

STUDY MATERIAL FOR THE  
CERTIFICATE OF FITNESS EXAM  
FOR

# C-22

# SUPERVISION OF SPRAY PAINTING

INSIDE THIS BOOKLET YOU WILL FIND  
THE FOLLOWING:

**NOTICE OF EXAMINATION (NOE)**

REVISED 03/09/01

This study material will help you prepare for the examination for the Certificate of Fitness for Supervising Spray Painting (C-22). The study material includes information taken from the Fire Prevention Code and the Fire Prevention Directives of the Bureau of Fire Prevention (FDNY) and the rules of the Board of Standards and Appeals (BSA). The study material does not contain all of the information you need to know in order to perform the job of supervising spray painting at your work location. It is your responsibility to learn whatever else you need to know to do your job. You must also become familiar with all applicable rules and regulations of the City of New York, even if they are not covered in the study material. For example, you must familiarize yourself with §18-01 of the Board of Standards and Appeals.

All questions on the Certificate of Fitness examination are multiple choice, with four alternative answers to each question. Only one answer is correct for each question. If you do not answer a question, your answer will be scored as incorrect. You will take the examination on a touch screen computer monitor. A score of 70% correct is required in order to secure a Certificate of Fitness. Read each question carefully. There is no penalty for guessing.

### Sample Questions

- 1. Persons or firms who spray paint with flammable paints are not subject to regulations of the Fire Department if the amount used in a day is less than:**
  - A) 1 quart.
  - B) 2 quarts.
  - C) 5 gallons.
  - D) 10 gallons.

The correct answer is "B". You would press "B" on your touch screen monitor.

- 2. Locations that spray, dip or immerse articles with flammable paints must be heated by:**
  - A) natural gas.
  - B) Electricity.
  - C) Steam or hot water.
  - D) Any available fuel.

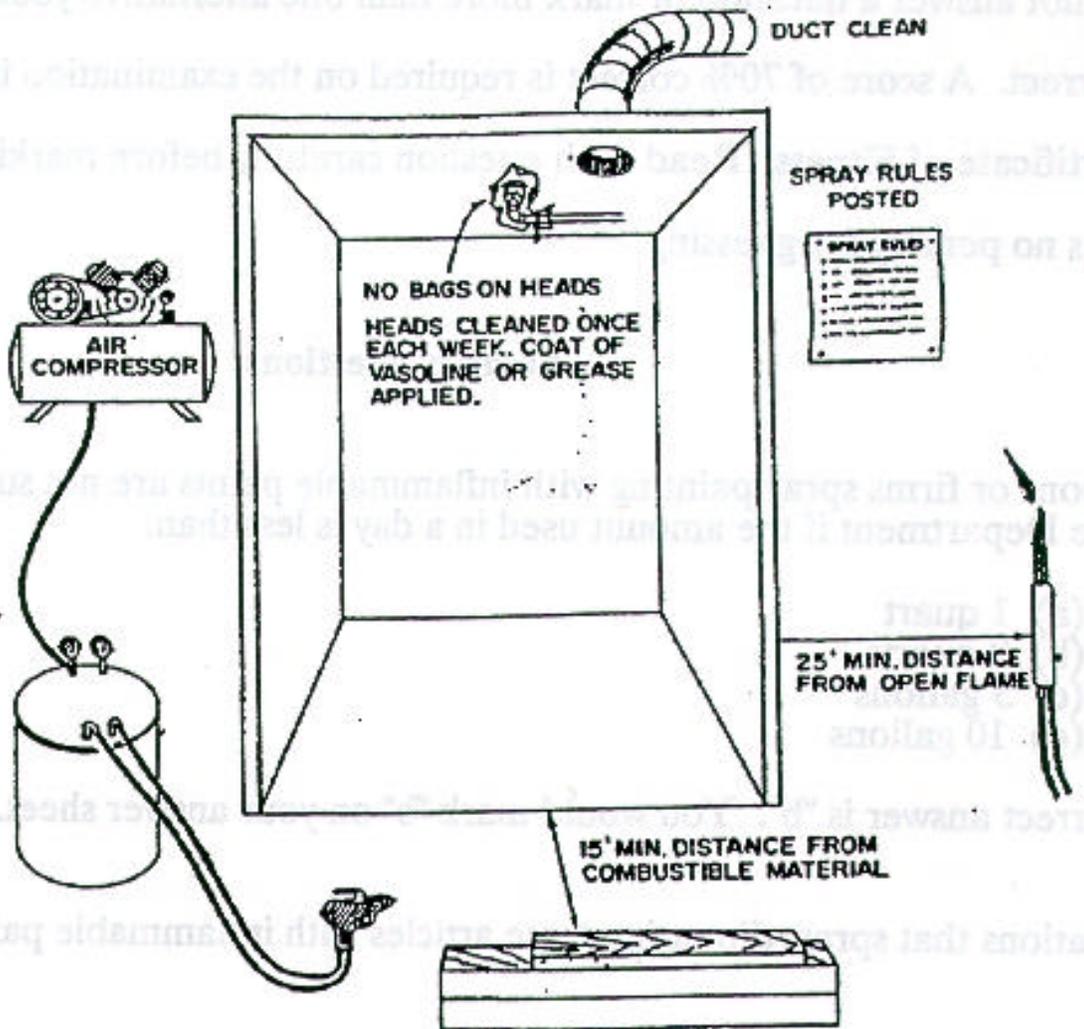
The correct answer is "C". You would press "C" on your touch screen monitor.

