Spray Applications of Coating Materials

Safety and Health Issues

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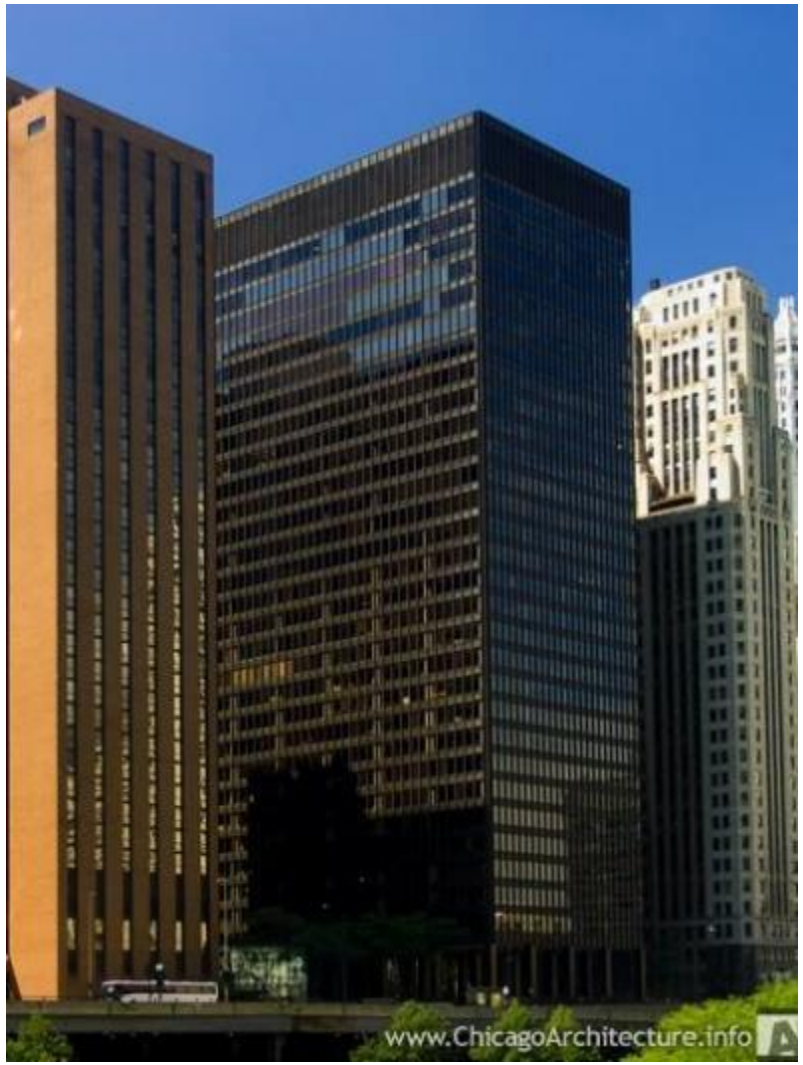
GARMAT
USA
BUILT IN THE
USA
NO SMOKING
OR
OPEN FLAMES

Designer Address

- May 13, 1987
- High-rise fire killed Nancy Clay.
- 20th Floor
- The reactions followed release of tape recordings of two conversations between Clay, who was working late in an office at 111 E Wacker Drive, and a 911 emergency dispatcher shortly before she died of smoke inhalation.
- Fire started in homemade booth to spray displays



Injuries

- Dec 2016
- Eaton PA
- An employee was heating a paint spray can with a heat gun when the can blew up, burning his hands, wrists, neck, and face.

Injuries

- Oct 2017
- Plano TX
- An employee was unclogging a paint sprayer when it fired while his finger was at the end of the nozzle. The paint/toxin was injected into his left index finger, lacerating it.

Cleaning Clogged Nozzles

- Try a dedicated spray-gun cleaning solution.
- Spray-gun cleaner softens oil and latex paint, polyurethanes, and other finishes, and it starts to work in a few minutes.
- Fill the gun with cleaner.
- Shake the paint gun vigorously to coat the inside of the cup with the cleaner to dissolve any paint left inside.

Injuries

- July 2016
- Webster NY
- An employee was painting a room with a paint sprayer (approximately 2000 psi).
- The equipment malfunctioned and the employee's left thumb was lacerated. In addition, paint was injected into the laceration.

Recommended Preventive Action

- Read all warnings and instructions in the owner's manual and keep them on hand.
- Ensure employees are properly trained and competent to operate the devices.
- Never point the spray gun at anyone or at any part of the body
- Adjust the pressure to the lowest setting possible.
- Never put your hand or fingers over the spray tip.

- Always have the tip guard in place on the spray gun when spraying.
- Engage the trigger lock when not spraying, even for a moment.
- Always engage the gun safety latch in the closed or ON SAFE position, making the gun inoperative. Failure to engage the safety latch can result in accidental triggering of the gun.
- Always follow the pressure relief procedure before cleaning or removing the spray tip or servicing any system equipment.
- Maintain, clean and store the airless sprayers and pump according to manufacturer's instructions; do not store the system under pressure.

