

# Statement of Conditions

*Prepared for :*



*Thomas J. Donnelly, Inc.*

**By:**

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## **Thomas J. Donnelly, Inc.**

Named in honor of the family patriarch, Thomas J. Donnelly, Inc. began in 1972 as North Shore Insulation, a commercial heat and frost insulation company. For the past 30 years we have been a subcontractor to the New York metropolitan areas top mechanical contractors, working in both the private and public sectors. Our projects include commercial, residential, and Industrial buildings, waste water treatment and power generating plants, healthcare facilities and educational institutions. Responding to the needs of the construction and Life Safety industries, Thomas J. Donnelly, Inc. has become the tri-State areas premier Firestop Specialty Contractor. A member of the Firestop Contractors International Association we are an Accredited Firestop Specialty Contractor versed in the latest building codes, specifications, and product applications. We are certified by the American Society of Healthcare Engineers (ASHE) to perform work in healthcare facilities and a New York City School Construction Authority qualified contractor. At Thomas J. Donnelly, Inc. our commitment to "Life Safety" will help to ensure the protection of your property and the well-being of your staff.

# History of Firestopping

Most people believe the firestopping impetus came about as a result of the disastrous MGM Grand Hotel fire in Las Vegas, Nevada in 1980. In that fire, which started in a kitchen area on the main floor lobby, 85 lives were lost. The majority of the casualties, 79 people, were found dead between the 21<sup>st</sup> and 26<sup>th</sup> floors of the building. Although the fire never left the first floor, the majority of the loss of life was due to asphyxia when the smoke and gas had traveled through unprotected construction joints, penetrations, and shaftways. Had the construction been subjected to today's standards, most, if not all the lives lost, could have been prevented.

In fact, passive fire protection firestopping has been around since World War II, when naval vessels used it as a way of "compartmentalizing" fire due to accident or attack. Then in the 1950's, the insurance industry, led by Factory Mutual in an effort to isolate multi-million dollar equipment, introduced separations in industrial plants to limit property loss in case of fire. Firestopping was developed to maintain the integrity of these compartmentalized areas.

Modern day firestopping was instituted into the building codes in 1980 to restrict the mobility of flame, smoke, and gasses within a building with concern for both life and property. Firestopping is a highly specialized trade requiring a responsible approach to ensure that installations are performed correctly to avoid loss of both life and property. Firestopping is as important as a sprinkler system, fire extinguisher or your local fire department because it allows you more time to get out and more time for rescue workers to get in. Not done correctly, firestopping raises the liability of the General Contractor, Construction Manager and Building Owner.

# Glossary Of Terms

- **FIRESTOPPING** is the assemblage of specially designed materials into an opening of a fire separation ( floor, ceiling, or wall) that could allow fire or smoke to pass to any other part of the building or to the interior of an adjoining fire separation area. Firestopping is commonly needed at such as areas as mechanical, plumbing, electrical penetrations, top of wall, perimeter edges, and expansion construction joints. Firestopping products vary in materials and applications, but most are caulk or spray applied.

**FIREPROOFING** is the application of fire retardant cementitious, fibrous, or intumescent products to bare, unprotected structural beams, columns, or decks of a building.

**Ablative Char**: Certain firestop materials form a "char" with thermal insulation characteristics, which helps fill voids when exposed to heat.

- **Approved Methods**: A term used to refer to the through-penetration firestop systems that have been tested and meet test criteria of ASTM E 814 by an independent, recognized laboratory. Additionally, an authority having jurisdiction may also make specific product evaluation and determine compliance with appropriate standards. Products alone are not tested systems or approved firestop methods unless tested to ASTM E 814 and classified for use in the specific application.
- **Authority Having Jurisdiction**: The final authority who writes the "Certificate of Occupancy Permit" in a municipality. This can be the building code official/inspector or fire inspector. Since each municipality is different, the "authority having jurisdiction" may also be different from town to town. Check with local officials to verify who has final jurisdiction. Industrial facilities and hospitals may have other "jurisdictions".

