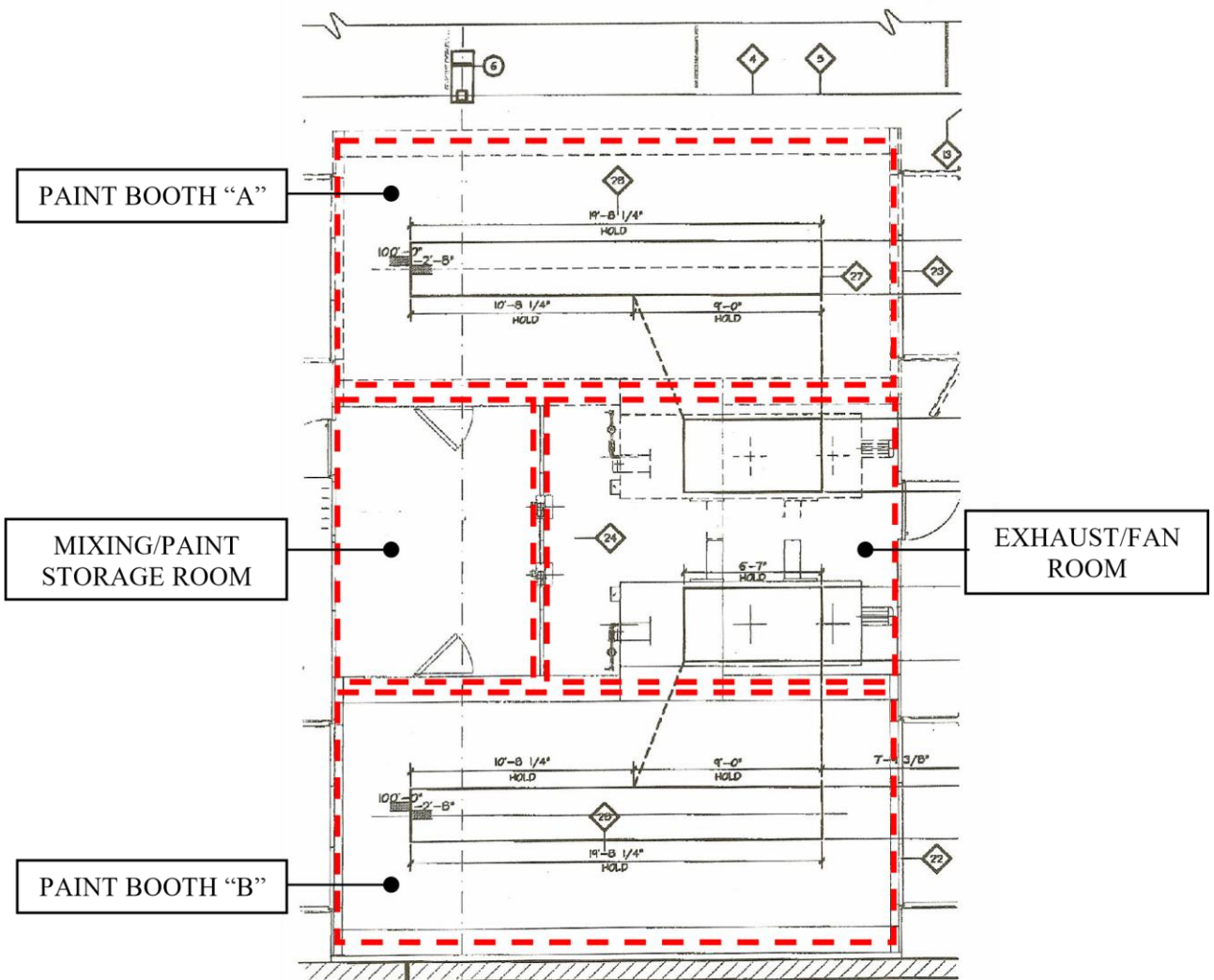


# Design Criteria for Multiple Spray Booths - Interpretation

## Purpose

Several questions have been submitted to the State Fire Marshal (SFM) Fire Protection Team regarding the design criteria for multiple attached/adjacent spray booths. The following floor plan serves as an example:



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## References to the National Fire Protection Association (NFPA) and Minnesota State Fire Code

References to NFPA 13 and 33 are the 2016 editions. Minnesota State Fire Code (MSFC) is the 2020 edition.