Respirators

- Organic Cartridge Respirators
- Required to be Worn
- Medical Evaluation
- Respirator Program
- Fit test
- Training
- Storage
- Cleaning

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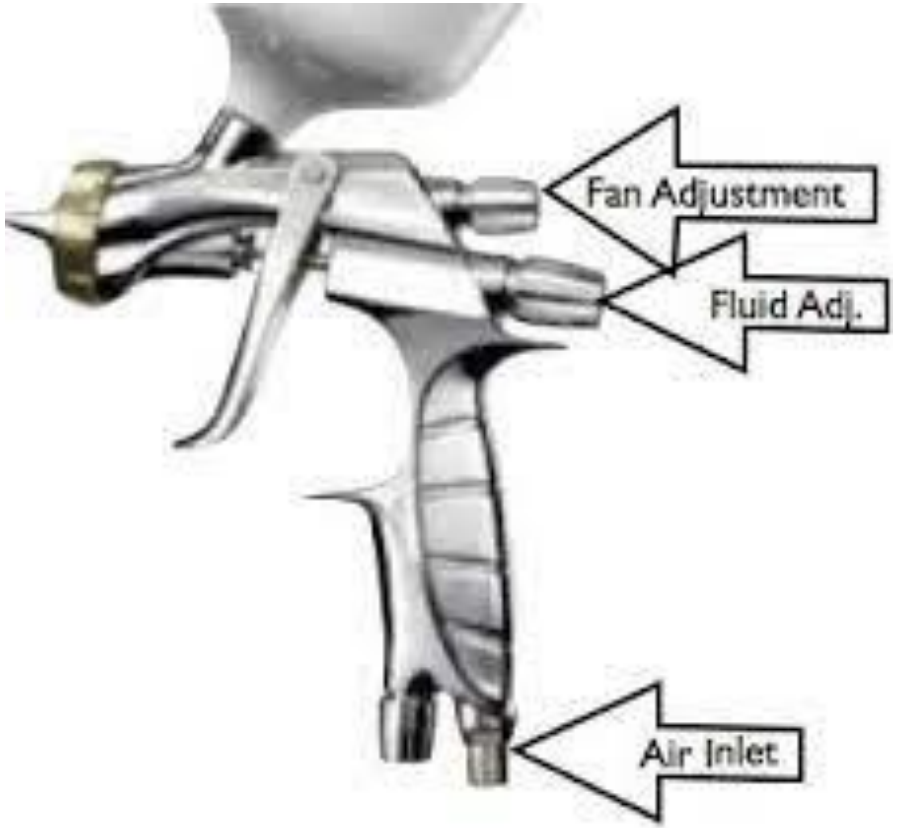
Injuries

- Aug 2019
- Normal IL
- An employee was adjusting the spray tip of a pneumatic powered paint sprayer when the spray trigger was activated, causing the spray stream of paint to contact the employee's hand.
- Paint was injected into the employee's hand, requiring hospitalization and surgery.



Injuries

- Jan 2016
- East Winsor CT
- An employee was attempting to close the spray booth door when the suction of the spray booth ventilation caused the door to close suddenly and pinch the employee's left middle finger, amputating the fingertip.

Injuries

- Aug 2016
- Houston TX
- An employee fell to the floor while climbing a ladder to inspect a spray booth, breaking the L1 vertebra.

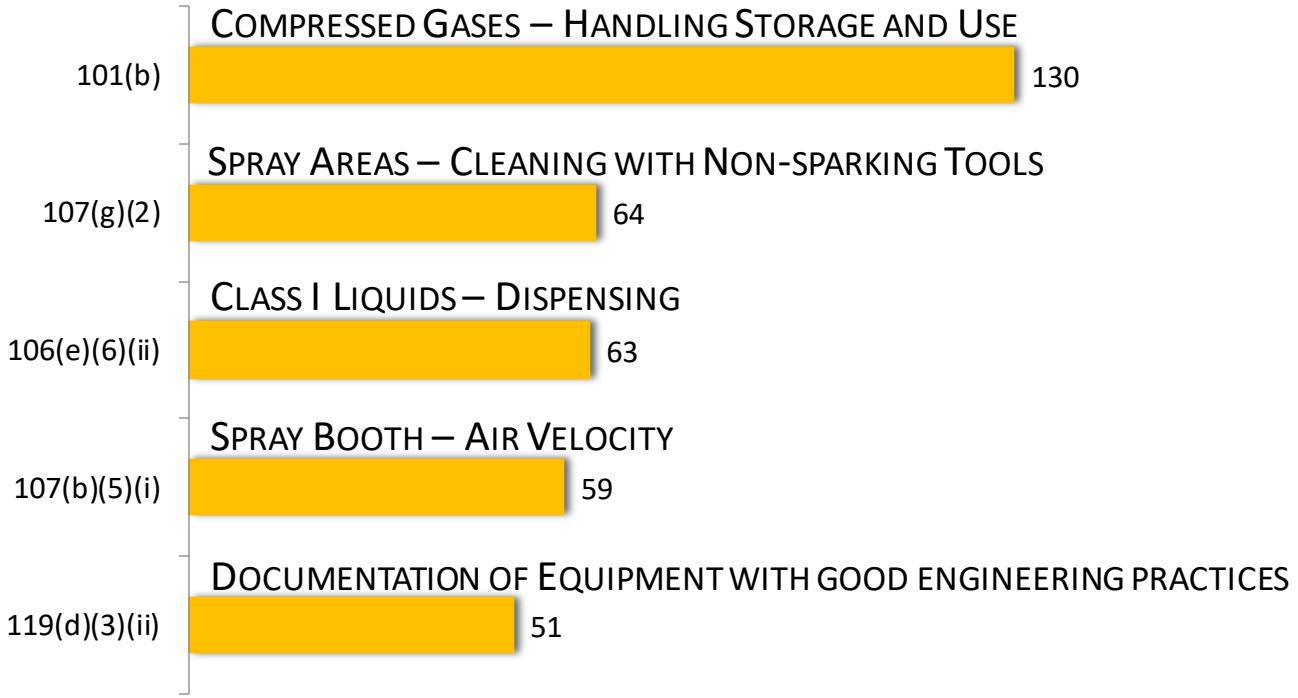
- What other hazards? Next slide for closeup.