## SUPERVISING SPRAY PAINTING

A certificate of fitness holder is required to supervise locations that are used for spraying, dipping or immersing any article with flammable paints, varnish or lacquers, or any other flammable or combustible substance. For example they are required to supervise spray booths, spray rooms, dipping rooms, and storage rooms. The rules for supervision of these locations apply if the amount used for painting, varnishing, etc. exceeds two quarts per day, or the amount stored exceeds 20 gallons. These locations are described in greater detail below.

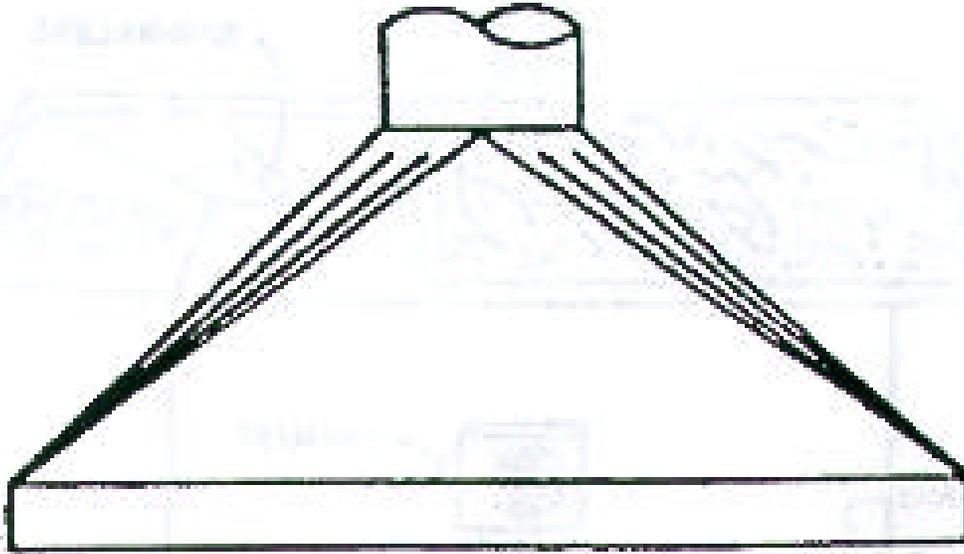
### SPRAYING AND DIPPING AREAS

**Spray Booth.** A spray booth consists of a three-sided compartment with a roof. The sides must be made of a non-combustible material such as metal. The roof should be made of a fire resistant material. The floor of the spray booth must be made of concrete. The spray booth must be equipped with an exhaust system. The exhaust system is designed to draw the flammable and hazardous vapors out of the spray booth. An example of a spray booth is shown below.



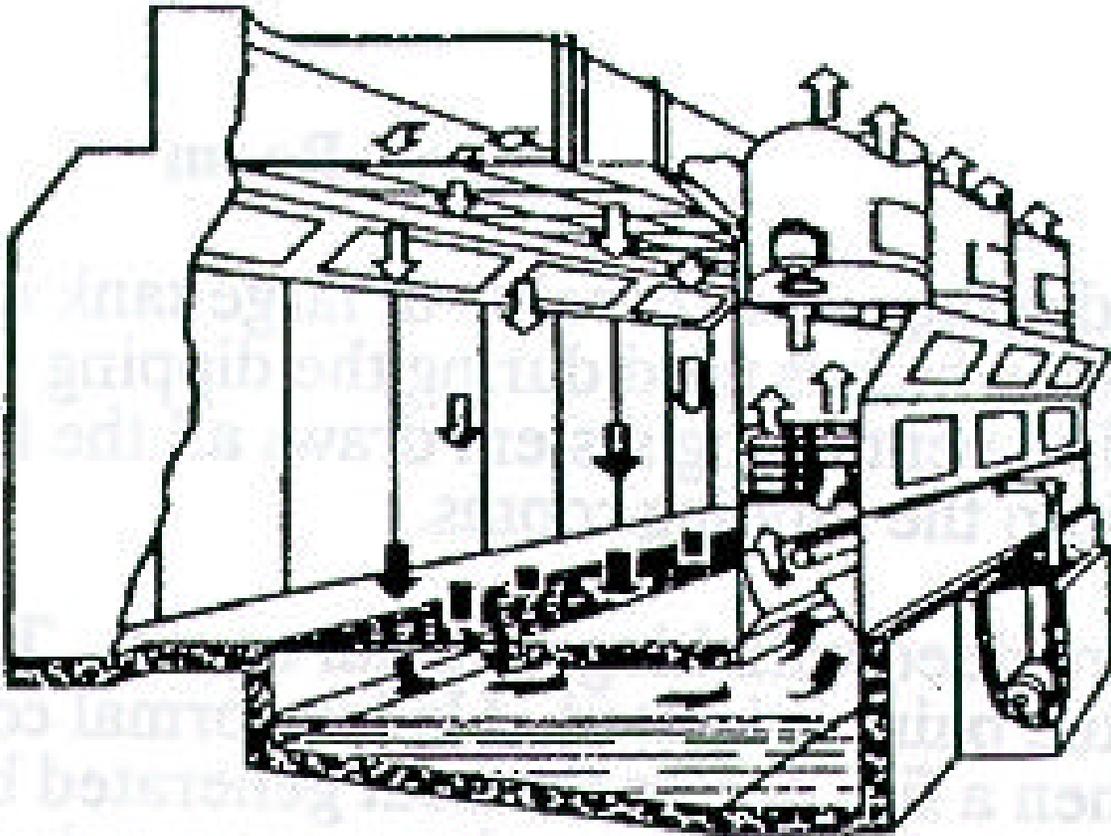
**Spray Booth**

**Spray Canopy Booth.** This kind of booth does not have any walls surrounding the area used for spray painting. A metal canopy or hood is installed over the spraying area. An exhaust system is installed inside the hood to draw off the flammable vapors.



