Summary

A spray room or booth does not appear to be all that complex. After all, they are found in a variety of commercial operations from auto garages to industrial manufacturers. Spray rooms and booths are dangerous. Fire and explosion are the two most significant hazards. To effectively control these hazards, you need to know the facts about spray rooms and booths.

Special Note: The governing agencies for the spray rooms and booths are many. Aspects of construction and installation are regulated by the National Electric Code (NEC 516), the Uniform Fire Code (UFC 4500), the National Fire Protection Association (NFPA) #33, and the Uniform Mechanical Code (UMV 1107). There are also various state and local agencies with codes and statutes. Harleysville Insurance uses the NFPA #33 as the benchmark for risk control evaluation and most of the content of this data sheet is derived from that code. The Occupational Safety and Health Administration (OSHA) is the enforcement agency on the national level using CFR 1910.107, Spray Finishing Using Flammable and Combustible Materials standard.

What Does a Spray Booth Do? Page: 1

A spray room must meet the same criteria as a spray booth. Therefore, all aspects mentioned in this data sheet apply to a spray room as well. It is sometimes more difficult to make a spray room compliant with the applicable codes just by it’s size and the possibility extra expense will be incurred with the installation of explosion proof lighting, wiring and ventilation equipment. With that in mind, it is easy to see that a pre-designed spray booth isolates the hazardous area, within the booth, and not the entire room.

Fire and Explosion Prevention and Protection

A spray booth is designed to protect building occupants against fires and explosions by providing fire prevention, containment and fire suppression systems. Booths also protect the environment by collecting contaminants before they are released into the atmosphere. With newly designed booths, you can add optional equipment that can clean the air sufficiently for re-circulation as makeup air.

Fire Prevention - Industries spray with solvent-based paints that are flammable and explosive under the right conditions. Spray booths, when properly constructed, keep sparks away from the spray gun and spray environment. All electrical equipment must be located greater than three (3) feet from the doors of the booth. A radio, electric or battery powered can provide a spark sufficient for ignition of paint fumes just by turning the on/off switch. All electrical components must be UL listed and be manufactured for class 1 division 1 atmospheres. Ventilation equipment must be able to keep the atmosphere of fumes, from the spraying operations, 25% below the “lower explosion limit”- (LEL). A common problem (especially with homemade spray booths) is that the fan is not “spark proof” and is incorrectly connected to the electrical service. The fan must be a non-ferrous (not containing iron) blade in a steel housing, and the motor must be an induction type (no brushes), sealed, UL listed and connected with explosion proof wiring.
a. **Fire Containment** - Fire containment is accomplished in two ways. The first is by the booth’s enclosed nature. In a UL Listed booth there are switched interlocks on all doors. If any door opens, the spray gun is automatically shut off. These switches are also connected to the fire extinguisher circuit so that if an automatic extinguisher goes off, the fan and spray gun are shut off, preventing more fuel being added to the fire. The second portion of fire containment is the fire rating of the booth itself. It must be constructed of one-hour firewalls of either steel or concrete. Fire rated drywall is **not** an acceptable option as it is easily broken, exposing the rest of the room and building to flammable fumes and vapor infiltration.

b. **Fire Suppression** - A fire suppression system is designed to stop a fire in its initial stages. It can use any of a variety of suppression agents including water, wet-chemical and even dry chemical. There should be an adequate number of extinguisher “heads” in the booth, stack and plenum to accomplish the initial knock down. Always consult the material safety data sheet for the best fire suppression agent. If you use several types of paints and solvents, install the suppression agent for the most dangerous or volatile.

c. **Environmental Protection** - Environmental regulations vary by State. It is prudent to consult the State regulations so overspray collected on the filters is disposed of correctly. You must also check with the State regulatory agency on how much volatile organic chemicals and air pollutants can safely be emitted from the spray booth. If make-up air is a problem, there are systems that can be added to the booth (i.e.: HEPA filtration), but constant upkeep of the equipment is needed. Air sampling or monitoring must be done on a regular basis to ensure air quality. In some areas of the country, you may have to install afterburners or charcoal filtration units on the exhaust if the booth is located in close to a school, hospital or residential neighborhood.

d. **Operator Protection** - Older spray booths use cross-ventilation to protect the person doing the painting from exposure to vapors. Newer booths are more efficient and primarily use downdraft systems that have filters in the floors and ceiling to keep vapors away from the operator. A well-designed spray booth will minimize the risk to employees, but not to the extent it will eliminate the need for a respiratory protection program.