VACUME

Large Loss

- Spring 2013
- Did not using a bonding cable to equipment
- Fire
- Loss Millions.
- Had to ship equipment to be painted.

Hazardous Materials [1910.101 – .126]



1910.107(g)(2)

- Cleaning.
- All spraying areas shall be kept as free from the accumulation of deposits of combustible residues as practical, with cleaning conducted daily if necessary.
- Scrapers, spuds, or other such tools used for cleaning purposes shall be of nonsparking material.

What could be the weaknesses in citing this?

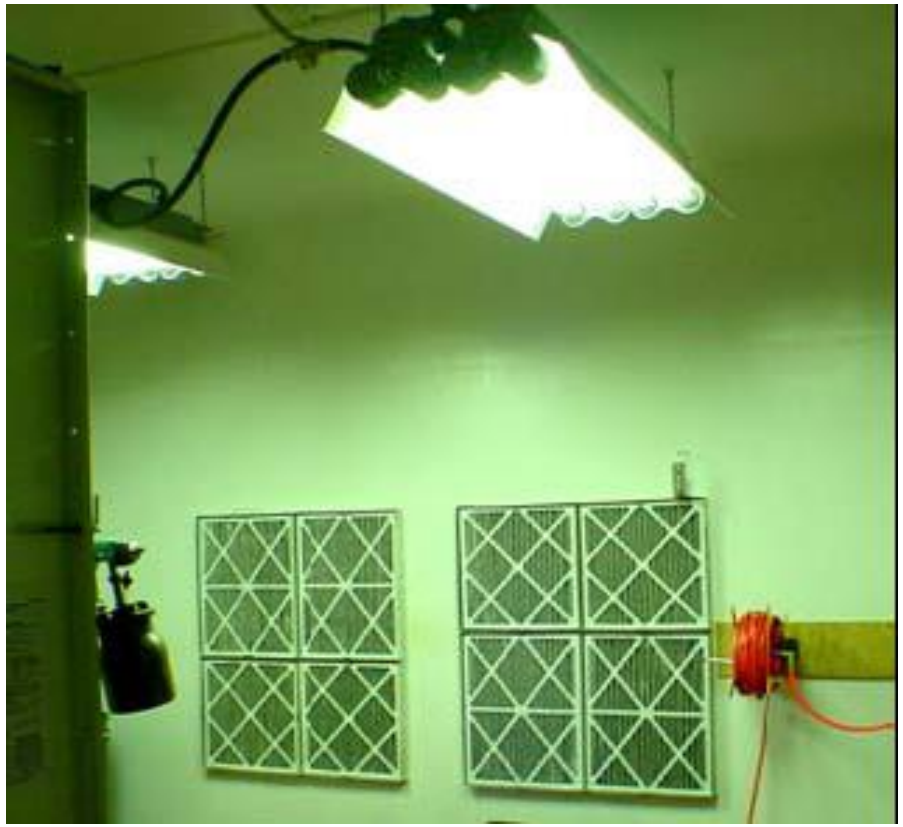
1910.107(b)(5)(i)

- The spraying operations except electrostatic spraying operations shall be so designed, installed and maintained that the average air velocity over the open face of the booth (or booth cross section during spraying operations) shall be not less than 100 linear feet per minute.

CHECK POINT

- Spray booths shall be substantially constructed of steel, securely and rigidly supported, or of concrete or masonry except that aluminum or other substantial noncombustible material may be used for intermittent or low volume spraying.
- Ref : 1910.107(b)(1)

