MINNEAPOLIS FIRE DEPARTMENT
FIRE PREVENTION BUREAU POLICY # 9-9
SMOKE CONTROL SYSTEMS

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ISSUE:

Smoke control systems are required in atria, fly galleries of legitimate stages and in some warehouses and factories.

CODE REQUIREMENTS:

The Minnesota State Building Code (MSBC) and the Minnesota State Fire Code (MSFC) require smoke and heat control systems for specific types of buildings or occupancy types. The codes give some detailed design and installation requirements and leave other issues to the local jurisdiction.

PROBLEM:

This policy clarifies MFD's requirements for smoke and heat control systems.

ACCEPTABLE COMPLIANCE:

Smoke control systems are to be designed and installed in accordance with the MSFC, MSBC and this policy. This policy clarifies requirements for both mechanical and passive smoke control systems.

A. *MECHANICAL SMOKE CONTROL*

An engineer's rational analysis is to be reviewed and approved by the City. After the analysis is accepted design documents are to be submitted for approval. The documents are to include all the information required by the MSBC and MSFC and the following.

1. **Smoke production calculations are to be based on the worst case scenario or the minimum design outlined in the codes, whichever is greater. The calculations are to include the following information:**
    a. **The estimated time of sprinkler activation.**
    b. **The size of the design fire at the time of sprinkler activation.**
    c. **The smoke production rate at the time of sprinkler activation.**
    d. **The height of the smoke layer above the highest floor at the time of sprinkler activation.**
2. **The smoke control operational narrative is to describe the detailed operation of the system including the control method used (pressurization, exhaust, airflow, etc.).**
3. **A fire alarm matrix showing input and output functions and the corresponding actions within the smoke control system.**
4. **Drawings with floor plans indicating areas served by the smoke control system, locations of fans and dampers, location of the fire fighter control panel.**

A. *Mechanical Smoke Control* (Continued)

5. A fire fighters control panel (see policy #9-10) is required for manual control of smoke control systems in atria and high-rise buildings.

6. System approval:

a. The design engineer is to submit test documents and special inspection reports indicating that the system was installed as designed and operates properly.

b. MFD will witness an operational test of the system.

B*. Passive Smoke Control*:

Passive or gravity smoke control is only to be used were acceptable in the MSBC or MSFC (stage fly galleries, warehouses, factories, etc.). The design and installation of the devices are to meet the prescriptive requirements of the code. Acceptance testing: All devices are to be tested by non-destructive means to assure proper operation.

C*. Additional Requirements for Mechanical Warehouse Smoke Control*.

1. The system is to be designed to exhaust air at a greater volume than the rate of smoke production at the time of sprinkler activation and provide at least two air changes per hour.

2. Exhaust fans are to be evenly distributed throughout the area served by the system. There is to be at least one fan for each 20,000 square feet of floor area.

a. Each fan is not to exceed 30,000 cfm capacity.

b. When smoke control fans are also used for environmental purposes, they must automatically shutoff on detection of smoke at the unit and on activation of the sprinkler system.

c. There is to be an on/off override switch for each fan.

3. Make-up air is to be provided as outlined in the MSFC.

Acceptable openings:

a. Man doors openable from the exterior.

b. Louvers in sidewalls automatically opened or openable from the fire command room.

Note: Overhead doors are not acceptable.

4. All equipment, wiring, controls, etc. are to meet the requirements of the MSFC.

5. The system is only to be activated manually (no automatic operation) from a control panel located at an approved location.

6. The following are to be clearly labeled: Door to the fire command room; control panels and switches; keys.

7. A fire department key box is to be provided and contain keys necessary to gain access and operate all equipment and make-up air sources.

D. *System Approval and Acceptance*

1. **The system design is to be approved by the Minneapolis Department of Inspections Mechanical Division and the Minneapolis Fire Department Fire Prevention Bureau. The design documents are to include maintenance and post acceptance periodic testing schedules and methods.**
2. **When required, the installation of the system components is to be supervised by an approved special inspector.**
3. **The special inspector/fire protection engineer is to provide written documentation that the system operates as designed.**
4. **An acceptance test is to be witnessed by MFD FPB personnel.**