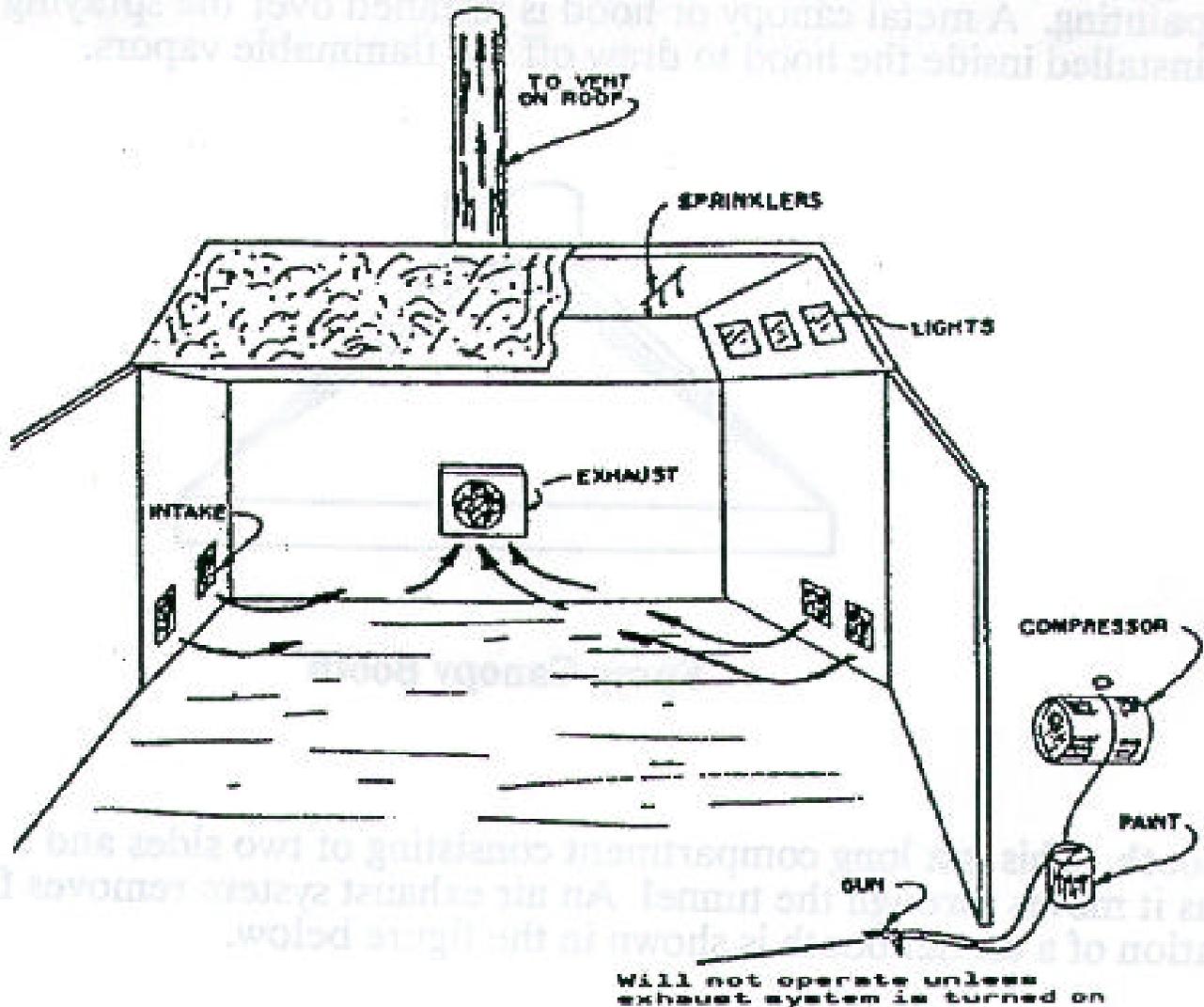
**Spray Canopy Booth**

**Tunnel Booth.** This is a long compartment consisting of two sides and a top. The object is painted as it moves through the tunnel. An air exhaust system removes flammable vapors. An illustration of a tunnel booth is shown in the figure below.



**Tunnel Booth**

**Spray Room.** This is a completely enclosed room used for open spray painting. There are no compartments in the spray room. The spray room must be fully ventilated. The ventilating system must be fully automatic. The illustration below shows the layout of a typical spray room.