# Glossary of Terms

(continued)

- ASTM 119: Fire test method, "fire Tests of Building Construction and Materials", conducted to evaluate the ability of a fire-resistive floor or wall assembly to perform its barrier function, resisting the passage of heat, flames, hot gasses, and smoke in a fire situation
- ASTM E 814: Fire tests of through-penetration of firestops or ASTM E 814 is the complementary test to ASTM 119 that evaluates penetrations through a tested, fire-resistive (ASTM E 119 tested) wall or floor assembly. The test involves a standard time-temperature curve, a hose stream test and assigns ratings based on "T" ( temperature rise) and "F" ) flame occurrence through the firestop/penetration ). The objective of specifying this type of system is to return the floor or wall to the compartments original fire rating. An "L" ( air leakage ) rating can also be assigned. Air leakage simulates smoke movement through a penetration, measured in cubic feet per minute for authorities having jurisdiction to make judgments.
- Annular Space: The distance from the inside edge of an opening ( floor/wall ) to the outside of the penetrating item.
- Building Codes: Model building codes are adopted by each municipality from the major code organizations. The major code authorities are BOCA ( Building Officials and Code Administrators) primarily in the Midwest, ICBO (International Council of Building Code Officials) in the west and Indiana, and SBCCI (Southern Building Code Congress, International) in the South. The local municipality or state can choose which major building code is adopted, or can adopt its own.

# Glossary of Terms

(continued)

- **Elastomeric:** A characteristic of a material that is flexible and permits movement.
- **Endothermic:** A characteristic of a material that blocks heat by chemical absorption and moisture release for fire resistance.
- **Engineering Judgments:** To meet actual field conditions, Manufacturers may need to make a recommendation based on available testing that seems to approximate the condition encountered. Testing laboratories should verify judgments by manufacturers for validity. Some jurisdictions only allow judgments if there is no tested system available for the condition.
- **Forming Materials:** Materials used under or beside a firestop system to either hold the system in place during application, improve fire resistance, or both. Mineral wool, ceramic fiber, and other materials are used. Consult the manufacturers specific tested system data for type, thickness, and density of material allowed.
- **"F" Rating:** A rating usually expressed in hours indicating a specific length of time that a fire-resistive barrier can withstand fire before being consumed or before permitting the passage of flame through an opening in the assembly.
- **"T" Rating:** A rating usually expressed in hours indicating the length of time that the temperature on the non-fire side of a fire-rated assembly does not exceed 325 degrees F above ambient temperature. As the tested method.
- **"L" Rating:** Amount of air leakage through a penetration, measured in cubic feet per minute. The test is administered at ambient and 400 degrees F for validity due to variances in performance of firestop systems at different temperatures.

# Glossary of Terms

(continued)

- **Intumescence:** A characteristic of certain fire barrier products that, when exposed to heat, expands to fill a void in the penetration caused by the deformation or combustion of the through penetrating item. When exposed to heat, intumescent materials expand at various rates to form a hard char to seal voids and provide hourly rated protection.
- **Latex:** A water emulsion of a synthetic rubber material that is manufactured to a sealant.
- **NFPA:** National Fire Protection Association, based in Quincy, Massachusetts, author of "Life Safety Code."
- **Restricting Collar:** A metal device supplied by the firestop system manufacturer to mount firestop from the outside or underside of a penetration.
- **Sleeves:** Sleeves, as required, must be part of the tested system or approved for use by their manufacturer of the firestop system.
- **Through Penetration Firestop System:** A specific field erected construction consisting of an assemblage of materials to prevent the spread of fire through openings made in floors or walls to accommodate through penetrating items, (i.e. pipes, electrical conduits, blanks, etc.) using ASTM E 814 (Test Standard UL 1479) as the test method.
- **Z Clips:** Z-shaped clips that support a firestop wrap strip material in a firestop system, sometimes without mineral wool forming.
- **Pullout Strength:** Firestop systems that need to be fastened to walls and floors will specify a fastener pullout strength minimum value. Additionally, there are requirements for the type of fastener, usually carbon or stainless steel. Lead, aluminum, and others may melt and not function properly under fire conditions.

# Glossary of terms

(continued)

## ■ IBC DEFINITIONS

- . *The following are additional terms defined by the International Building Code*

- **Building Separation Wall:** A fire-resistance rated wall, having protected openings, which restricts the spread of fire and extends continuously from the foundation to or through the roof.

