Spray Booth Installation

PURPOSE

The intent of this guideline is to provide the information necessary to ensure that the design and installation of spray booths will comply with the applicable provisions of the 2010 California Fire Code (CFC), the 2010 California Building Code (CBC), and locally adopted ordinances enforced by the Office of the Fire Marshal (OFM).

SCOPE

A spray booth is a mechanically ventilated appliance provided to enclose or accommodate a spraying operation, to confine and limit the escape of spray, vapor and residue, and exhausting it safely. Spray booths are manufactured or constructed in a variety of forms to control the unique hazards associated with flammable sprays and vapors.

This guideline is applicable to any spray booth in which spraying operations utilizing flammable or combustible liquids and combustible powders are conducted per CFC.

SUBMITTAL REQUIREMENTS

1. Review and Inspection Process

All new plan submittals and revisions will consist of two copies. These plans shall be drawn with all dimensions identified or drawn to scale (minimum 1/16” = 1’), and they must demonstrate compliance with the CFC, CBC, and the provisions in this guideline.

The storage, use, and handling of flammable and combustible liquids shall be in accordance with CFC Chapter 34. A chemical inventory shall be provided for OFM review. Follow the requirements contained in the OFM “Chemical Classification Packet” guideline. CFC 1503.3
Plans for the extinguishing system required in the booth shall be submitted by a licensed fire protection contractor (C-16 license) responsible for the work. CFC 1504.4

Following the plan review process, contact the OFM Inspection Scheduling office at 951-443-1029 to request an inspection to verify compliance with the approved plans, codes, and standards and to witness testing of any chemical-based fire extinguishing system.

Plan review and inspection services are provided on a fee-for-service basis. All fees must be paid at the time the project is submitted for review.

2. Permits

A permit is required for spraying or dipping operations utilizing flammable or combustible liquids or the application of combustible powders regulated by the CFC. Approved plans and signed final job card by the Perris inspector serves as the permit.

3. Submittal Requirements

A. General Requirements

1) Spray booths shall be substantially constructed of steel not less than 0.0478 inches (18 gauge) in thickness or other approved noncombustible material. CFC 1504.3.2.1

2) The aggregate area of spray booths in a building shall not exceed the lesser of 10% of the area of any floor of the building or the basic area allowed for a Group H, Division 2 occupancy, without area increases, as set forth in CFC 1504.3.2.6.

3) The area of any individual spray booth in a building shall not exceed the lesser of the aggregate size limit or 1500 square feet. CFC 1504.3.2.6

4) Spray booths shall be separated from other operations by not less than three feet, by a wall or partition, or by a greater distance as required by the OFM when specific conditions are defined. CFC 1504.3.2.5.

5) All portions of spray booths shall be readily available for cleaning, and a clear space of not less than three feet around the booth shall be kept free of storage or combustible materials. The space required for cleaning would no longer be required if the space adjacent to the wall or partition is sealed. CFC 1504.3.2.5.

6) Exit doors from pre-manufactured paint spray booths shall not be less than two feet six inches wide by six feet eight inches tall. CFC 1504.3.2.4.

7) Areas Subject to Overspray Deposits – Electrical equipment in spraying areas that is located such that deposits of combustible residues could readily accumulate shall be specifically approved for locations containing deposits of readily ignitable residue and explosive vapors. CFC 1503.2.1.4.
8) Areas Not Subject to Overspray Deposits – Electrical wiring and equipment not subject to deposits of combustible residues but located in a spraying area shall be of an explosion-proof type approved for use in a Class I, Division 1 hazardous located in accordance with the California Electrical Code (CEC). CFC 1503.2.1.2 and CEC Article 16

9) Electrical wiring, motors, and other equipment located outside of but within 20 feet of a spraying area and not separated from the spraying area by partitions shall not produce sparks under normal operating conditions. Such areas shall be considered a Class I, Division 2 hazardous in accordance with the CEC. CFC 1503.2.1

a. Class I or Class II, Division 1 Locations

1. All interior locations of spray booths and rooms except as specifically provided in Section 516-3(c) of the CEC for portable equipment.