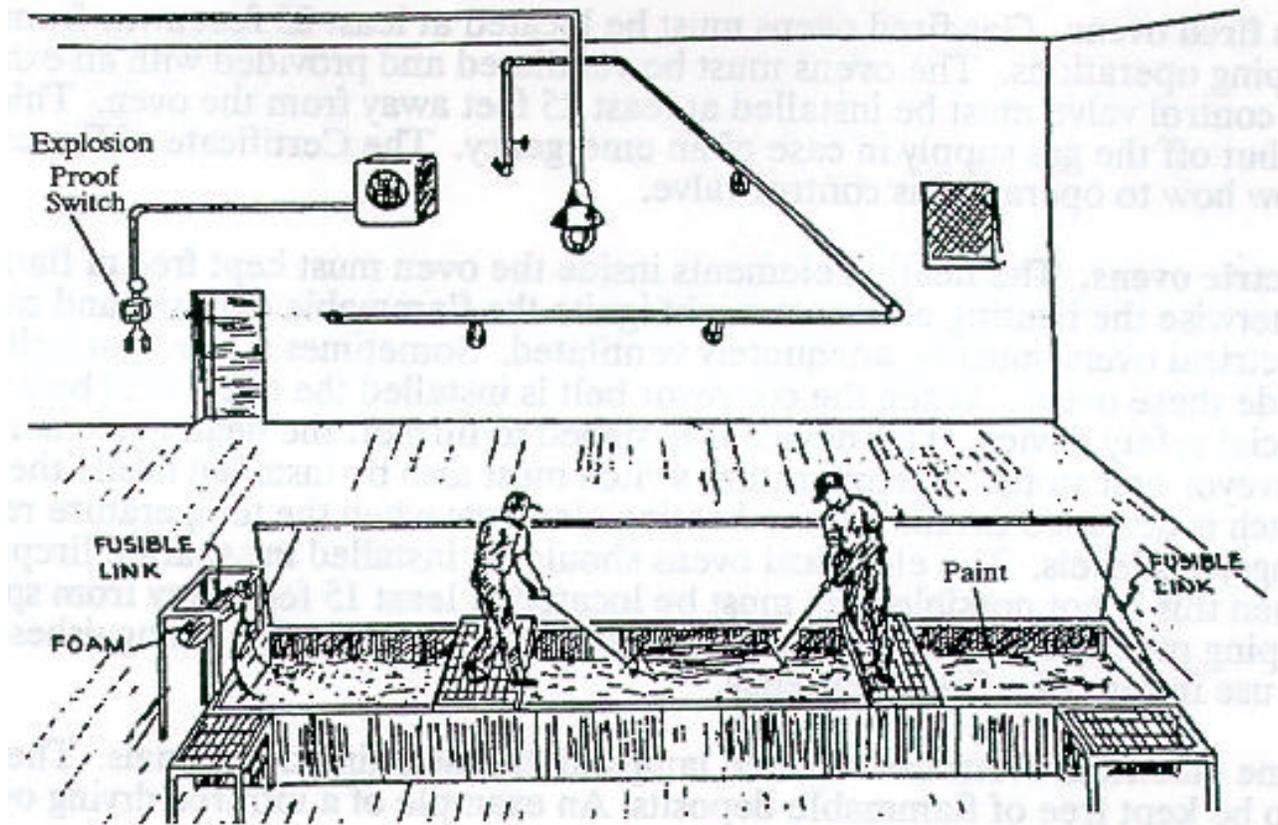


**Spray Room**

**Dipping Tank.** The dipping tank consists of a large tank installed inside a single room. The tank is filled with paint that is used during the dipping process. The dipping room must be fully ventilated. The ventilation system draws all the flammable vapors out of the air. It also forces fresh air into the dipping room.

Each tank must be provided with hinged metal covers. The covers are designed to close automatically when the paint is ignited. Under normal conditions the covers are kept open by a fusible link. When a fire occurs the heat generated by the fire causes the fusible link to melt. When the link melts, the covers close automatically. The fire will smother because of lack of air.

An automatic extinguishing system must be installed on each dipping tank. Generally, a foam system is installed. The extinguishing system is designed to automatically discharge the extinguishing agent into the dipping tank when a fire occurs. The certificate of fitness holder must make sure that the extinguishing system is fully charged at all times. An example of a typical dipping tank is shown below.



**Dipping Tank**

Sometimes a conveyor belt is installed inside the dipping tank. When a conveyor belt is installed, it must be designed to stop automatically when the extinguishing system is activated. Manually operated fire extinguishers are also required when a conveyor belt system is installed in the dipping tank.

**Storage Area.** Generally, the storage area is a designated area used to store spraying supplies. For example, paint, varnish and lacquers are stored in this room. The storage room must be fireproof or constructed of a fire resistant material. It must also be ventilated. Air vents are commonly installed in the storage rooms. An automatic ventilation system may be installed, as well. This system draws any flammable vapors out of the storage area. It also forces fresh air into the storage room.

The door to the storage room must be self-closing and raised at least six inches above floor level. It must be fireproofed and tin clad. The door to the storage room must be kept locked when the room is not in use. Signs must be posted inside and outside the storage room. The sign must read **"PAINT STORAGE ROOM - NO SMOKING"**. The light switch must be located outside the storage room. A 10 pound dry chemical fire extinguisher must be provided in the storage room.

The storage racks, stands, etc. inside the storage room must be made of a non-combustible material. Portable electrical appliances of any kind may not be used inside the storage room. The trash container must have a self-closing lid. The trash container must be emptied daily.