- **Draft Stop:** A material, device, or construction installed to restrict the movement of air within open spaces of concealed areas of building compartments such as crawl spaces, floor-ceiling assemblies, and roof-ceiling assemblies and attics.

- **Fireblocking:** Building materials installed to resist the free passage of flame and gasses to other areas of the building through small concealed spaces.

- **Fire Area:** The aggregate floor area enclosed and bounded by building separation walls, fire barrier walls, exterior walls, or fire resistance rated horizontal assemblies of a building.

- **Fire Barrier Wall:** A fire resistance rated assembly of materials having protected openings which is designed to restrict the spread of fire.

- **Fire Damper:** A device, installed in an air distribution system, designed to close automatically upon detection of heat, to interrupt migratory airflow, and to restrict the passage of flame A combination fire and smoke damper meets the requirement of both.

- **Fire Door Assembly:** Any combination of a fire door, frame, hardware, and other accessories that together provide a specific degree of fire protection to the opening.

# Glossary of Terms

(continued)

- **Fire Door:** The door component of a fire door assembly.
- **Fire Partition:** A vertical assembly of materials having protected openings and designed to restrict the spread of fire.
- **Fire Resistance:** That property of materials or their assemblies which prevents or retards the passage of excessive heat, hot gasses, or flames under conditions of use.
- **Fire Resistance Rating:** The period of time a building or building component maintains the ability to confine a fire or continues to perform a given structural function or both, as determined by tests described in Section 703.
- **Membrane Penetration:** An opening made through one side ( wall, floor, or ceiling membrane ) of an assembly.
- **Membrane Penetration Firestop:** A material, device, or construction installed to resist, for a prescribed period of time, the passage of flame, heat, and hot gasses through openings in a protective membrane in order to accommodate cables, cable trays, conduit, tubing, or pipes.
- **Penetration Firestop:** A through-penetration firestop or a membrane penetration firestop.
- **Self-Closing:** As applied to a fire door or other opening, means equipped with an approved device that will ensure closing after having been opened.
- **Shaft:** An enclosed space extending through one or more stories of a building, connecting vertical openings in successive floors, or floors and roof.
- **Fire Resistive Joint System:** An assemblage of specific materials or products that are designed, tested, and fire rated in accordance with ASTM E 119 to resist, for a prescribed time period, the spread of fire through joints made in or between fire rated assemblies.

# Glossary of Terms (continued)

- **Fire Separation Distance:** The distance in feet measured from the building face to the closest interior lot line, to the centerline of a street, alley, or public way, or to an imaginary line between two buildings on the property.
- **Fire Separation Wall:** Same as "fire barrier wall". Traditional term replaced by " building Separation wall ".
- **Fire Wall:** Same as " fire barrier wall ". Traditional term replaced by " building separation wall " .
- **Smoke Barrier:** A smoke barrier consists of walls, partitions, floors, and openings therein as will prevent the transmission of smoke or gasses through the construction.
- **Smoke Compartment:** A smoke compartment is a space within a building enclosed by smoke barriers on all sides, top and bottom.
- **Splice:** The result of a factory and or field method of joining or connecting two or more lengths of a fire-resistive joint system into continuous entity.
- **Fire Window:** A window constructed and glazed to give protection against the passage of fire.
- **Joint:** The linear opening in or between adjacent fire-resistance rated assemblies that is designed to allow independent movement of the building, in any plane, caused by thermal, seismic, wind loading, or any other loading.
- **Through-Penetration:** An opening that passes through an entire assembly.

# Codes and Standards

## 1994 and 1997 Uniform Building Code

### 1994 UBC

#### Sec. 4308 Through-Penetration Fire Stops

#### Sec. 4308 Through-Penetration

#### General Sec. 4301

(A) **Standards of Quality.** In addition to all other requirements of this code, fire-resistive materials shall meet the requirements for fire-resistive construction given in this chapter.

The standards listed below are labeled a " U.B.C. Standard".

U.B.C. Standard No. 43-1, Fire Tests of Building Construction and Materials.