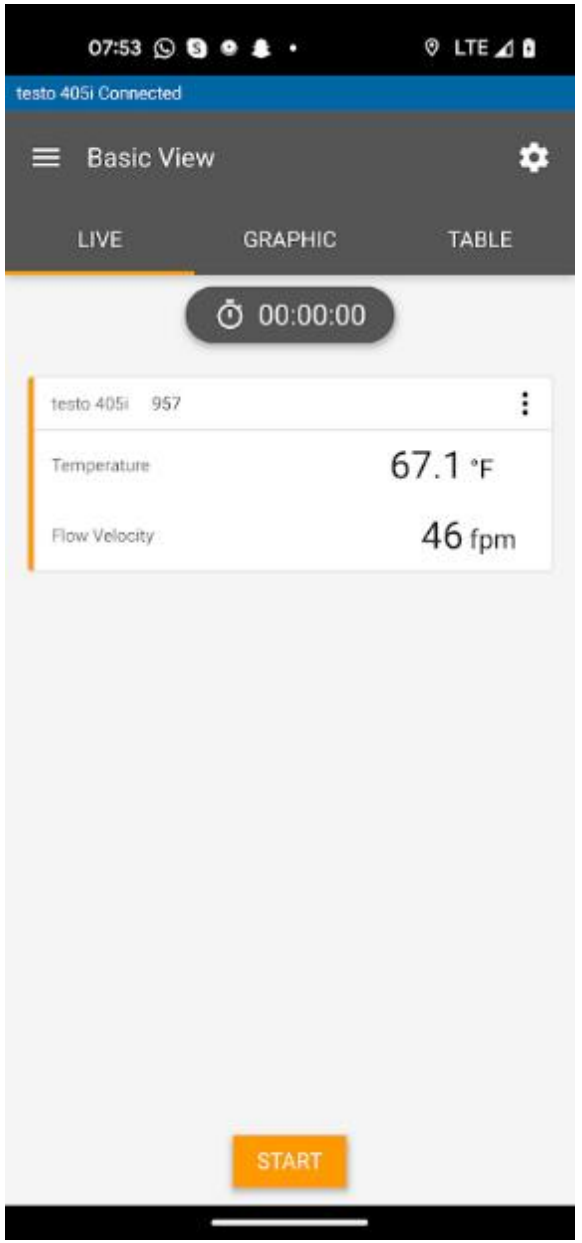
Fluorescent Lighting – Ignition Source



- Bare Bulbs can ignite vapors.
- 6.5.2: Electrical area classification NFPA-33, confirms that if spray application operations are conducted within a closed-top, open-face or open-front booth or room, as shown in Figure 6.5.2, any electrical wiring or utilization equipment located outside the booth or room but within 915mm (3 ft) of any opening shall be suitable for Class I, Division 2;

Velometer

- Hot wire anemometers



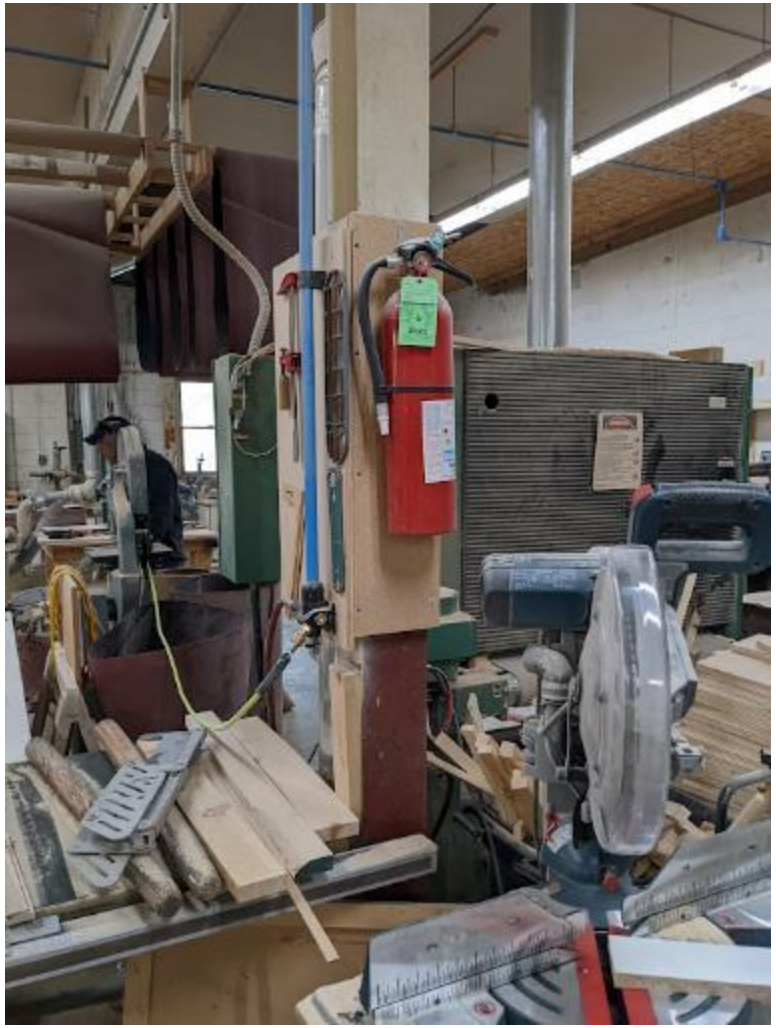
Selection of Respirators

Employer must select and provide an appropriate respirator based on the respiratory hazards to which the worker is exposed and the factors that affect respirator performance and reliability.

CLEAN FILTERS

- Replacing clogged air filters keeps the paint booth's ventilation system working efficiently.
- Ventilation will drop.

CHECK POINTS



- Are fire extinguishers installed near all spraying areas? Ref: 1910.107(f)(4)
- What is wrong here?

FOLLOW GOOD HOUSEKEEPING

- 1910.107(b)(9)
- ***Cleaning***. A clear space of not less than 3 feet on all sides shall be kept free from storage or combustible construction.

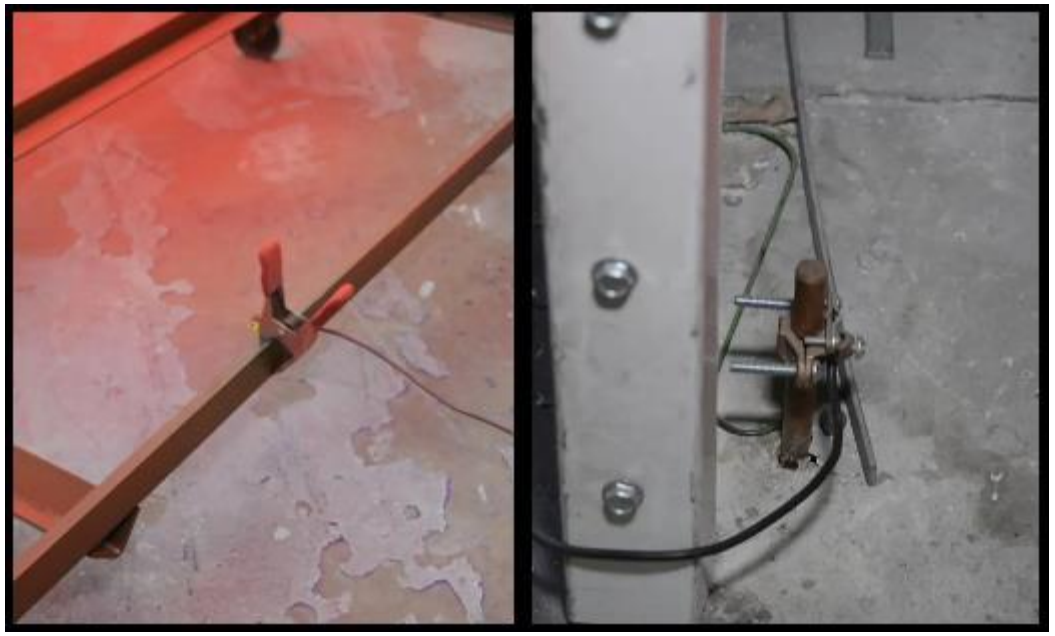
- Combustible cardboard boxes should not be stored in the booth and filters are not stored properly.

