m ³	IDLH: 3300 ppm TWA: 1000 ppm TWA: 1900 mg/m ³	STEL: 1000 ppm
Methyl alcohol	TWA: 200 ppm STEL: 250 ppm Skin	(Vacated) TWA: 200 ppm (Vacated) TWA: 260 mg/m ³ (Vacated) STEL: 250 ppm (Vacated) STEL: 325 mg/m ³ Skin TWA: 200 ppm TWA: 260 mg/m ³	IDLH: 6000 ppm TWA: 200 ppm TWA: 260 mg/m ³ STEL: 250 ppm STEL: 325 mg/m ³	TWA: 200 ppm STEL: 250 ppm
Methylisobutyl ketone	TWA: 20 ppm STEL: 75 ppm	(Vacated) TWA: 50 ppm (Vacated) TWA: 205 mg/m ³ (Vacated) STEL: 75 ppm (Vacated) STEL: 300 mg/m ³ TWA: 100 ppm TWA: 410 mg/m ³	IDLH: 500 ppm TWA: 50 ppm TWA: 205 mg/m ³ STEL: 75 ppm STEL: 300 mg/m ³	TWA: 20 ppm STEL: 75 ppm
Ethyl acetate	TWA: 400 ppm	(Vacated) TWA: 400 ppm (Vacated) TWA: 1400 mg/m ³ TWA: 400 ppm TWA: 1400 mg/m ³	IDLH: 2000 ppm TWA: 400 ppm TWA: 1400 mg/m ³	TWA: 400 ppm

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
 OSHA - Occupational Safety and Health Administration
 NIOSH IDLH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures Ensure adequate ventilation, especially in confined areas. Use explosion-proof electrical/ventilating/lighting equipment. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN188.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State Liquid
 Appearance Clear

Ethanol, Anhydrous (Histological)

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Odor	Alcohol-like
Odor Threshold	No information available
pH	Not applicable
Melting Point/Range	< -90 °C / -130 °F
Boiling Point/Range	77.1 °C / 170.8 °F
Flash Point	13.9 °C / 57 °F
Method -	Estimated
Evaporation Rate	3.6 (Butyl acetate = 1.0)
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	18.0 vol %
Lower	3.3 vol %
Vapor Pressure	48 mmHg
Vapor Density	1.5
Specific Gravity	0.785 - 0.792
Solubility	Soluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	362.8 °C / 685 °F
Decomposition Temperature	No information available
Viscosity	No information available
VOC Content(%)	100

10. Stability and reactivity

Reactive Hazard	None known, based on information available
Stability	Stable under normal conditions.
Conditions to Avoid	Incompatible products. Excess heat. Keep away from open flames, hot surfaces and sources of ignition.
Incompatible Materials	Strong oxidizing agents, Acids, Acid anhydrides, Acid chlorides, Peroxides, Alkali metals
Hazardous Decomposition Products	Carbon monoxide (CO), Carbon dioxide (CO ₂)
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions	None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Oral LD50	Based on ATE data, the classification criteria are not met. ATE > 2000 mg/kg.
Dermal LD50	Based on ATE data, the classification criteria are not met. ATE > 2000 mg/kg.
Vapor LC50	Based on ATE data, the classification criteria are not met. ATE > 20 mg/l.

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Ethyl alcohol	LD50 = 10470 mg/kg OECD 401 (Rat) 3450 mg/kg (Mouse)	Not listed	LC50 = 117-125 mg/l (4h) OECD 403 (rat) 20000 ppm/10H (rat)
Methyl alcohol	LD50 = 1187 – 2769 mg/kg (Rat)	LD50 = 17100 mg/kg (Rabbit)	LC50 = 128.2 mg/L (Rat) 4 h
Methylisobutyl ketone	LD50 = 2080 mg/kg (Rat)	LD50 = 3000 mg/kg (Rabbit)	LC50 2000 - 4000 ppm (Rat) 4 h
Ethyl acetate	10,200 mg/kg (Rat)	> 20 mL/kg (Rabbit) > 18000 mg/kg (Rabbit)	58 mg/l (rat; 8 h)
Solvent naphtha (petroleum), light aliphatic	Not listed	LD50 = 3000 mg/kg (Rabbit)	Not listed

Toxicologically Synergistic No information available

Ethanol, Anhydrous (Histological)

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Products

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Severe eye irritant

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
Ethyl alcohol	64-17-5	Not listed	Known	A3	Not listed	A3
Methyl alcohol	67-56-1	Not listed	Not listed	Not listed	Not listed	Not listed
Methylisobutyl ketone	106-10-1	Group 2B	Not listed	A3	X	A3
Ethyl acetate	141-78-6	Not listed	Not listed	Not listed	Not listed	Not listed
Solvent naphtha (petroleum), light aliphatic	64742-89-8	Not listed	Not listed	Not listed	Not listed	Not listed

IARC (International Agency for Research on Cancer)

IARC (International Agency for Research on Cancer)

NTP: (National Toxicity Program)

*Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans
NTP: (National Toxicity Program)
Known - Known Carcinogen
Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen*

ACGIH: (American Conference of Governmental Industrial Hygienists)

*A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen*

Mexico - Occupational Exposure Limits - Carcinogens

*ACGIH: (American Conference of Governmental Industrial Hygienists)
Mexico - Occupational Exposure Limits - Carcinogens
A1 - Confirmed Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Confirmed Animal Carcinogen
A4 - Not Classifiable as a Human Carcinogen
A5 - Not Suspected as a Human Carcinogen*

Mutagenic Effects Mutagenic effects have occurred in experimental animals.