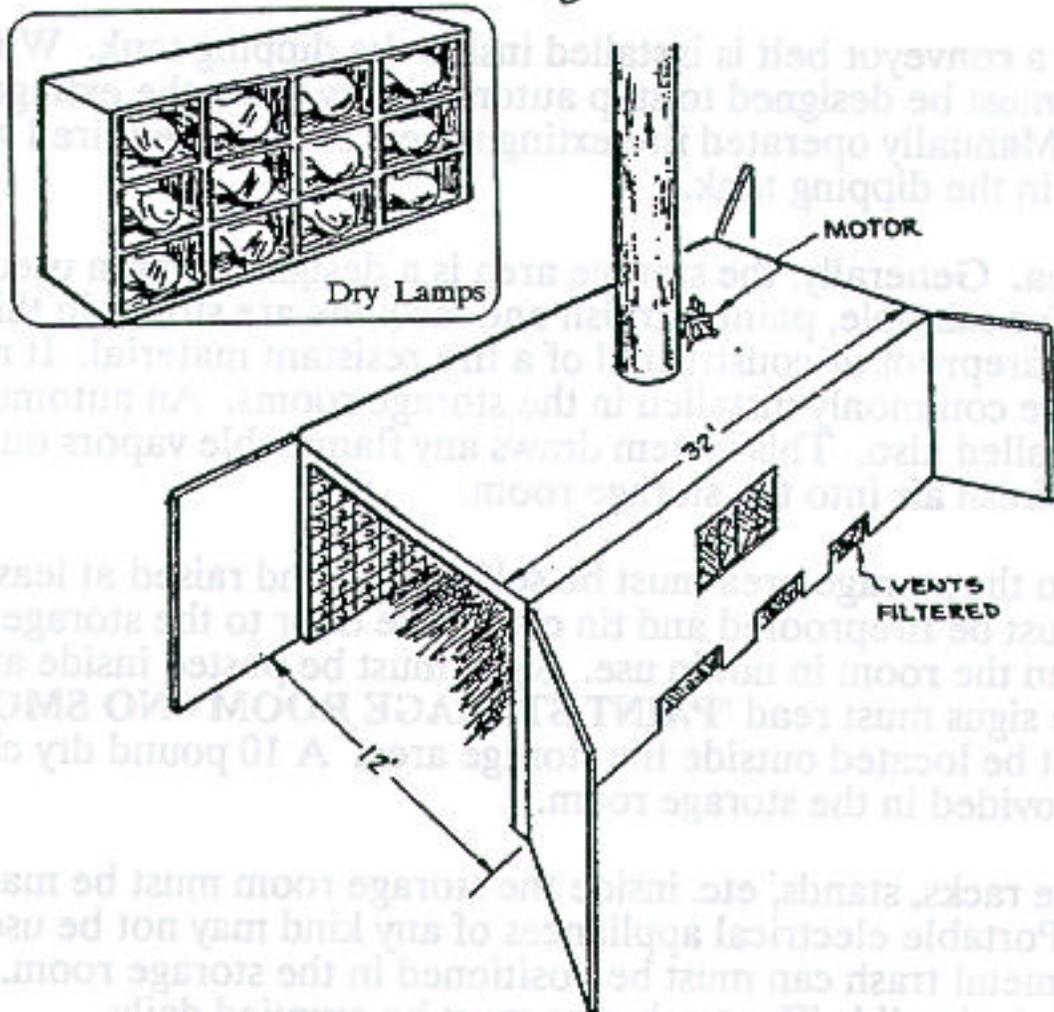
## **DRYING OVENS**

Drying ovens are commonly installed in locations used for spraying and painting. All ovens must be approved by the Board of Standards and Appeals. The ovens may be electric or gas fired.

**Gas-fired Ovens.** Gas-fired ovens must be located at least 25 feet away from spraying and dipping operations. The ovens must be ventilated and provided with an exhaust system. A gas control valve must be installed at least 25 feet away from the oven. This valve is used to shut off the gas supply in case of an emergency. The certificate of fitness holder must know how to operate the control valve.