CHECK POINTS

- Are automatic sprinkler heads located so as to provide water distribution throughout the spray booth?
- Dry chem can protect a booth also.
- Ref: 1910.107(f)(1)
- Ref: 1910.107(b)(5)(iv)

CHECK POINTS

- NFPA 33
- 6.7* STATIC ELECTRICITY. All electrically conductive objects in the spray area shall be electrically connected to ground .
- This requirement shall apply to containers of coating material, wash cans, guards, hose connectors, brackets, and any other electrically conductive objects or devices in the area.



Transfer Pumps

- 1910.107(e)(4)
- ***Transferring liquids***. Except as provided in paragraph (e)(5) of this section the withdrawal of flammable liquids and liquids with a flashpoint greater than 199.4 °F (93 °C) from containers having a capacity of greater than 60 gallons shall be by approved pumps.

CHECK POINTS

- Are No smoking signs conspicuously posted.
- Ref: 1910.107(g)(7)

CHECK POINTS

- Are freshly sprayed articles dried only in spaces provided with adequate ventilation?
- Ref: 1910.107(d)(12)

CHECK POINTS

- Is all residue, scrapings, and debris contaminated with residue immediately removed from the premises and properly disposed of? Ref:1910.107(g)(3)

Paint Stripper

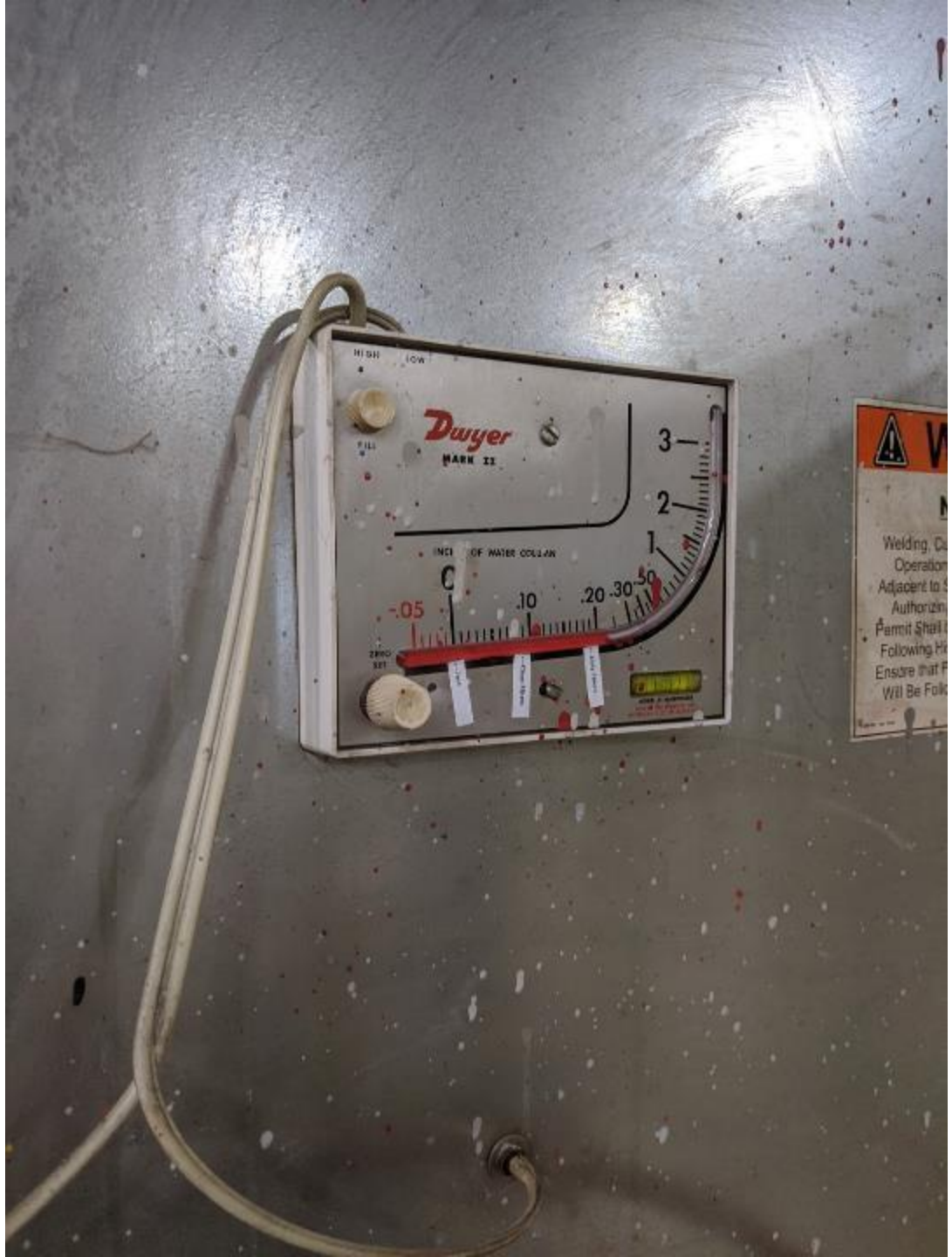
- Methylene Chloride is listed on the IARC and NTP carcinogen list.