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Central nervous system (CNS) Optic nerve Respiratory system

STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects, both acute and delayed Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

Contains a substance which is: Toxic to aquatic organisms. The product contains following substances which are hazardous for the environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Ethyl alcohol	EC50 (72h) = 275 mg/l (Chlorella vulgaris)	Fathead minnow (Pimephales promelas)	Photobacterium phosphoreum: EC50 = 346.34	EC50 = 9268 mg/L/48h EC50 = 10800 mg/L/24h

Ethanol, Anhydrous (Histological)

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		LC50 = 14200 mg/l/96h	mg/L/30 min Photobacterium phosphoreum: EC50 = 35470 mg/L/5 min	
Methyl alcohol	Not listed	Pimephales promelas: LC50 > 10000 mg/L 96h	EC50 = 39000 mg/L 25 min EC50 = 40000 mg/L 15 min EC50 = 43000 mg/L 5 min	EC50 > 10000 mg/L 24h
Methylisobutyl ketone	EC50: 400 mg/L/96h	LC50: 496 - 514 mg/L, 96h flow-through (Pimephales promelas)	EC50 = 79.6 mg/L 5 min	EC50: 4280.0 mg/L/24h EC50: 170 mg/L/48h EC50: 4280.0 mg/L/24h
Ethyl acetate	EC50 = 3300 mg/L/48h	Fathead minnow: LC50: 230 mg/l/ 96h Gold orfe: LC50: 270 mg/L/48h	EC50 = 1180 mg/L 5 min EC50 = 1500 mg/L 15 min EC50 = 5870 mg/L 15 min EC50 = 7400 mg/L 2 h	EC50 = 717 mg/L/48h
Solvent naphtha (petroleum), light aliphatic	EC50: ~ 4700 mg/L, 72h (Pseudokirchneriella subcapitata)	Not listed	Not listed	Not listed

Persistence and Degradability Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility Will likely be mobile in the environment due to its volatility.

Component	log Pow
Ethyl alcohol	-0.32
Methyl alcohol	-0.74
Methylisobutyl ketone	1.19
Ethyl acetate	0.6

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Methyl alcohol - 67-56-1	U154	-
Methylisobutyl ketone - 108-10-1	U161	-
Ethyl acetate - 141-78-6	U112	-

14. Transport information

DOT

UN-No UN1170
 Proper Shipping Name ETHANOL SOLUTION
 Hazard Class 3
 Packing Group II

TDG

UN-No UN1170
 Proper Shipping Name ETHANOL SOLUTION
 Hazard Class 3
 Packing Group II

IATA

UN-No UN1170
 Proper Shipping Name ETHANOL SOLUTION
 Hazard Class 3
 Packing Group II

IMDG/IMO

UN-No UN1170
 Proper Shipping Name ETHANOL SOLUTION
 Hazard Class 3

Ethanol, Anhydrous (Histological)

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Packing Group II

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Ethyl alcohol	64-17-5	X	ACTIVE	-
Methyl alcohol	67-56-1	X	ACTIVE	-
Methylisobutyl ketone	108-10-1	X	ACTIVE	-
Ethyl acetate	141-78-6	X	ACTIVE	-
Solvent naphtha (petroleum), light aliphatic	64742-89-8	X	ACTIVE	-

Legend:

TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)

X - Listed

- - Not Listed

TSCA 12(b) - Notices of Export Not applicable

International Inventories

Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Ethyl alcohol	64-17-5	X	-	200-578-6	X	X	X	X	X	KE-13217
Methyl alcohol	67-56-1	X	-	200-659-6	X	X	X	X	X	KE-23193
Methylisobutyl ketone	108-10-1	X	-	203-550-1	X	X	X	X	X	KE-24725
Ethyl acetate	141-78-6	X	-	205-500-4	X	X	X	X	X	KE-00047
Solvent naphtha (petroleum), light aliphatic	64742-89-8	X	-	265-192-2	X	-		X	X	KE-31661

KECL - NIER number or KE number (<http://ncis.nier.go.kr/en/main.do>)

U.S. Federal Regulations

SARA 313

Component	CAS No	Weight %	SARA 313 - Threshold Values %
Methyl alcohol	67-56-1	3-5	1.0
Methylisobutyl ketone	108-10-1	1-3	0.1

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Methyl alcohol	X		-
Methylisobutyl ketone	X		-

OSHA - Occupational Safety and Health Administration Not applicable

CERCLA

Component	Hazardous Substances RQs	CERCLA EHS RQs
Methyl alcohol	5000 lb	-
Methylisobutyl ketone	5000 lb	-

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Ethyl acetate	5000 lb	-
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California Proposition 65 Ethyl alcohol is only considered a Proposition 65 developmental hazard when it is ingested as an alcoholic beverage. This product contains the following Proposition 65 chemicals.