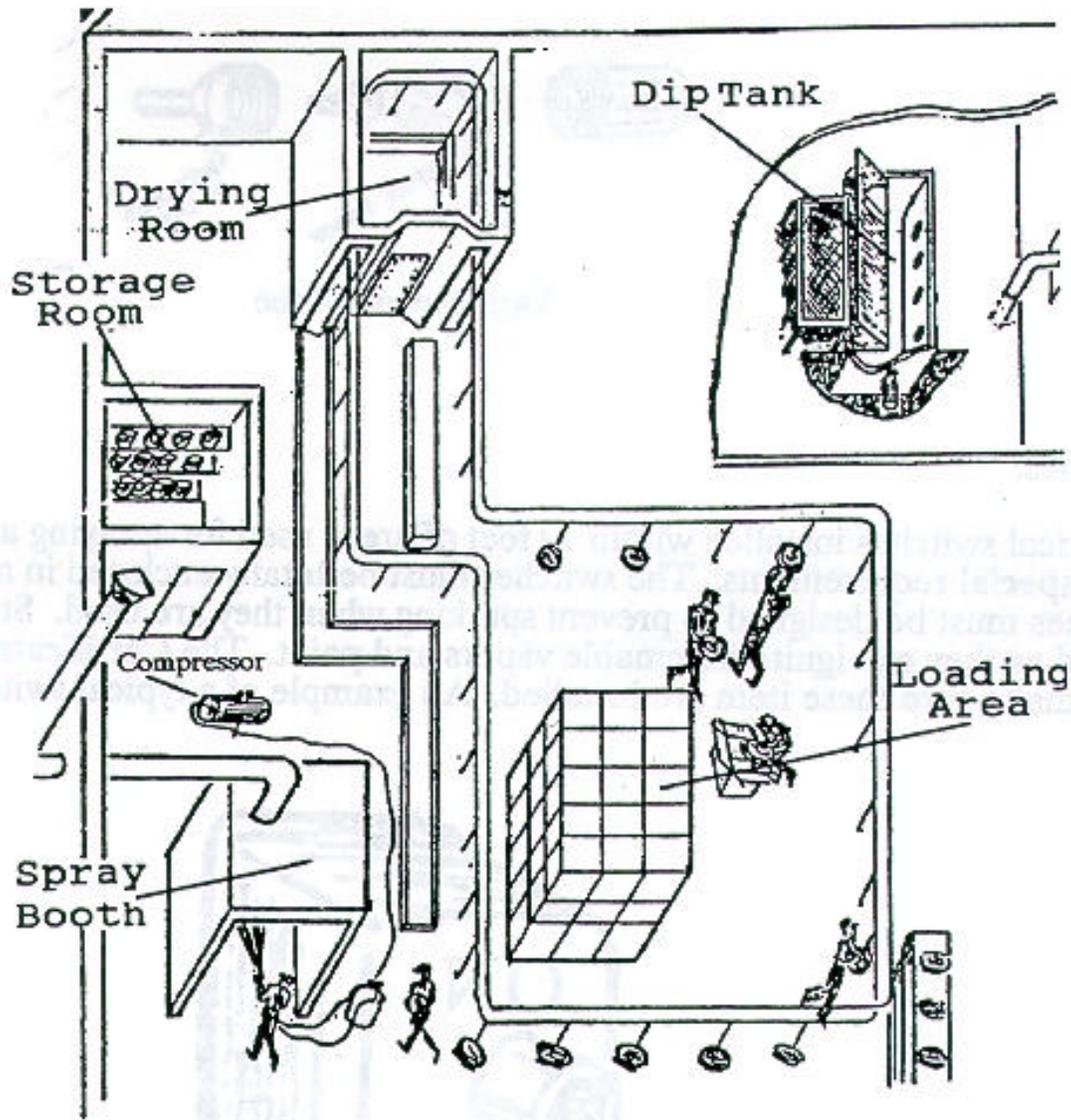
**Electric Ovens.** The heating elements inside the oven must be kept free of flammable deposits. Otherwise the heating elements might ignite the flammable deposits and cause a fire. Electrical ovens must adequately ventilated. Sometimes a conveyor belt is installed inside these ovens. When the conveyor belt is installed, the oven must be equipped with a special device. This device is designed to turn off the heating elements when the conveyor belt stops. A temperature switch must also be installed inside the oven. This switch is designed to shut down the heating elements when the temperature reaches dangerous levels. The electrical ovens should be installed in separate fireproof rooms. When this is not possible they must be located at least 15 feet away from spraying and dipping processes. Carbon dioxide (CO<sub>2</sub>) or dry chemical fire extinguishers must be near by for use in case of a fire emergency.

Some electrical ovens use infrared lamps to dry the painted materials. These lamps must also be kept free of flammable deposits. An example of an infrared drying oven is shown below.



**Infrared Drying Oven**

The drawing below shows an example of the typical layout of an entire spraying plant.



Layout of Entire Spraying Plant

## ELECTRICAL SYSTEMS

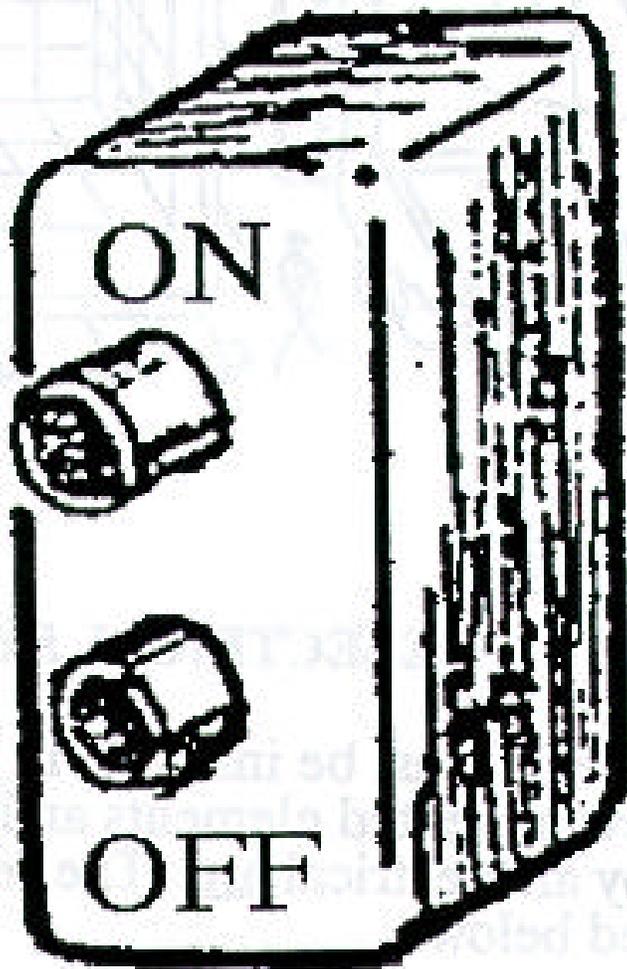
Special electrical components must be installed in locations used for painting and spraying. They are designed to prevent heated elements and spray sparks from causing a fire. The spray sparks are caused by an electric arc. The requirements for these electrical components are described below>

**Lighting.** Electrical lighting is the only means of artificial lighting that may be used in locations used for spraying and painting. Bulbs become extremely hot while they are in use. Flammable vapors must be prevented from reaching the hot bulb. This is done by enclosing the bulb in a special vapor-proof globe. A protective metal guard is then placed over the globe. This metal guard protects the electrical unit from physical damage. The vapor-proof globe and the guard must be installed over bulbs that are located within 10 feet of the spray booth rooms and dipping areas. A vapor-proof globe and metal guard must be installed on all portable lights. The certificate of fitness holder must make sure these items are properly installed. An example of a typical vapor-proof globe is shown below.