CHECK POINTS

- ***Separation of operations***. Each spray booth shall be separated from other operations by not less than 3 feet, or by a greater distance, or by such partition or wall as to reduce the danger from juxtaposition of hazardous operations.
- Ref 1910.107(b)(8)

CHECK POINTS

- Is mechanical ventilation being operated during all spraying operations and for a sufficient time afterward to allow vapors to be exhausted? Ref:1910.107(d)(2)



CHECK POINTS

- Are approved metal waste cans provided whenever rags or waste are impregnated with finishing material and are rags and waste deposit in them immediately after use? Ref:1910.107(g)(3)

CHECK POINTS

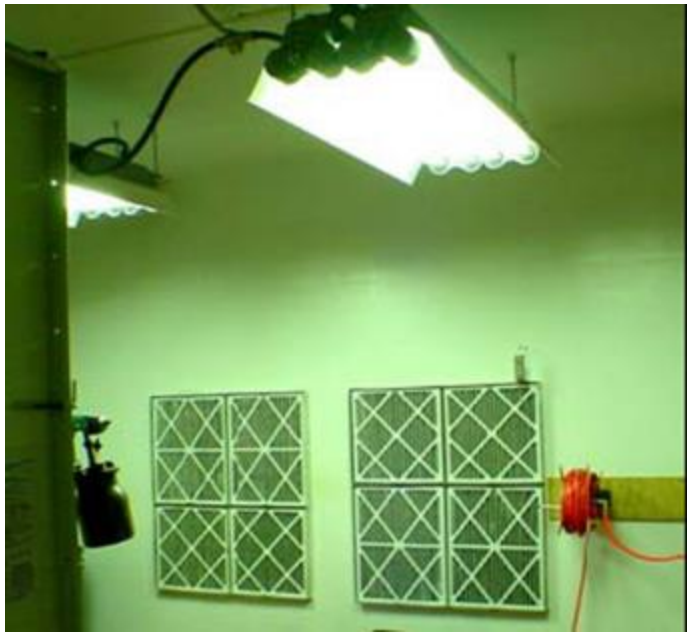
- Does the quantity of flammable or combustible liquids that are kept in the vicinity of spraying operations exceed a supply needed for one shift? Ref: 1910.107(e)(2)

CHECK POINTS

- Is a visible gauge, audible alarm, or pressure-activated device installed to ensure that the required air velocity is maintained? Ref:1910.107(b)(5)(i)

CHECK POINTS

- Panels shall effectively isolate the spraying area from the area in which the lighting unit is located, and shall be of a noncombustible material of such a nature or so protected that breakage will be unlikely.
- Ref: 1910.107(b)(10)
- Violation



CHECK POINTS

- Panels shall effectively isolate the spraying area from the area in which the lighting unit is located, and shall be of a noncombustible material of such a nature or so protected that breakage will be unlikely.
- Ref: 1910.107(b)(10)
- No Violation

What is in the Paint?

FLAMMABLE LIQUIDS - Category 3	On basis of test data
ACUTE TOXICITY (inhalation) - Category 4	Calculation method
SKIN CORROSION/IRRITATION - Category 2	Calculation method
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2A	Calculation method
RESPIRATORY SENSITIZATION - Category 1	Calculation method
SKIN SENSITIZATION - Category 1	Calculation method
CARCINOGENICITY - Category 1A	Calculation method
TOXIC TO REPRODUCTION (Fertility) - Category 1B	Calculation method
TOXIC TO REPRODUCTION (Unborn child) - Category 1B	Calculation method
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3	Calculation method
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) (lungs) - Category 1	Calculation method
ASPIRATION HAZARD - Category 1	Calculation method

Electrostatic CHECK POINTS

- Is the electrical equipment in an electrostatic hand spraying area interlocked with the ventilation system so that it cannot be turned on unless the ventilation fans are operating?
- Ref: 1910.107(I)(8)

Electrostatic CHECK POINTS

- Electrostatic spraying operations may be conducted with an air velocity over the open face of the booth of not less than 60 linear feet per minute.
- Ref: 1910.107(b)(5)(i)