Component	CAS No	California Prop. 65	Prop 65 NSRL	Category
Ethyl alcohol	64-17-5	Development (alcoholic beverages only) Carcinogen	-	Developmental Carcinogen
Methyl alcohol	67-56-1	Developmental	-	Developmental
Methylisobutyl ketone	108-10-1	Carcinogen Developmental	-	Developmental Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Ethyl alcohol	X	X	X	X	X
Methyl alcohol	X	X	X	X	X
Methylisobutyl ketone	X	X	X	X	X
Ethyl acetate	X	X	X	-	X

U.S. Department of Transportation

Reportable Quantity (RQ): Y
 DOT Marine Pollutant N
 DOT Severe Marine Pollutant N

U.S. Department of Homeland Security This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade Serious risk, Grade 3

Authorisation/Restrictions according to EU REACH

Component	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Methyl alcohol	-	Use restricted. See Item 69. (see link for restriction details)	-
Methylisobutyl ketone	-	Use restricted. See Item 75. (see link for restriction details)	-
Ethyl acetate	-	Use restricted. See Item 75. (see link for restriction details)	-
Solvent naphtha (petroleum), light aliphatic	-	Use restricted. See Item 28. (see link for restriction details) Use restricted. See Item 29. (see link for restriction details) Use restricted. See Item 75. (see link for restriction details)	-

<https://echa.europa.eu/substances-restricted-under-reach>

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Ethyl alcohol	64-17-5	Listed	Not applicable	Not applicable	Not applicable
Methyl alcohol	67-56-1	Listed	Not applicable	Not applicable	Not applicable

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Methylisobutyl ketone	108-10-1	Listed	Not applicable	Not applicable	Not applicable
Ethyl acetate	141-78-6	Listed	Not applicable	Not applicable	Not applicable
Solvent naphtha (petroleum), light aliphatic	64742-89-8	Listed	Not applicable	Not applicable	Not applicable

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Ethyl alcohol	64-17-5	Not applicable	Not applicable	Not applicable	Annex I - Y42
Methyl alcohol	67-56-1	500 tonne	5000 tonne	Not applicable	Not applicable
Methylisobutyl ketone	108-10-1	Not applicable	Not applicable	Not applicable	Annex I - Y42
Ethyl acetate	141-78-6	Not applicable	Not applicable	Not applicable	Annex I - Y42
Solvent naphtha (petroleum), light aliphatic	64742-89-8	Not applicable	Not applicable	Not applicable	Not applicable

16. Other information

Prepared By Regulatory Affairs

Email:

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Print Date 07-Jan-2022

Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

Appendix C.

FC 908.

Emergency alarms for the detection and notification of an emergency condition in Group H occupancies.

Maintenance. Emergency alarm and detection systems governed by this section must be inspected, tested, serviced and otherwise maintained in accordance with the manufacturer's specifications. Those approved for connection to a fire alarm system or which will transmit an alarm to a central station must additionally comply with the requirements of NFPA 72, as modified by FC Appendix B, and the rules governing the operation and maintenance of such systems.

Emergency alarm systems required by the construction codes, this code or the rules for the detection and notification of a release of a hazardous material or other hazardous materials incident, or other physical or health hazard, including systems designed to detect flammable, toxic, asphyxiant and other gases, must be designed, installed, operated and maintained in compliance with the construction codes, the Electrical Code, the code requirements referenced in FC Table 908.1, this section and the manufacturer's instructions.

Plan approval. Design and installation documents for emergency alarm systems must be submitted for department review and approval when required by FC105.4 and the rules.

Signage. Signs must be posted in a conspicuous location near the emergency alarm system control panel and each alarm notification device to inform building occupants in the affected area of the meaning of the alarm activation and the appropriate response.

Central station monitoring. Emergency alarm systems required to transmit an alarm signal to a central station must transmit such signal through the central station-monitored fire alarm system for the building or occupancy, or through an approved central station-monitored control panel. Such central station connections must be maintained in compliance with the requirements of NFPA 72, as modified by FC Appendix B, and the rules.

Periodic inspection and testing. Sensors and other mechanical and electrical components of emergency alarm systems must be tested by a trained and

knowledgeable person on not less than an annual basis to ensure that they are in good working order, and a record kept of such testing.

Five-year retest. All emergency alarm systems and other detection systems must be retested once every five years from the date of acceptance of the system. The first retest of emergency alarm systems lawfully existing on the effective date of this provision must be conducted on or before the fifth anniversary of the date of acceptance after such effective date. Such test must be conducted, and reported to the department, in the manner prescribed by rule, by a person holding a certificate of fitness for professional certification of fire alarm and emergency alarm installations and testing, as set forth in FC104.2.1(1) and the rules, or a fire alarm system installer with NICET-Level II certification licensed by or registered with the State of New York and holding a certificate of fitness in accordance with the rules.