

THE SPRAY BOOTH

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Spraying of solvent-based coatings for vacuum metallizing presents a fire and explosion hazard. While we no longer lose as many metallizing shops to fire as we once did, it still makes sense to review the basics of spray booth safety. We will limit ourselves to an overview and refer the reader to the National Fire Protection Association (NFPA) Code #33 which is the nationally recognized code governing spray booth safety. This Tips should not be used as a substitute for the information contained in NFPA #33 and Midwest Tungsten Service accepts no legal responsibility for the correctness or completeness of this material or its application to specific situations. Additionally, since materials used in a spray booth often have hazards other than explosion or fire, one should also read and heed the information contained on the Material Safety Data Sheet (MSDS) for the material being sprayed.

Location

Spray booths should be located on non-combustible and easy-to-clean flooring in a designated area of the plant away from spark producing or open flame equipment such as welding, cutting, heat treating, and furnaces. Smoking in the area should be prohibited and signs to that effect clearly posted.

Construction

Spray booths should be constructed of #18 gauge steel. No aluminum is allowed for structural supports or ducting. All areas of the booth should be accessible for maintenance and cleaning, including ducts where fan blades and sprinkler heads are located. The exhaust path should be as direct as possible and be well supported. The duct must maintain an 18" clearance from any combustible roof or other

construction, although NFPA #33 provides for protections which can reduce this distance.

Spray Equipment

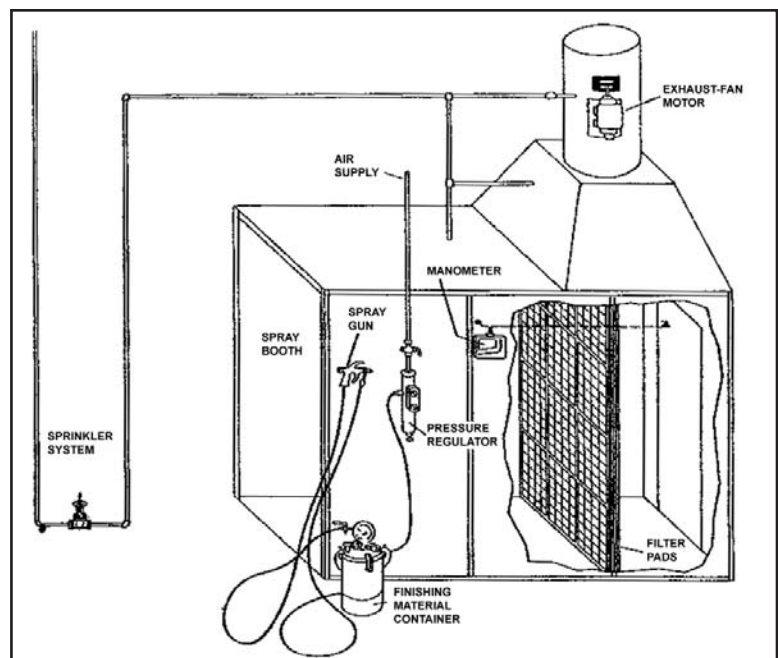
All equipment (sprayers, mixers, pumps, etc.) should be designed and manufactured for use in flammable/combustible spray application. The equipment should be electrically interlocked with the ventilation system to prevent it from working when the ventilation system is not on.

Ventilation

The system should provide a minimum linear airflow of 100 feet per minute across all booth openings. The exhaust fan should have non-sparking, non-ferrous blades and should be solidly mounted. The electric motor for the the fan should be located outside the duct and be of a type suitable for hazardous locations.

Filtration

The filtration system should be designed to be non-combustible. Baffle types are less efficient than mesh filters. Mesh filters are more



efficient, but the filters need to be replaced at regular intervals. Mesh filters may not be used with spray materials which are prone to spontaneous heating and combustion. Baffles do not need to be replaced but require regular cleaning to remove build-up. In either case, cleaning or replacement is required when spray materials are changed in order to avoid what is called the "compost effect" where layers of different materials can begin to react with one another and spontaneously combust. Storage and disposal of filters and overspray must also be done in a manner to reduce fire hazards and comply with EPA requirements.

One of the best choices for filtration is the water wash system. Vapor-filled air is drawn through a recirculating waterfall which traps the overspray particles. The water must be changed or filtered according to the manufacturer's instructions and the water and solids properly disposed of.

Electrical

A good rule of thumb is that no electrical equipment, switches, lights, or other devices should be located inside a spray booth. When this is not possible, all devices should meet Class 1, Division 1 specifications of the National Electrical Code (NEC). Lights of any type should not be considered explosion proof and should be located above the booth, behind a substantial glass panel, which is sealed to prevent entry of vapors or mist at the edges. All metal parts of the booth must be electrically grounded to prevent build-up of static charges. If the ventilation system is interlocked with the spraying equipment, areas 5 feet horizontally and 3 feet vertically from all openings shall meet Class 1, Division 2 specifications of the NEC. If the ventilation system and the spraying equipment are not interlocked, then areas 10 feet horizontally and 3 feet vertically shall meet Class 1, Division 2 specifications of the NEC.

Protection

All spraying operations which use flammable or combustible materials must be protected by an automatic sprinkler system installed in the booth,

behind the filters, and in the exhaust duct. See NFPA Code #13 for details. Sprinkler head coverage should not exceed 90 square feet per head and water supply should operate at 25 p.s.i. and have a separate control valve. Sprinkler heads should be covered to prevent accumulation of overspray which could impede function. Covers can be light cellophane, polyethylene, or paper bags. If water is not available, other extinguishing systems such as dry chemical or CO₂ are acceptable if installed to code.

Training

Personnel should be instructed in the potential health and safety hazards and the safe handling of combustible materials. Further they should be instructed in operational, maintenance, and emergency procedures, and the need for constant awareness. Documentation should record the type and date of training.

That's a quick summary of some of Code #33. You should read it in its entirety. Here are a few more things to consider. No more than 60 gallons of paint should be in the booth area at one time. Booth sides should be smooth and easy to clean. Personnel should not take matches, lighters, or any spark-generating electrical devices into the area. Scraping should be done using spark-proof, non-ferrous scrapers. Consider whether masks or breathing apparatus are required for personnel. This can be the case even if non-flammable coatings are being sprayed. Test to see what the sound decibel level is in the area. Provide hearing protection that is adequate for the noise level and the amount of time personnel will be exposed. See OSHA 1915.95 for more information.

Web sites containing more useful information:

www.nfpa.org

www.epa.gov

www.osha.gov

www.paint.org

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