2. All interior portions of exhaust ducts.

3. All areas in the direct path of spray operations.

b. Class I or Class II, Division 2 Locations

1. All space outside of, but within 20 feet horizontally and 10 feet vertically of, the Class I, Division 1 location for open spraying, and separated by partitions.

2. Locations outside of spraying operations conducted within a closed-top, open-face, or open-front booth or room extending from the edge of the open-face or open-front of the booth or room as follows (Figure 1).

   a. Locations measuring 5 feet horizontally and 3 feet vertically when the exhaust ventilation system is interlocked with the spray application equipment.

   b. Locations measuring 10 feet horizontally and 3 feet vertically when the exhaust ventilation system is not interlocked with the spray application equipment.

   c. Locations measuring 3 feet vertically above the booth and within 3 feet of other booth openings when spraying operations are conducted within an open-top spraying booth (Figure 2).
B. Ventilation

1) Each spray booth shall have an independent exhaust system discharging to the building exterior. CFC 1504.7.5.

2) Electric motors driving exhaust fans shall not be placed inside booths or ducts. Fan rotating elements shall be nonferrous or non-sparking or casings shall consist of or be lined with such material. Belts shall not enter ducts or booths unless belts and pulleys within a duct or booth are tightly enclosed. CFC 1504.7.7.

3) Exhaust ducts shall be constructed of steel having a thickness in accordance with California Mechanical Code (CMC) Table 5-5.
4) The termination point for exhaust ducts shall not be less than the distances shown in the following table.

<table>
<thead>
<tr>
<th>Duct Type:</th>
<th>from property line</th>
<th>from openings into the building</th>
<th>from exterior walls or roofs</th>
<th>from combustible walls or openings into the building which are in the direction of the exhaust discharge</th>
<th>above adjoining grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ducts conveying explosive or flammable vapors, fumes, or dust</td>
<td>30’</td>
<td>10’</td>
<td>6’</td>
<td>30’</td>
<td>10’</td>
</tr>
<tr>
<td>Other product-conveying outlets</td>
<td>10’</td>
<td>10’</td>
<td>3’</td>
<td></td>
<td>10’</td>
</tr>
<tr>
<td>Environmental air duct exhaust</td>
<td>3’</td>
<td>3’</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5) Exhaust ducts shall have a clearance from combustible construction or material of not less than 18 inches. CMC 506.7.1

6) When combustible construction is provided with the following protection features applied to all surfaces within 18 inches of the exhaust duct, clearances shall not be less than those indicated below: CMC 507.3

<table>
<thead>
<tr>
<th>Protection</th>
<th>Clearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.013 inch (28 gauge) sheet metal on 1/4&quot; insulating millboard</td>
<td>12 inches</td>
</tr>
<tr>
<td>0.013 inch (28 gauge) sheet metal on 1/8&quot; insulating millboard spaced out one inch on noncombustible spacers</td>
<td>9 inches</td>
</tr>
<tr>
<td>0.027 inch (22 gauge) sheet metal on 1-inch rockwool batts reinforced with wire mesh or the equivalent</td>
<td>3 inches</td>
</tr>
</tbody>
</table>

7) Clean-out openings shall be provided at intervals that allow thorough cleaning of ducts. Clean-out openings shall have tight-fitting sliding or hinged doors with metal equal to or greater than the thickness of the duct or pipe and the doors shall latch tightly. CMC 510.3.

C. Fire Protection Equipment

1) Spray booths and spraying rooms shall be protected by approved automatic fire extinguishing systems. These systems shall be extended to protect exhaust plenums, exhaust ducts, and both sides of dry filters when such filters are used. CFC 1504.4
2) If a building’s sprinkler system is monitored for waterflow by a central monitoring station and the same fire sprinkler system is used to protect the spray booth, then the valve for the sprinkler system required for the spray booth shall have a tamper switch. CFC 903.4

D. Drying Apparatus

1) The spraying apparatus, drying equipment, and ventilating system for the spray booth or spraying room shall be equipped with suitable interlocks which shall (CFC 1504.6.1.2.1):

a. Prevent the operation of spraying apparatus while drying operations are in progress.

b. Purge spray vapors from the spray booth or spraying room for a period of not less than three minutes before drying apparatus can be operated.

c. Have the ventilating system maintain a safe atmosphere within the spray booth or spraying room during the drying process and automatically shut off drying apparatus in the event of a failure of the ventilating system.

d. Automatically shut off the drying apparatus if the air temperature within the booth exceeds 200°F, when other than portable infrared drying apparatus is used.