### Question 1: Can I use one control valve for all the sprinklers in the spray area?

**Answer:** Yes. A spray area is not the same as a spray booth; multiple booths can make up a spray area. Each booth does not need its own control valve.

- NFPA 13 Section 22.4.1.5: The sprinkler system shall be controlled by a separate, listed indicating valve(s), operable from floor level. [NFPA 33 Section 9.4.5]
- NFPA 33 Section 9.4.5: The sprinkler system shall be controlled by a separate, listed indicating valve(s), operable from floor level.

### Question 2: Do I calculate only one booth at a time or do I calculate the entire spray area as an Extra Hazard Group 2, 0.4/2000 (in this case the full 1,080 sq. ft.)?

**Answer:** Design the hydraulically most demanding single booth and associated exhaust ductwork to Extra Hazard Group 2. The single booth calculations are independent and do not have to be added to the overhead system calculations.

Attached booths with openings in common wall(s) are considered as one single booth. Example: Two booths have a common wall with a walk through opening. The door of the opening consists of strips of heavy plastic material commonly found in coolers and freezers. For calculation purposes, the entire area of both booths shall be considered as one booth. If the door of the opening is of material consistent with the remainder of the booth, for calculation purposes this would be considered as two independent booths.

- NFPA 13 Section 22.4: The automatic sprinkler system shall be designed for Extra Hazard Group 2 occupancies as defined in NFPA 13.
  - Exception 1: For spray application of styrene cross-link thermoset resins, Section 17.3 of NFPA 33 shall apply.
  - Exception 2: Automatic sprinkler systems for powder coating operations shall be designed for Ordinary Hazard Group 2, as defined in NFPA 13. [NFPA 33 Section 9.4.2]
- NFPA 13 Section 22.4.1.3 and NFPA 33 Section 9.4.3: Water supply for sprinklers shall be sufficient to supply all sprinklers likely to open in any one fire incident, without depleting the available water for use in hose streams.

**Rationale:** The paint spray booth is self-contained and fire shouldn't spread beyond the walls of the booth therefore the sprinklers likely to open in a fire incident would be confined to a single booth and associated exhaust ductwork.



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**Question 3: Assuming in Question 2, the whole area needs to be calculated; a new twist is if the booths are not attached to each other. How far apart do they need to be to become separate booths and calculated individually: 1 inch, 1 foot, 5 feet...etc.?**

**Answer:** The whole area is not required to be calculated (refer to Question 2). It is important to note that MSFC Section 2404.3.3.5 requires that booths have a 3 foot clearance.

**Question 4: Does the code actually say the sprinklers behind the filter and in the exhaust duct need to be calculated together with the sprinklers in the booth?**

**Answer:** Yes

- NFPA 13 Section 22.4.1.3 and NFPA 33 Section 9.4.3: Water supply for sprinklers shall be sufficient to supply all sprinklers likely to open in any one fire incident, without depleting the available water for use in hose streams.
- NFPA 33 Annex A.9.4: "...Because of the rapidity and intensity of fires that involve spray operations, the available water should be ample to simultaneously supply all sprinkler likely to open in one fire without depleting the available water for use by hose streams..."
- NFPA 33 Section 9.1: Spray areas, as defined in the standard, and mixing rooms shall be protected with an approved automatic fire protection system. This shall apply to both manual and automated spray application processes.
- NFPA 33 Annex A.9.1: "...Because the ductwork is part of the spray area, it must be protected in accordance with Chapter 9. This includes the ductwork from a water-wash booth..."
- NFPA 33 Section 9.3: Air make-up systems and spray area exhaust systems shall remain functioning during any fire alarm condition.

The water supply for sprinklers shall be sufficient to supply all sprinklers likely to open in any one fire incident without depleting the available water for use in hose streams. It also requires that the air make-up and spray area exhaust systems not be interlocked with the fire alarm system and remain functioning during any fire alarm condition. Because of this, an event occurring in a paint spray booth will have a strong probability of operating sprinklers on both sides of the filters. As such, all of the sprinklers involved in a paint spray booth should be treated as a single subsystem. Sprinklers inside ducts are exposed to the same conditions as the paint spray booth because of the ventilation system. The exhaust system demand shall be added to the water supply requirements of the paint spray booth.

Send any questions to [FM.Fire.Sprinklers@state.mn.us](mailto:FM.Fire.Sprinklers@state.mn.us).

