

PROBLEM: Penetrations have been made through fire rated structures without restoring the required fire resistance. (Any annular space left after a membrane or through penetration in a fire rated structure negates that structure’s fire resistance.)

Examples: Telecommunications and computer cabling, pipes for electrical wiring or plumbing, ductwork for heating and air conditioning systems, etc. have been installed after initial construction, i.e., in existing buildings through fire rated walls, floors and/or ceilings where the remaining annular space around the holes for these penetrating items have not been properly sealed.



Department of Administration Safety – Hazard Log (Open Items) for
“Fire Rating - Fire retardant sealant is required”

17 Open Hazard Log items in 14 buildings; plus 32 closed (2000-2010)

Hazard Log Number	Building
2009-267	Archives & History
2009-060	Blatt
2009-188	Blatt
2009-183	Brown
2009-218	Columbia Mills
2009-049	Dennis
2009-111	ESC David
2009-118	ESC Harper
2009-233	ESC Job Service
2009-042	Five Points
2009-027	Mills-Jarrett
2009-251	North Towers
2009-260	Senate Street
2009-178	State Library
2009-179	State Library
2009-180	State Library
2009-192	Wade Hampton

PROBLEM: Penetrations are being made through asbestos containing materials (ACM) or work is being done in close vicinity to cause damage to the ACM and thus exposes the unprotected workers to asbestos health hazards.



Sprayed on fireproofing



Sheetrock and joint compound



HVAC Insulation

Involved Parties:

- Facilities Management Building Maintenance and Building Systems employees involved in building renovations
- DSIT who installs telecommunications and computer systems
- Contractors (hired/managed by FM Construction & Planning (C&P) or sometimes hired by a tenant without C&P knowledge) for renovation projects
- DOA Safety inspects existing DOA owned / maintained facilities for compliance with OSHA regulations and fire and life safety and building codes

Regulatory Requirements:

A. **International Building Code** (2006), Chapter 7 Fire-Resistance-Rated Construction (to include the following excerpts):

1. Section 702 Definitions

Fire Resistance Rating. The period of time a building element, component or assembly maintains the ability to confine a fire, continues to perform a given structural function, or both, as determined by the tests, or the methods based on tests, prescribed in Section 703

Membrane-Penetration Firestop. A material, device or construction installed to resist for a prescribed time period the passage of flame and heat through openings in a protective membrane in order to accommodate cables, cable trays, conduit, tubing, pipes or similar items.

Penetration Firestop. A through-penetration firestop or a membrane-penetration firestop.

Through Penetration. An opening that passes through an entire assembly.

Through-Penetration Firestop System. An assemblage of specific materials or products that are designed, tested and fire-resistance rated to resist for a prescribed period of time the spread of fire through penetrations. The F and T

rating criteria for penetration firestop systems shall be in accordance with ASTM E 814.

2. Section 712 Penetrations

B. **International Fire Code (2006)**, Chapter 7 Fire-Resistance-Rated Construction, Section 703.1 Maintenance

The required fire-resistance rating of fire-resistance-rated construction (including walls, firestops, shaft enclosures, partitions, smoke barriers, floors, fire-resistive coatings and sprayed fire-resistant materials applied to structural members and fire-resistant joint systems) shall be maintained. Such elements shall be properly repaired, restored or replaced when damaged, altered, breached or penetrated. Openings made therein for the passage of pipes, electrical conduit, wires, ducts, air transfer openings and holes made for any reason shall be protected with approved methods capable of resisting the passage of smoke and fire. Openings through fire-resistance-rated assemblies shall be protected by self- or automatic-closing doors of approved construction meeting the fire protection requirements for the assembly.

703.1.1 Required fireblocking and draftstopping in combustibile concealed spaces shall be maintained to provide continuity and integrity of the construction.

C. **SC Department of Administration Asbestos Policy and 29 CFR 1910.1001:**

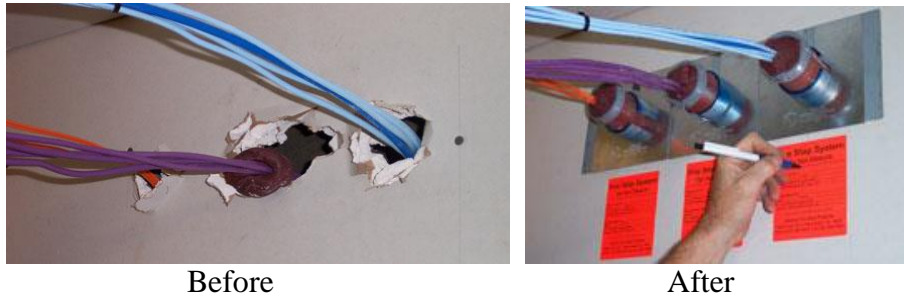
Any employee of the Department of Administration or a contracted organization involved in performing maintenance, renovations, demolition or other processes that can disturb or damage asbestos containing material in a Department of Administration owned or operated facility shall do so in accordance with the procedures outlined in this policy; Occupational Safety and Health Administration (OSHA) standards, particularly Chapter 29 of the Code of Federal Regulations, standard 1910.1001 Asbestos, and Environmental Protection Agency standard 40 CFR 763 Asbestos, Subpart G, Asbestos Worker Protection. Before conducting work in a Department of Administration owned or operated facility, the worker must ascertain there is no ACM involved in the planned work. If ACM is present or suspected in the planned work project, a SC licensed asbestos contractor must conduct the work or make it safe for Department of Administration employees by removing the ACM. <http://www.osha.gov/SLTC/asbestos/index.html>