U.B.C. Standard No. 43-2, Fire Tests of Door Assemblies.

U.B.C. Standard No. 43-3, Tinclad Fire Doors.

U.B.C. Standard No. 43-4, Fire Tests of Window Assemblies.

U.B.C. Standard No. 43-7, Fire Dampers.

U.B.C. Standard No. 43-8, Thickness and Density Determination for Spray Applied Fire Proofing.

U.B.C. Standard No. 43-9, Methods for Calculating FireResistance of Steel, Concrete, Masonry, and Wood Construction.

# Codes and Standards (continued)

**(B) Definitions:** "F" Rating is the time period that a through-penetration fire stop limits the spread of fire, smoke, and hot gasses, through the fire stop assembly, including penetrating elements, when tested in accordance with the time-temperature curve defined in U.B.C. Standard No. 43-1.

"T" Rating is the time period that a through-penetration fire stop limits temperature rise through the fire-stop assembly, including penetrating elements, when tested in accordance with the time-temperature curve defined in U.B.C. Standard No. 43-1.

## **Walls and Partitions**

### **Sec. 4304**

- (A) General.** Fire-resistive walls and partitions shall be assumed to have the fire-resistance ratings set forth in table No. 43-B.
- (B) Combustible Members.** Combustible members framed into a wall shall be protected at their ends by not less than one half the required fire-resistive thickness of such wall.
- (C) Exterior Walls.** In fire-resistive exterior wall construction, the fire-resistive rating shall be maintained for such walls passing through attic areas.
- (D) Nonsymmetrical Wall Construction.** Walls and partitions of nonsymmetrical construction shall be tested with both faces exposed to the furnace, and the assigned fire-resistive rating will be the shortest duration obtained from the two tests conducted in conformance with U.B.C. Standard No. 43-1. When evidence is furnished to show that the wall was tested with the least fire-resistive side exposed to the furnace, subject to acceptance of the building official, the wall need not be subjected to tests from the opposite side.

# Codes and Standards

(continued)

**(E) Through-Penetration.** Penetrating items passing entirely through both protective membranes of bearing walls required to have a fire-resistance rating and walls requiring protected openings shall be protected with through-penetration fire stops suitable for the method of penetration.

***EXCEPTION:*** Penetrations not larger than 4-inch nominal pipe or 16 square inches in overall cross-sectional area containing noncombustible penetrating items, where the annular space between the penetrating items and the wall assembly being penetrated is filled with a material which will prevent the passage of flame and hot gasses sufficient to ignite cotton waste when subjected to U.B.C. Standard No. 43-1. Time-temperature fire conditions under a minimum positive pressure differential of 0.01 inch water column at the location of the penetration for the time period at least equal to the fire resistance rating of the wall assembly.

The "T" rating for through-penetration fire stops in fire rated walls requiring protected openings shall apply to penetrations in the following locations:

# Codes and Standards (continued)

- (F) Membrane Penetrations. Walls may have openings for steel electrical outlet boxes not exceeding 16 square inches in area, provided the aggregate area of such openings is not more than 100 square inches for any 100 square feet of wall or partition area. Outlet boxes on opposite sides of walls and partitions shall be separated by a horizontal distance of at least 24 inches. Where wall-protective membranes are penetrated by other materials or where larger openings are required than permitted above, the penetrating items shall be:
1. Protected with membrane-penetration fire stops suitable for the methods of penetration.
  2. Installed in accordance with the installation instructions of their listing for such use.
- EXCEPTION:* Penetrations not larger than 4-inch nominal pipe or 16 square inches in overall cross-sectional area containing noncombustible penetrating items, where the annular space between the penetrating items and the wall assembly being penetrated is filled with a material which will prevent the passage of flame and hot gases sufficient to ignite cotton waste when subjected to U.B.C. Standard No. 43-1. Time-temperature fire conditions under a minimum positive pressure differential of 0.01 inch water column at the location of the penetration for the time period at least equal to the fire resistance rating of the wall assembly.
- (G) Construction Joints. Construction joints shall comply with the requirements of section 1707.