**Typical Vapor-proof Globe**

**Switches.** Electrical switches installed within 10 feet of areas used for spraying and painting must meet special requirements. The switches must be totally enclosed in a protective unit. The switches must be designed to prevent sparking when they are used. Stray sparks are a fire hazard as they can ignite flammable vapors and paint. The certificate of fitness holder must make sure these items are installed. An example of a typical switch is shown below.



**Enclosed Switch**

Sometimes fluorescent tubes are used as a means of artificial lighting in these locations. Only special fluorescent tubes may be used. These fluorescent tubes must be approved for explosive atmospheres. The certificate of fitness holder must make sure that only approved fluorescent tubes are used.

**Power Receptacles and Power Cords.** Standard pin type power receptacles are not permitted in locations used for spraying or painting. These receptacles pose a serious fire hazard since they can emit sparks. Special receptacles are designed for use in dipping and spray painting locations. These receptacles must have explosion-proof interlocking devices installed. Most of these devices prevent the removal of the plug while the switch is on. Some receptacles seal the connection when the power is interrupted. This prevents arcing that could cause sparks. The certificate of fitness holder must make sure that only approved receptacles are used.

Standard power cords are not permitted in spray and dipping rooms. However, properly grounded power cords may be used. These power cords have three insulated cables inside the cord. These cords are easily identified. They have a three-prong plug attached to the end of the cord. The grounding prong should never be removed from the plug for this kind of power cord.

## OTHER GENERAL REQUIREMENTS

**Drainage.** A special drainage system must be installed in areas used for spraying and painting. These systems may not be connected to drains leading to public sewers. This is done to prevent a buildup of flammable vapors that could lead to an explosion.

**Storage and Mixing of Paint.** The paint, varnish, and lacquers being used must be thinned before they may be used. Special rules must be followed when mixing and thinning these liquids.

- ? A minimum of 10 gallons may be mixed in a spray room.
- ? Mixing paints in excess of 10 gallons must be done in the paint storage room.
- ? A maximum of one day's working supplies may be positioned in the area used in the spray room. However, these supplies may not exceed 20 gallons per spray booth. A total of 100 gallons may be kept in the spray room or in the room where the spray booths are located.

The air exhaust and ventilation systems must be in operation when mixing and thinning is being done.

**Pressure Tanks.** Generally, pressure tanks are used to feed paint into a spray gun. These tanks must not exceed 60 gallons. The tank pressure must not exceed 80 p.s.i. A safety relief valve must be installed on the tank. This valve must be open if the pressure inside the tank exceeds 80 p.s.i.

## GENERAL SAFETY GUIDELINES

A certificate of fitness holder must supervise the spraying and painting operations. The certificate of fitness holder must also make sure that correct maintenance procedures are followed on the premises.

The exhaust and ventilation systems must be turned on before any spraying is done. Often a safety exhaust system is installed. In some locations the exhaust system is turned automatically when the spray gun is operated. In other locations the spray gun may not be operated until the exhaust system is turned on manually. The certificate of fitness holder must make sure that the exhaust system is in operation when spraying is performed.

The spray booths and spray rooms must be cleaned regularly. Only soap and water cleaning solutions may be used. The certificate of fitness holder must make sure that only non-flammable cleaning solvents are used. Flammable cleaning solvents would cause a serious fire hazard.

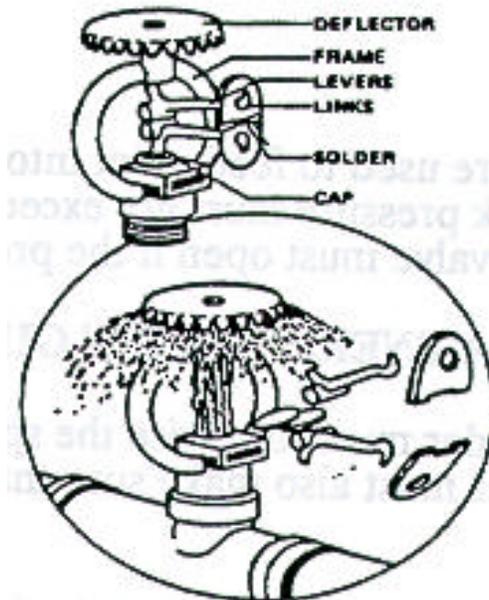
Accumulation of garbage and waste materials must not be permitted in areas used for spraying and painting. The certificate of fitness holder must make sure that the entire area is kept clean. Several waste cans must be positioned throughout the area.

When automobiles are taken into the area used for spraying and painting they must have their batteries disconnected. This will prevent stray sparks from causing a fire. Engines must not be started in these locations.