E. Required Notes

1) Copy the OFM required notes, verbatim, on the plans (see next page).
OFFICE OF THE FIRE MARSHAL NOTES

Place all of the following notes, verbatim, on the plans:

1. City of Perris, Office of the Fire Marshal final inspection required. Please schedule all field inspections at least 48 hours in advance. To schedule inspections call (951) 443-1029.

2. Smoking shall be prohibited in spray finishing areas and in the vicinity of dip tanks. “NO SMOKING” signs shall be conspicuously posted in such areas. CFC 1503.2.6.

3. Welding warning signs shall be posted in the vicinity of spraying areas, dipping operations, and paint storage rooms with the following warning: “NO WELDING — The use of welding and/or cutting equipment in or near this area is dangerous because of fire and explosion hazards. Welding and cutting shall be done only under the supervision of the person in charge. CFC 1503.2.7.”

4. Electrical wiring and equipment shall be in accordance with CFC 15, NFPA 70, and the California Electrical Code. CFC 1503.2.1.

5. Interior surfaces of spray booths shall be smooth and continuous without edges and otherwise designed to prevent pocketing of residue, to allow free passage of exhaust air from all pockets of the interior, and to facilitate washing and cleaning without injury. CFC 1504.3.2.2.

6. Floors shall be of noncombustible material or shall be covered with a noncombustible, non-sparking material of such character to facilitate safe cleaning and removal of residue. CFC 1504.3.1.1.

7. When spray booths are illuminated, fixed lighting units that transmit light into the spray booth through heat-treated or hammered wire glass shall be used. Glass panels shall be arranged to minimize breakage and so that normal accumulation of residue on the exposed surface of a panel will not be raised to 200°F by the heat from the source of the illumination. CFC 1504.6.2.

8. Portable electric lamps shall not be used in spraying areas during a spraying operation. CFC 1504.6.2.4.

9. Metal parts of spray booths, exhaust ducts, and piping systems conveying Class I or Class II liquids shall be electrically grounded in accordance with the National Electrical Code. CFC 1503.2.5.

10. Spraying areas shall be provided with mechanical ventilation adequate to prevent the dangerous accumulation of vapors. CFC 1504.7.
11. Mechanical ventilation shall be kept in operation at all times while spraying operations are being conducted and for a sufficient time thereafter to allow vapors from drying coated articles and finishing material residue to be exhausted. CFC 1504.7.1.

12. Spraying equipment shall be interlocked with the ventilation of the spraying area such that spraying operations cannot be conducted unless the ventilation system is in operation. CFC 1504.8.

13. Recirculation ventilation systems shall have approved vapor detection systems. If the approved vapor concentration in the re-circulated air stream exceeds 25 percent of the lower flammability limit, the system shall automatically shut down the spraying operation, switch the ventilation system to 100 percent outdoor exhaust and sound an alarm. CFC 1504.7.2.

14. Ventilation systems shall be designed, installed and maintained such that the average air velocity over the open face of the booth, or booth cross-section, in the direction of airflow during spraying operations shall not be less than 100 lineal feet per minute. CFC 1504.7.3.

15. Portable fire extinguishers shall be provided for spraying areas in accordance with the requirements for an extra (high) hazard occupancy (e.g., 4-A:40-BC within 30 feet of the booth). See CFC Standard 10-1. CFC 1504.4.1 and 906.

16. Spray booths and spraying rooms shall not be alternately used for the purpose of drying arrangements which would cause a material to increase the surface temperature of the spray booth or room unless used for automobile refinishing in accordance with Section CFC 1504.6.1 and 1504.6.1.2.2.