# Codes and Standards (continued)

## Floor-Ceilings or Roof-Ceilings

### Sec. 4305

- (A) **General.** Fire-resistive floors, floor-ceiling or roof-ceiling assemblies shall be assumed to have fire-resistance ratings set forth in table No. 43-C. When materials are incorporated into an otherwise fire resistive assembly which may change the capacity of heat dissipation, fire test results or other substantiating data shall be made available to the building official to show that the required fire-resistive time period is not reduced.
- (B) **Ceiling Membrane Protection.** When a ceiling forms the protective membrane for a fire-resistive floor-ceiling assembly, the ceiling shall be without openings in order to protect the structural elements.
- EXCEPTIONS:*
1. Openings for noncombustible sprinkler pipe and openings for steel electrical outlet boxes not greater than 16 square inches in area may be installed, provided the aggregate area of such openings through the ceiling is not more than 100 square inches for any 100 square feet of ceiling area.
- (C) **Floors.** Fire-resistive floors which are part of the floor-ceiling assembly shall be continuous without openings or penetrations in order to completely separate one story or basement from another.
- EXCEPTIONS:*
1. Openings enclosed in fire-resistive rated shaft enclosures in accordance with Section 1706.
  2. Exit enclosures in accordance with Chapter 33.
  3. Openings permitted in accordance with Section 1706.

4. Atria constructed in accordance with Section 1716.
5. Penetrations protected with through penetration firestops installed to provide an "F" rating or a "T" rating in accordance with Section 4301 (b). The "T" rating shall apply only to:
  - a. Penetrations which are not contained within a wall at the point where they penetrate the floor, or
  - b. Penetrations which are larger than 4-inch nominal pipe or 16 square inches in overall cross-sectional area.
6. Penetrations not larger than 4-inch nominal pipe or 16 square inches in overall cross-sectional area containing noncombustible penetrating items, where the annular space between the penetrating items and the wall assembly being penetrated is filled with a material which will prevent the passage of flame and hot gasses sufficient to ignite cotton waste when subjected to U.B.C. Standard No. 43-1. Time-temperature fire conditions under a minimum positive pressure differential of 0.01 inch water column at the location of the penetration for the time period at least equal to the fire resistance rating of the wall assembly.
  - (D) Roofs. Fire-resistive roofs may have unprotected openings. See Chapter 34 for skylight construction.
  - (E) Wiring in Plenums. Wiring in plenums shall comply with the Mechanical Code.
  - (F) Construction Joints. Construction joints such as those used to accommodate wind, seismic or expansion movements when located in fire-resistive floors shall comply with the requirements of Section 1707.

# Codes and Standards (continued)

## Through Penetration Firestops

### Sec. 4308

Through penetration fire stops required by this code shall have an "F" or a "T" rating as determined by tests conducted in accordance with U.B.C. Standard No. 43-6.

Through-penetration firestops may be used for membrane penetrations. The "F" rating shall apply to all through-penetrations and shall not be less than the required fire-resistance rating of the assembly being penetrated. The "T" rating shall apply to those through-penetration locations required to have "T" rating as specified in Sections 4304 (e) and 4305 (c) and shall not be less than the required fire-resistance of the assembly penetrated.

## **1997 UBC**

### **Section 706- Fire Resistive Joint System**

**706.1 General.** Joints installed in or between fire-resistive walls, floors or floor-ceiling assemblies and fire-resistive roof or roof-ceiling assemblies shall be protected by an approved fire-resistive joint system designed to resist the passage of fire for a time period not less than the required fire-resistance rating of the floor, roof, or wall in or between which it is installed. Such material or construction assembly shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen, or otherwise impair its ability to accommodate expected building movements and to resist the passage of fire and hot gasses.

### **Section 709.3.2 Vertical Fire Spread at Exterior Walls**

**709.3.2.1 General** The provisions of this section are intended to restrict the passage of smoke, flame, and hot gasses from one floor to another at exterior walls.

**709.3.2.2 Interior** When fire-resistive floor or floor-ceiling assemblies are required, voids created at the intersection of the exterior wall assemblies and such floor assemblies shall be sealed with an approved material for the time period at least equal to the fire-resistance rating of the floor assembly.