Combustible materials must be stored at least 15 feet away from any spray booth. Care must be taken to make sure that open flames are kept at least 25 feet away from the spray booth. Open flames are not permitted inside the storage room.

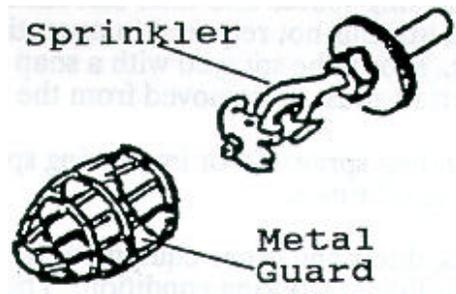
**Smoking.** Smoking is not permitted in areas used for spray painting. Smoking is also not permitted in paint storage areas. The certificate of fitness holder must strongly enforce these no smoking regulations. Several **NO SMOKING** signs must be posted in these locations. The certificate of fitness holder must make sure that the **NO SMOKING** signs are visible at all times.

**Sprinkler Systems.** A sprinkler system is required in areas used for spraying, dipping, and drying of paint varnishes and lacquers. The sprinkler system must be designed to automatically discharge water through the sprinkler head in case of fire. The sprinkler head consists of a series of links and levers. They are held together by a fusible element. When the temperature in the room reaches a set level, the fusible element melts. This causes the levers and links to separate and permits the discharge of water. An example of a typical sprinkler head is shown below.



**Sprinkler Head**

The sprinkler heads must be protected from possible damage when things are being moved around in the painting area. Metal guards are usually installed on the sprinkler heads. An illustration of a typical sprinkler guard is shown below.



**Metal Guard for Sprinkler Head**

The certificate of fitness holder must make sure that the sprinkler heads are kept free of foreign materials. The sprinkler heads must be cleaned at least every week. The sprinkler heads must be cleaned to ensure that they will operate correctly during a fire emergency. After the sprinkler heads are cleaned they must be covered with a light coat of Vaseline. The Vaseline will prevent the accumulation of foreign material on the sprinkler heads.

Sprinkler heads must not be covered at any time; bags must not be placed over the sprinkler heads to prevent the accumulation of dirt and paint particles. The bag will interfere with the operation of the sprinkler heads in case of a fire emergency. The certificate of fitness holder must make sure that the sprinkler heads are not obstructed. For example, care must be taken to make sure that the storage racks are not positioned too close to the sprinkler heads. Stored materials and racks must be kept at least 18 inches from the sprinkler heads.

**Fire Extinguishers.** The fire extinguishers must be inspected every six months by a qualified technician. The technician must recharge the fire extinguisher as needed. The portable fire extinguishers must be hydrostatically tested every five years. Generally, inspections and maintenance are conducted by a representative of a company certified by the Fire Department holding a service contract for the extinguishers. The certificate of fitness must check the condition of the extinguishers regularly in addition to make arrangements to have the fire extinguishers recharged as required. Defective extinguishers must be replaced immediately.

Special fire extinguishers must be used to extinguish paint fires. Foam and dry chemical fire extinguishers may be used to extinguish paint fires. These extinguishers are designed to smother the fire. Sand may be used to extinguish paint fires. **Water-type extinguishers should not be used to extinguish paint fires.**

### **SAFETY RULES WHEN WORKING IN PAINT SPRAYING AREAS**

Paint spraying rules must be posted next to the spray booth or spray rooms. The following guidelines may be used to develop those rules.

- ? Smoking or the carrying of lighted cigars, cigarettes, pipes, or matches in spray, dipping or immersing space is prohibited.
- ? No person is permitted within a spray space between the spray gun and the exhaust outlet while the spray gun is in use.

- ? Spraying, dipping or immersing spaces and their surroundings must be kept clear of all materials, equipment, and utensils not required in the operation of spray painting. Side walls, ceilings, baffle plates, etc., should be sprayed with a soap and water solution before cleaning. Waste materials must not be allowed to accumulate in the premises, it must be removed on a daily basis. Floors within and surrounding spray, dip or immersing spaces must be kept clean and free from waste materials at all times.
- ? Spray room, booths, fans, ducts, and other equipment must be cleaned frequently and maintained in clean and efficient working conditions. The lacquer spraying booths must be wet down before cleaning.
- ? Implements used for cleaning must be made of non-ferrous material to avoid sparks.
- ? Metal waste cans with self-closing covers must be provided for all spraying, dipping, or immersing spaces and storage rooms. The number of waste cans to be installed will be determined by the manager of the work location.
- ? Approved fire extinguishing systems must be installed in all spraying, dipping, or immersing spaces and storage rooms. The type of fire protection provided must meet the requirements of the Fire Department.
- ? The accumulation of flammable waste, sweepings, or deposits from spraying, dipping or immersing is prohibited. All such waste must be placed in approved waste cans and removed from the premises every day at the close of work.

**Emergency Procedures.** The Fire Department must be notified immediately when a fire occurs or is discovered. The Fire Department can be reached by dialing **911**, the telephone operator, or the Borough Dispatch Center using one of the following numbers:

<b>Manhattan</b>	<b>(212) 999-2222</b>
<b>Bronx</b>	<b>(718) 999-3333</b>
<b>Brooklyn</b>	<b>(718) 999-4444</b>
<b>Queens</b>	<b>(718) 999-5555</b>
<b>Staten Island</b>	<b>(718) 999-6666</b>

These numbers must be posted close to the phones most likely to be used in case of a fire emergency.