CHAPTER XI
FIRE CONTROL AND FIRE DAMPERS
(based on NFPA Pamphlet No. 90A, Uniform Mechanical Code and the N. C. Building Code)

1100—SCOPE

This chapter of the code applies to fire dampers, and fire assemblies in duct systems.

1101—ILLUSTRATIONS of Dampers and Installations may be found in APPENDIX "G".

1102—PROTECTION OF VERTICAL OPENINGS OR SHAFTS
(Based on N. C. Building Code)

(a) GENERAL

Openings in all shaft enclosures shall be limited to those absolutely necessary for the purpose of the shaft and shall be protected with approved fire doors, fire shutters, or fire windows (See Section Below).

(b) APPROVED TYPES OF FIRE WINDOWS, FIRE DOORS, AND FIRE SHUTTERS

Fire windows, fire doors and fire shutters shall be deemed approved if satisfactory evidence is given that they have successfully passed a fire test as specified in this section, conducted by an accredited laboratory, provided a test report is filed with the Building Official from such accredited laboratory. Every fire window, fire door and fire shutter shall bear the label or identification of an approved testing agency showing the classification.

(c) FIRE TESTS OF PROTECTIVE DOOR OR SHUTTER ASSEMBLIES

Tests of opening protective assemblies shall be made upon complete full size assemblies, except that in any case the assembly need not exceed one hundred eight (108) Sq. Ft. in area, constructed and installed in all essentials as in actual service and subjected to a fire on one side continuously for periods in accordance with the time-temperature curve of the standard fire test specifications prescribed in Section 601 (ASTM "Standard Methods of Fire Tests of Building Construction and Materials" (E119-61).

Opening protective assemblies tested to establish a fire-resistive rating (one hour or more) shall be subjected to a hose stream test conducted in accordance with the standard ASTM fire test specifications, "Fire Tests of Door Assemblies, E152-58."

The duration of the fire test shall be as follows:

For fire doors required in fire walls or 4-Hr. fire-resistive walls or partitions	3-Hrs.
For fire doors required in 3-Hr. fire-resistive walls or partitions	1½-Hrs.
For fire doors required in 2-Hr., or less, fire-resistive walls	1-Hr.
For fire shutter assemblies	¾-Hr.

When two fire door assemblies each of which has been accepted for a one and one-half (1½) hour fire-resistance rating, are installed on two (2) sides of the same opening, such combined assembly shall be accepted as having a 3-hour fire-resistance rating. Similarly, two door

assemblies each having a three-quarter (¾) hour rating, shall be accepted as having a one and one-half (1½) hour rating.

Exception: Required exits through fire walls in Group C, D, and E occupancies may be 1 Hr.

1103—FIRE SHUTTERS (No restriction on heat)

Tests of fire shutters to be successful shall meet the requirements for fire doors except that no restriction shall be made as to the amount of heat transmitted through the shutters.

1104—FIRE SHUTTERS (Swinging type)

(a) When equipped with fire shutters of the swinging type, at least one in every three openings facing a street in each story shall have such shutters arranged to be readily opened from the outside. Distinguishing marks shall be provided on these shutters.

(b) Fire shutters of the rolling type shall be carefully counter-balanced and so arranged that they can be readily opened from the outside.

1105—OPENINGS IN STAIRWAYS OR SHAFTWAYS

Shaft walls or enclosures of vertical oqenings shall have no openings other than such as are necessary for the purpose of the shaftway; all openings in shafts shall be protected with approved fire doors, approved fire shutters or approved fire windows.

1106.0—VENTILATION REQUIREMENTS FOR STAGE AND FOR PROJECTION BOOTH—FANS, ETC. . . .

Refer to Section 1508.0 Chapt. XV.

1107.0—DAMPERS

Based on the National Fire Protection Association Pamphlet No. 90A

(a) SCOPE

This Standard applies to fire dampers and fire assemblies in duct systems.

(b) PROVISIONS FOR DUCTS THROUGH AREA SEPARATION WALLS

The passing of ducts through area separation walls shall be avoided wherever possible. When ducts or the outlets from or inlets to them pass through area separation walls, they shall be provided with an approved automatic fire assembly on both sides of the walls through which they pass. On small openings not exceeding eighteen inches (18") in diameter, three-eights-inch (⅜") steel plates may be used in lieu of a fire assembly. Hand hole openings shall be provided to make all fire dampers in ducts accessible for inspection and servicing.

(c) SPECIFICATIONS FOR FIRE DAMPERS

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Fire dampers shall be No. 16 U. S. gage steel in ducts to eighteen inches (18") in diameter or greatest width, No. 12 U.S. gage on diameters up to thirty-six inches (36") or greatest width and No. 7 U.S. gage on ducts above thirty-six inches (36") in diameter or greatest width. Louvered type fire dampers may be constructed of No. 18 U.S. gage steel, provided the individual louvers are not over six inches (6") in width and are stiffened by formed edges. One-half-inch (½")

approved rigid asbestos sheet material may be used at points where steel dampers are specified, when permission of the Building Official is granted.

Fire dampers shall carry the UL Label, or be UL Listed or be part of an assembly having the required hourly rating of UL tests, and installed in accordance with the listing.

Refer to Appendix G —FIRE DAMPER GUIDE

(d) OPERATION

Fire dampers shall be arranged to close automatically and remain tightly closed, upon the operation of an approved fusible link or other approved heat actuated device located where readily affected by an abnormal rise of temperature in the duct. Fusible links shall have a temperature rating approximately 50 degrees F. above the maximum temperatures that would normally be encountered with the system in operation or shut down. Hinged dampers shall be equipped with spring catches and pins of hinges shall be of corrosion-resistant material.