**Details for a Typical Spray Booth/Room**

**Construction**
- Booth-Walls and Ceiling - 18 gage metal or heavier, concrete or masonry.
- Room- 1-hr fire resistive rating-non-combustible materials (no wood or drywall)-walls must be smooth and no rough joints.
- Floor- Watertight concrete or non-combustible - (Note: a floor drain must be included if water sprinkler heads installed).

**Ventilation**
- Mechanical ventilation must be sufficient to maintain 100 cubic feet per minute velocity across the face of the booth or room. It must be operated during painting and drying until all vapors are removed. Ventilation equipment must be interlocked with spray guns and fan to stop the spraying if ventilation ceases.

**Electrical**
- Inside Booth or Room- It is generally accepted that no electrical devices be located in the spray booth or room but if there has to be, the electrical service must be in UL listed explosion proof switches and junction boxes.

This information may not address all hazardous conditions at your location and does not warrant workplace safety or compliance with federal, state or local laws.
Lighting- Must be explosion proof and separated by wired glass with a vapor tight seal. (Plexiglas will not be accepted)
Motor-The motor for exhaust must be UL listed for Class 1, Division 1 locations and wired with explosion proof wiring.
Grounding-All metal elements of the booth, ducts, and equipment must be grounded.

**Fan Blades**
All fan blades must be non-ferrous and non-sparking - (brass, aluminum or plastic).

**Ducts**
22 gage sheet metal or heavier. Ducts must be substantially constructed, rigidly braced, and with ample doors for cleaning. All doors must be equipped with a vapor gasket. An 18” clearance between ducts and all combustible materials must be maintained.

**Cleaning**
- All spray areas, including ducts, fans, etc., must be kept free of combustible materials.
- Removal of overspray accumulations must be performed using non-sparking tools.
- Residue from cleaning must be removed immediately.
- UL Listed waste cans with self-closing metal lids must be used for combustible rags or rags.
- Solvents used for cleanup must have a flash point of greater than 100º F and handled in UL listed safety cans.

**Fire Suppression**
If installed, water, dry chemical, or wet chemical suppression “heads” must cover the entire booth, stack and plenums. They must be serviced annually.

**Paint Storage**
Only the paint necessary to complete the job is permitted within the booth or room. The proper grounding and bonding is also required for cans of flammable paint and solvent. See companion Risk Control Data Sheet for “Storage of Flammable Liquids”.

**Smoking**
No smoking signs must be posted throughout and strictly enforced.

**Employee Safety**
There must be a written respiratory protection program and all employees performing spray painting must be properly trained.

Samples of Spray Booths

Spray Booth with Fire Suppression  Industrial Spray Booth
Related Information:

**Spray-Tech**
100 E. Main St.
Suite A
Ontario, California 91761
USA

**Kayco Spray Booths**
P.O. Box 487
La Vernia, TX 78121
1-800-KAYCO40

**Bleeker Bros. Inc.**
10868 Drury Lane
Lynnwood, CA 90262
800-421-1107

**T&G Industrial Equipment, Inc.**
856 US Highway 60 East
P.O. Box 418
Morganfield, KY 42437
(888) 389-3156

**Air Filtration Company Inc.**
See Internet links for sales reps.

**Paasche Airbrush**
7440 W. Lawrence Avenue
Harwood Heights, IL 60656
Phone: 1-800-621-1907

References:
National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

This information may not address all hazardous conditions at your location and does not warrant workplace safety or compliance with federal, state or local laws.
17.1.2 Other Publications.
17.1.2.1 ASME Publication.
American Society of Mechanical Engineers, Three Park Avenue, New York, NY 10016-5990.
17.1.2.2 ASTM Publications.
American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.
ASTM D 323, Standard Method of Test for Vapor Pressure of Petroleum Products (Reid Method), 1999.
17.1.2.3 UL Publications.
Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062.

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