Recommendation 1: All maintenance work and renovation projects, telecommunications and computer installation projects, etc. must comply with the Department of Administration Asbestos Policy which requires first checking the building's Asbestos Operations and Maintenance Manual to determine if the materials to be penetrated contain asbestos (ACM). Organizations outside of the General Services Division, Facilities Management Section, are to contact the Department of Administration Asbestos Program Manager, Aaron Redmond, 734-3712, for this information prior to conducting work in a Department of Administration -owned or managed facility. If the materials to be penetrated contain asbestos, the Department of Administration Asbestos Program Manager will assist in obtaining and independent asbestos licensed contractor to either

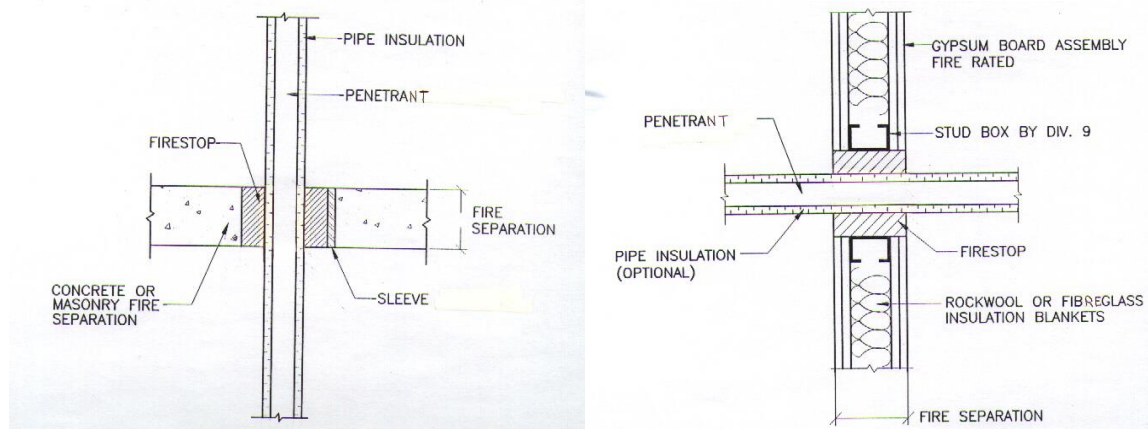
remove enough ACM for the work to be completed or the work will be done by the asbestos licensed contractor.

Recommendation 2: All maintenance work and renovation projects, telecommunications and computer installation projects, etc. must comply with the IFC/IBC in restoring the structure's fire-resistance rating.

A firestop is a passive fire protection system of various components or materials used to seal openings and joints in fire-resistant rated wall and/or floor assemblies, based on fire testing and certification listings. Unprotected openings in fire separations void the fire-resistance ratings of the fire separations that contain them, allowing spread of fire. Firestop materials are designed to restore the fire-resistance ratings of rated wall and/or floor assemblies by impeding the spread of fire through the opening by filling the openings with fire resistant materials. Fire stop, when properly installed, does exactly what it says. It stops the spread or advancement of fire from one section of a structure to another.



Electrical / Mechanical / Structural Through Penetrations:



<http://en.wikipedia.org/wiki/Firestop>

Firestop Materials may include, but are not limited to the following specialized products and devices:

- **Intumescent** - a substance which swells as a result of heat exposure often results in charring, which is a poor heat conductor, or releases water vapor thus has a cooling effect



Intumescent caulk around copper pipe penetration

- **Firestop Mortar** – a powder mixed with water to form a cement typically pigmented red to differentiate it from normal building materials

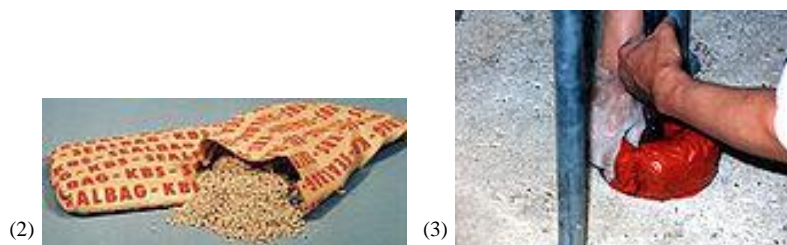


- **Firestop Silicone** - a one-part or two-part man-made heat resistant sealant foam compound (though flexible and has a high dielectric strength, it incurs shrinkage and cracking, is combustible and hard to extinguish, and has significant smoke development)



Silicone firestop with rock wool packing (red arrows) around mechanical pipes.
 Rock wool pre-molded insulation (yellow arrow) around pipes.
 Silicone sealant being applied (right photo).

- **Firestop Pillows** – can be rockwool batts with intumescent resin inside plastic bags ⁽¹⁾, vermiculite with intumescent graphite inside fiberglass bags ⁽²⁾, or intumescent foam rubber ⁽³⁾ used in locations requiring frequent access, for reasons such as cable changes, but can be easily resealed; typically held in place with wire mesh anchored to the structure



- **Mineral Fibers** – made from natural or synthetic minerals or metal oxides and pressed into rolls or sheets to provide excellent heat insulators, i.e., glass wool, stone wool, ceramic wool (similar to asbestos and some considered "possibly carcinogenic to humans")



Rock wool (on left) is OK as packing but is missing overlying firestop. Firestop mortar is used around pipe (on right).

Other firestop products:



Composite sheet



Wrap strips / sleeves / collars

http://solutions.3m.com/wps/portal/3M/en_US/fire/stop/products/catalog/
<http://www.americantechsupply.com/firestop.htm>



Penetration Fire Seal membrane - <http://www.fire-stopsystems.com/elastaseal.html>