(e) INSTALLATION OF APPROVED FIRE DAMPERS

Approved fire dampers shall be installed in the following locations:

(1) OCCUPANCY SEPARATIONS. In ducts piercing occupancy separations. N.C. Building Code, Volume I, Section 412.

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(2) CEILING PROTECTION. In ducts piercing ceilings providing fire resistive protection to structural members. N.C. Building Code, Volume I A.

(3) CORRIDOR PROTECTION. In ducts piercing corridor walls required to be of fire-resistive construction. N.C. Building Code, Volume I, Section 1104.7.

(4) SERVING TWO OR MORE FLOORS. Where duct systems serve two or more floors, approved fire dampers shall be required either at each direct outlet or inlet and in each branch duct at its junction with the main vertical duct, or at each point where a floor is pierced. Dampers are not required at room openings in branch ducts. Dampers are not required in branch ducts having a cross-sectional area of less than twenty-square inches (20 sq. in.) which supply only air conditioning units discharging air at not over four feet (4') above the floor. Dampers may be omitted in small buildings with unprotected floor openings subject to approval by the Building Official.

(5) IN SYSTEMS OF OVER 15,000 CUBIC FEET. In systems of over 15,000 cubic feet per minute capacity, serving areas where large numbers of people congregate or areas having valuable contents particularly subject to smoke damage, except when system is located on the same floor that it serves, it is recommended that approved smoke dampers be installed in the main supply duct and main return duct. Such dampers should be arranged to close automatically when the system is not in operation and also by the operation of the smoke detecting apparatus or by the manual emergency motor stop.

(6) EXHAUST OF AIR TO OUTSIDE. Fire dampers provided in ducts used solely for exhaust of air to the outside, shall be installed in such a way that they will not interfere with the flow of air in the main duct. No dampers are required in a system serving only one floor and used only for exhaust of air to the outside. Dampers should be designed to close in the direction of air flow.

Where direction of exhaust air flow is upward, subducts at least twenty-two inches (22") in length may be carried up inside the air duct from each inlet, in lieu of dampers.

(7) ALUMINUM DUCTS. Aluminum ducts which pass through fire-resistive floors, unless incased,* shall have approved automatic fire-dampers at the floors.

*** Ducts which pass through floors of "fireproof construction," "semi-fireproof construction" or heavy timber construction, in which vertical openings are generally protected, shall be incased in four-inch (4") hollow clay tile, four-inch (4") gypsum block or their equivalent. Such construction, however, shall not be required for branches which are cut off from the main portion of the duct by approved fire dampers.**

(f) FRESH AIR INTAKES

Fresh air intakes shall be protected with approved automatic fire dampers except where permission to omit them, because of light exposure, is granted by the Building Official. When deemed necessary by the Building Official approved heat-actuated devices shall be installed at intake openings to shut fans down in case of exposure fires.

(g) PROTECTIVE ARRANGEMENT

Fire doors at openings through area separation walls and fire dampers at fire partitions shall be so arranged that the disruption of the duct will not cause failure to protect the opening.

Note: This may be accomplished by locating the fire door or damper in a collar securely fastened to the wall.

(h) The designer of the air duct system shall show on the plans, the location of all fire doors, fire dampers and any smoke detection equipment. This is quoted from Section 906 of NFPA Standard 90-A.

See additional information and illustrations in Appendix "G".

1108—SMOKE DETECTORS FOR THE FIRE PROTECTIVE SIGNALING SYSTEMS

(a) Smoke detector shall be UL listed, UL labeled, or carry an approval by an independent testing agency equal to UL.

(b) A detection system for smoke and combustible vapors operating upon the ionization principle activated by the presence of combustible gases, is acceptable, if UL or Factory Mutual approved.

6-11-74 Note - Refer to Section 1127, Vol. I for requirements as to where smoke detectors shall be provided

1109—FIRE PROTECTION COMPLIANCE

Sprinkler design shall comply with NFPA Bulletins No. 13, No. 13E and No. 13L. Maintenance of sprinkler systems shall comply with NFPA No. 13A. Foam-water sprinkler and spray systems shall comply with NFPA No. 16. Standpipe and hose systems shall comply with NFPA No. 14 and No. 23. Sprinklers and standpipes shall comply with Chapter IX of the N. C. Building Code, page 9-1.

New heating and air-conditioning projects and any alterations to existing installations (beyond maintenance and repair) shall be governed by this code, and the NFPA bulletin applicable.

(e) INSTALLATION OF APPROVED FIRE DAMPERS

Approved fire dampers shall be installed in the following locations:

(1) **OCCUPANCY SEPARATIONS**—In ducts or openings piercing occupancy separations of 2 hours or more as required by Vol. I, N. C. State Building Code, Sec. 412.

(2) **CEILING PROTECTION**—When dampers are selected as the means of protecting the opening. (See specific designs in U.L. Fire Resistance Index, and alternate methods approved for use.)

(3) **WALLS AND PARTITIONS, INCLUDING SHAFT WALLS**—Penetrations of enclosures required by this Code or Volume I of N. C. State Building Code to have fire resistance ratings as follows:

A. 2-hours or more (not fire walls). All such penetrations.

B. 1-hour. As follows:

(1) Air transfer openings not protected by proper ducts, as defined in (3) below.

(2) Air transfer openings, with or without proper ducts, in enclosures for exits and for boilers and furnaces where the enclosures are required by this Code or by Volume I, N. C. State Building Code.

(3) Proper ducts, as used above, shall mean:

(a) Sheet steel ducts meeting the requirements of Chapter VI .

(b) Protection of the opening by having not less than ½" clearance of the duct from combustible material, sealing the clearance space with non-combustible material retained, and the duct secured in the opening, by steel collars of a gage equivalent to that of the duct and fastened to both the duct and the enclosure, or other approved method affording equivalent protection."