

FIRESAFETY

CONSIDERATIONS FOR HEATING, VENTILATING, AND AIR CONDITIONING SYSTEMS

CONTENTS	PAGE
1. GENERAL	1
2. ASSOCIATED PARACTICES	2
3. DUCT SYSTEMS	2
4. DUCT ENCLOSURES AND FIRE DAMPERS.....	2
5. AIR HANDLING, COOLING, AND HEATING EQUIPMENT ROOMS	3
6. AIR FILTERS.....	3
7. ELECTRIC WIRING AND EQUIPMENT	5
8. CONTROLS.....	5
9. ALARMS.....	6
10. SMOKE CONTROL/VENTING	6
11. COOLING TOWERS	6

1. GENERAL

- 1.01 This section provides fire safety considerations for HVAC systems.
- 1.02 This section is being reissued to reflect the most recent refinements of the Fire Safety Practices. Revision arrows are used to identify the revised paragraph(s).
- 1.03 The recommendations in this section are based, in general, on the Fire Codes of the National Fire Protection Association (NFPA) and the Model Building Codes. Since many detail features of these source documents have not been covered herein, they should be reviewed for complete details.

* * Reprinted to comply with modified final judgment.

- 1.04** Where local, state, or Occupational Safety and Health Act (OSHA) regulations require higher degrees of protection, the legislated measures should be followed.

2. ASSOCIATED PRACTICES

- 2.01** Support information for this general area may be found in the following sections.

- (a)** Glossary of fire safety terms in Section 760-600-110
- (b)** Ventilation of building mechanical equipment areas and power rooms is covered in Section 760-550-151.
- (c)** Fire protection compartmentation considerations in Section 760-630-400
- (d)** Kitchen and cafeteria ventilation considerations in Section 760-610-300.

3. DUCT SYSTEMS

- 3.01** All ductwork shall be constructed of class I material (flame spread less than 25 and smoke generation less than 50). The use of sealed fibrous glass ductwork shall be considered only for the horizontal distribution ducts in nonequipment spaces. ç
- 3.02** Shafts used as vertical air ducts are acceptable if constructed of masonry or other material which conforms to the following:
- (a)** Having a fire-resistance rating of at least 2 hours
 - (b)** Completely lined with sealing material to make them airtight throughout
 - (c)** There shall be no piping, electrical conduit, cabling, exhaust pipes, or fuel piping installed in these ducts if they are conveying fresh air, supply air, or recirculated air.
- 3.03** Duct insulation, lining materials, or adhesives should be limited to those materials with a flame-spread rating not over 25 and a smoke developed rating not higher than 50.
- 3.04** Duct installation shall not extend through walls or floors required to be firestopped. Duct linings shall be interrupted at fire dampers and access doors. Duct insulation and linings shall also be interrupted in the immediate area of operation of heat sources in a duct. At each interruption, exposed edges should be sealed with proper adhesives.

4. DUCT ENCLOSURES AND FIRE DAMPERS

- 4.01** In order to preserve the fire integrity of rated partitions and floors, it is necessary to provide listed fire damper assemblies when penetrating these rated assemblies.
- 4.02** Duct systems should be designed to avoid or minimize the piercing of fire walls, stairs, or horizontal exit enclosures.

- 4.03** Fire dampers shall be listed or built in accordance with UL555 requirements. Fusible links shall have a temperature rating approximately 50 F above maximum temperature that would normally be encountered with the system in operation or shut down, but not less than 165 F.
- 4.04** There shall be a hinged, or easily removable, access door for each fire damper. The door should be in a good location and proportioned to allow for easy access to the damper for service and inspection.
- 4.05** Fire dampers are required at the following locations:
- (a) Where a duct passes through a 2-hour fire rated wall or rated partition.
 - (b) At each floor penetration regardless of floor rating.
 - (c) At each opening in a vertical shaft enclosure except for exhaust ducts which are carried up at least 22 inches inside the shaft enclosure.
 - (d) Where a duct terminates at an opening (such as a return grille) in a partition having a required fire resistance rating of 1 hour.
 - (e) Where serious exposure hazards exist on fresh air intakes. See Section 760-630-100, Protection Against Exposure Fires. Every effort should be made to select locations of fresh air intakes to minimize such exposure hazards.
 - (f) See Fig. 1 for an illustration of typical fire damper locations. See Fig. 2 for typical fire damper installation.
- 4.06** A test shall be made of all fire dampers to assure proper operation, accessibility, and construction before final acceptance.
- 4.07** The use of fire dampers in fire-rated door assemblies is not recommended.