Electrostatic CHECK POINTS

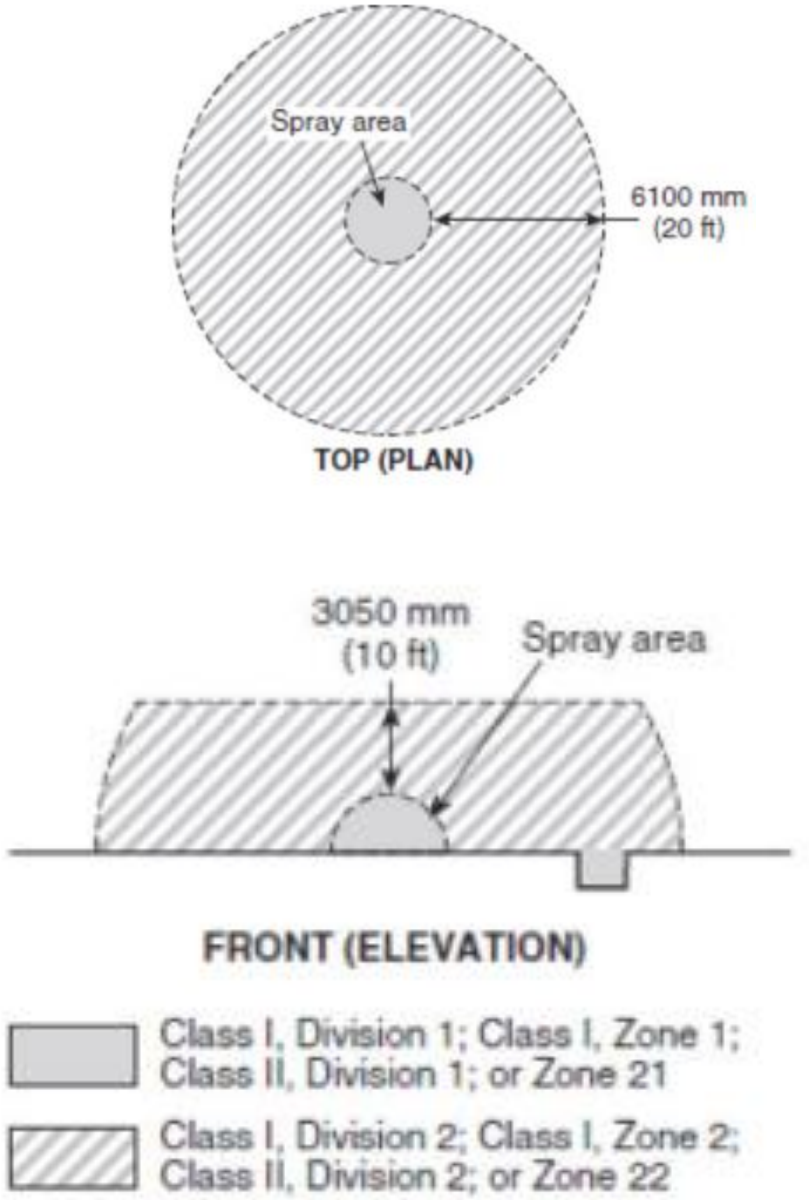
- NFPA 33
- 15.6 Enclosures. Powder shall be confined by conducting coating operations within one of the following:
- (1) A completely enclosed, ventilated room of noncombustible or limited combustible construction with smooth surfaces designed to prevent accumulation of powder and to facilitate cleaning
- 2) A ventilated spray booth meeting the requirements of Section 5.1 through Section 5.7, and having enclosed, ventilated containers (tanks, bins, etc.)

Electrostatic CHECK POINTS

- Where is the fire extinguisher for the flammables?

Open Spraying

- NFPA 33
- Section 5.1.1: Walls, doors, and ceilings that intersect or enclose a spray area shall be constructed of noncombustible or limited combustible materials or assemblies and shall be securely and rigidly mounted or fastened.
- Class II electrical per 6.3.1.5 or 1910:307(b)



Open Spraying

- NFPA 33
- 7.2 PERFORMANCE REQUIREMENTS. Each spray area shall be provided with mechanical ventilation that is capable of confining and removing vapors and mists to a safe location and is capable of confining and controlling combustible residues, dusts, and deposits.
- The concentration of the vapors and mists in the exhaust stream of the ventilation system shall not exceed 25 percent of the lower flammable limit.

Ovens

- Jan 2014
- According to OSHA records, it was first shift workers acting under supervision, who loaded the fateful batch of carbon and graphite parts, coated in a highly flammable alcohol and iodine solution.
- The oven, unequipped to handle combustibles, exploded roughly 15 minutes later.
- OSHA said the force ripped the oven's door from its hinges, causing the heavy metal object to strike a group of three workers on a tour of the facility, 15 to 20 feet away.
- The result is listed as "death and broken bones."

The "event" oven – a Despatch-brand electric oven — had reportedly been purchased by the company to cure water-based calcium treatments roughly four years earlier.

Truck Bed Liners

- Spray-on bedliners are designed to provide a layer of protection inside a pick-up truck's bed to prevent rust and corrosion and lessen wear and tear.

Truck Bed Liners

- Health hazards in spray-on bedliner applications typically include exposure to various solvents and a group of contaminants known as isocyanates that can cause severe respiratory disease.

Truck Bed Liners

- Hexamethylene Diisocyanate
- Hexamethylene
- 1,6-Hexamethylene Diisocyanate
- Isophorone Diisocyanate
- Methyl Isocyanate[
- Methylene Bisphenyl Isocyanate (MDI)
- 1,5-Naphthalene Diisocyanate

Truck Bed Liners

- Hexamethylene Diisocyanate
- Hexamethylene
- 1,6-Hexamethylene Diisocyanate
- Isophorone Diisocyanate
- Methyl Isocyanate[
- Methylene Bisphenyl Isocyanate (MDI)
- 1,5-Naphthalene Diisocyanate

4,4'-Diphenylmethane Diisocyanate (MDI) (101-68-8)