5. AIR HANDLING, COOLING, AND HEATING EQUIPMENT ROOMS

- 5.01** Air Handling Equipment: For recommended enclosures, refer to Section 760-630-400, Compartmentation.
- 5.02** Refrigeration Equipment: Equipment using group I refrigerant, R-11, 12, 22, and 113 (ANSI B9.1 Safety Code for Mechanical Refrigeration) may be installed in the same room as the fan equipment.
- 5.03** Boilers: Boilers must be within a separate room, independent of the fan rooms, except small installations using self-contained burning and fan equipment.

6. AIR FILTERS

- 6.01** Air filters shall be approved types that will not burn freely or emit large volumes of smoke or other objectionable products of combustion when attacked by flames. Filters qualifying as class I or class II should be accepted as meeting these requirements:

Class I: When clean, does not contribute fuel when attacked by flame and emits only negligible amounts of smoke when tested by the Standard for Air Filter Units (UL 900).

Class II: When clean, burns moderately when attacked by flames or emits moderate amounts of smoke, or both when tested by the Standard for Air Filter Units (UL 900).

6.02 For additional information on filters, refer to Section 760-555-150, Atmospheric Environment for Telephone Equipment Space.

7. ELECTRIC WIRING AND EQUIPMENT

7.01 Electric wiring and equipment shall be installed in accordance with the National Electrical Code (NFPA 70). Lamps within the plenums of the conditioning system shall be enclosed gasketed-type fixtures of the marine (vapor-tight) type.

8. CONTROLS

8.01 Manual Shutdown: Each system should be equipped with a manual emergency stop located at an accessible point for quick shutdown of the fans in case of an emergency.

8.02 Automatic Shutdown: In systems with 2,000 to 15,000 CFM capacity, all fans shall be arranged to shutdown automatically when the temperature of the air in the system becomes excessive as from a fire. For this purpose, approved fixed temperature thermostatic devices (firestats) shall be provided in each of the following locations:

(a) With a setting not in excess of 136 F at a suitable location in the return

(b) With a setting not in excess of 50 F above the maximum operating temperature at a suitable location in the main supply duct on the downstream side of the filters.

Each firestat shall be of a type that is manually reset or the control system shall be arranged so that some manual operation is required to restart the fan after the firestat has operated. Smoke detectors approved for duct installation may be substituted for firestats. See Fig. 3 for typical installation details.

8.03 In systems of over 15,000 CFM capacity, smoke detectors approved for duct installations shall be installed and arranged to automatically shut down fans. See Fig. 3 for typical installation details. Smoke detectors approved for duct installation shall be provided as follows:

(1) In systems which have outside air capability, detector(s) shall be located in the main supply duct downstream of the filters.

(2) In systems normally utilizing recirculated air, the detectors shall be located in the return air stream (prior to mixture with outside air) and in the main supply duct downstream of the filters.

(3) In multistory buildings having central air handling systems, additional smoke detectors shall be located at the connection to the return air shaft at each floor. Smoke dampers shall be installed in these systems to restrict gravity circulation of smoke. They shall be arranged to close automatically when the system is not in operation or is shutdown by operation of the smoke detecting apparatus.

9. ALARMS

- 9.01 Duct Detectors:** Duct detectors shall be wired into the detection system. When alarmed, the fan system shall shut down and the alarm shall appear at the control panel identifying the fan system which is under alarm.

10. SMOKE CONTROL/VENTING

- 10.01** For information concerning smoke control, refer to Section 760-640-100.

- 10.02** For information concerning smoke control, refer to Section 760-640-110.

11. COOLING TOWERS

- 11.01** New cooling towers should be built of noncombustible materials and contain noncombustible fill. In those existing cooling towers constructed of noncombustible materials and/or containing combustible fill, consideration should be given to providing a deluge sprinkler system based on the evaluation and design guidelines outlined in NFPA 214.