US. ACGIH Threshold Limit Values

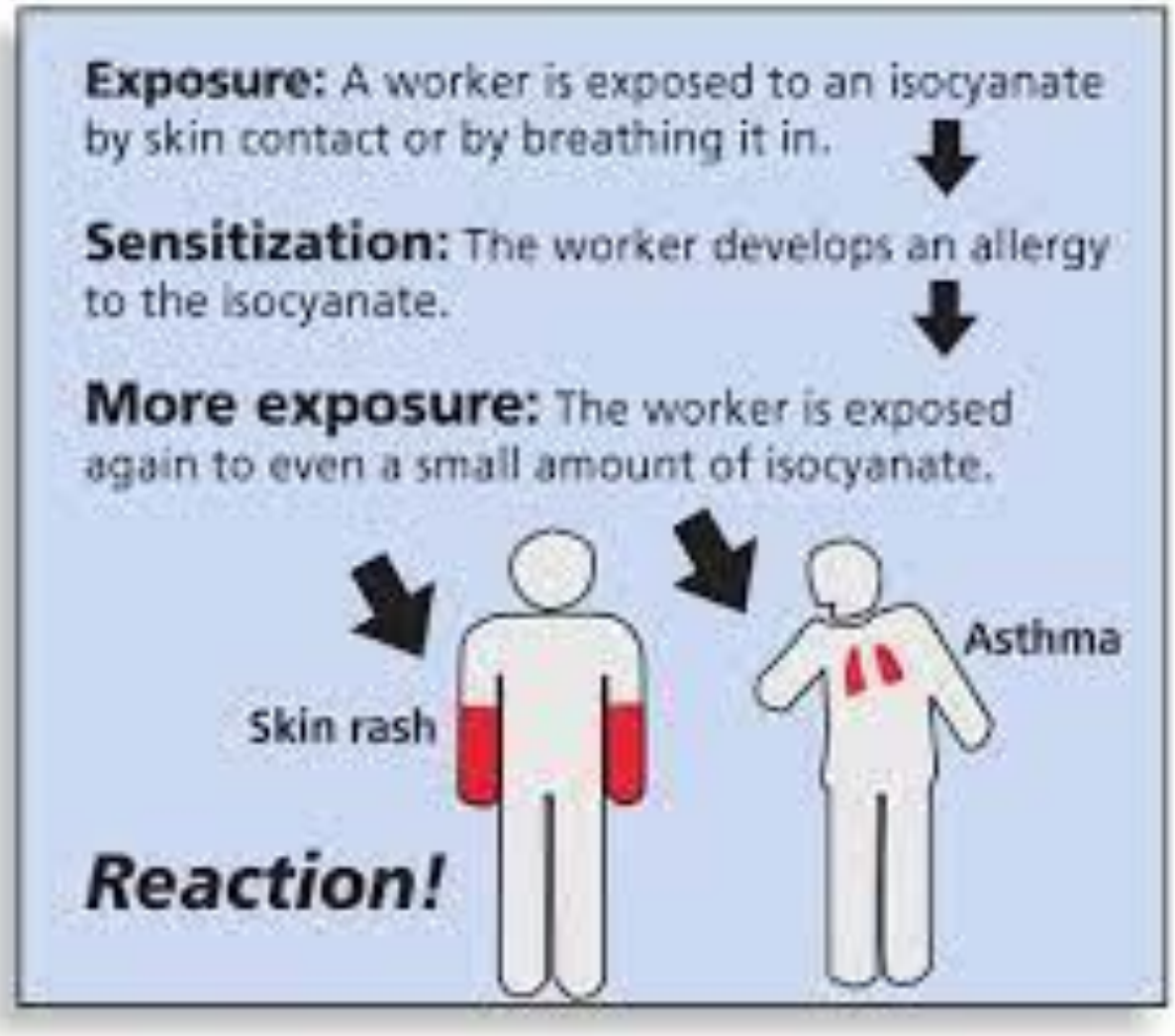
Time Weighted Average (TWA): 0.005 ppm

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Ceiling Limit Value: 0.02 ppm, 0.2 mg/m3

Truck Bed Liners

- You can be overexposed!
- Aurora had overexposure to IH who stayed out of the spraying area, but vapors came into the break area.
- Self monitoring is advised



Truck Bed Liners

- On February 20, 2003 a 45-year old male store manager died after spraying on an isocyanate-based truck bed liner on the floor and up the sides of a cargo van.
- The victim was wearing an air-supplied ½ mask respirator and coveralls.
- “died of acute asthmatic reaction due to inhalation of chemicals”.

Truck Bed Liners

- NIOSH
- When spraying isocyanate-containing material, employers should:
- Provide a ventilated spray booth or room and evaluate the effectiveness of the ventilation.
- Establish a written respiratory protection program and require a supplied-air full facemask respirator to minimize employee exposure.
- Develop, implement and maintain a written hazard communication program and train employees about the program and chemicals they work with.

Truck Bed Liners

- NIOSH
- Institute medical monitoring of employees exposed to sensitizers or other asthma-causing agents.

- Conduct a workplace hazard assessment to identify health and safety issues, types of personal protective equipment to be used, and standard operating procedures to permit safe work.
- Additionally, manufacturers/suppliers/distributors should emphasize the health and safety aspects for their products when conducting training about their product at end user worksites.
- .

Fiberdome

- 2013
- Fiberdome Inc. has agreed to limit employee exposure to styrene, pay a $2,000 penalty and accept a general duty clause citation under the Occupational Safety and Health Act alleging that an employee was exposed to styrene over the industry agreed-upon level

TPI Composites

- The citations support complaints from dozens of former workers who say TPI didn't properly protect them from epoxy resin that caused them severe skin injuries.
- Hundreds of cases.
- Those complaints were first reported by the Des Moines Register.
- Some workers say they were fired after reporting the injuries

TPI Composites

- Epikote Resin
- No PEL
- No TLV

Ingredient name	% by weight	CAS number
Phenol, 4,4'-(1-methylethylidene)bis[2,6-dibromo-, polymer with (chloromethyl)oxirane	100	40039-93-8

Questions?