SECTION 23 05 48 - VIBRATION ISOLATION

PART 1 - GENERAL

NOTE: CONTRACTOR IS TO FURNISH AND INSTALL A VIBRATION ISOLATING DEVICE ON ALL MACHINE, MOTOR, AND CIRCULATING PIECES OF EQUIPMENT.
IF A VIBRATION ISOLATING DEVICE IS OMITTED FROM THE DRAWINGS, THE CONTRACTOR IS TO MAKE AN ALLOWANCE TO INSTALL ONE.

1.01 REFERENCE

A. Refer to section 23 05 00 for requirements which are applicable to this section.

1.02 WORK INCLUDED

A. Provide all labor, material, equipment, and supervision necessary to select, provide, and install vibration isolation devices as described herein and required for equipment on the project.

1.03 SUBMITTALS

A. Submit shop drawings of all isolators, rails, hangers, mountings, connectors, hoses, and anchors specified herein.

1.04 QUALITY ASSURANCE

A. Verify that all equipment is installed in accordance with the manufacturer's warranty requirements.
B. Install equipment in accordance with manufacturer’s instructions.

PART 2 - PRODUCTS

2.01 NEOPRENE PADS

A. Roof mounted condensing units and floor mounted air handling units or furnaces shall be mounted on neoprene waffle pads. Pads shall be 5/16" thick type "W" as manufactured by Mason Industries Vibration Eliminator Company or Amber Booth.
B. Application: Floor mounted furnaces and A/C units of 2000 CFM or less.
C. Roof mounted condensing units up to 5 tons shall be mounted on curbs with neoprene pads. See spring mounts for over 5 tons.

2.02 NEOPRENE MOUNTINGS

A. Double deflection neoprene mountings shall have a minimum static deflection of 0.35". All metal surfaces shall be neoprene covered to avoid corrosion and have friction pads both top and bottom so they need not be bolted to the floor. Bolt holes shall be provided for these areas where bolting is required. On equipment such as small vent sets and close coupled pumps, steel rails shall be used

above the mountings to compensate for the overhang.

B. Mountings shall be type ND or rails type DNR as manufactured by Mason Industries, Inc. or equivalent by Vibration Eliminator Company or Amber Booth.

C. Application: Base mounted pumps up to 5 Hp slab on grade, air handling units' slab on grade, ATC compressors slab on grade.

2.03 SPRING MOUNTINGS

A. Spring type isolators shall be free standing and laterally stable without any housing and complete with 1/4" neoprene acoustical friction pads between the baseplate and the support. All mountings shall have leveling bolts that must be rigidly bolted to the equipment. Spring diameters shall be no less than 0.8 of the compressed height of the spring at rated load. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Submittals shall include spring diameters, deflections, compressed spring height and solid spring height.

B. Mountings shall be type SLF as manufactured by Mason Industries, Inc. or equivalent by Vibration Eliminator Company or Amber Booth.

C. Application: Base mounted pumps not slab on grade and less than 5 Hp, base mounted pumps slab on grade 7 ½ HP and up. Air handling units not slab on grade, ATC compressors not slab on grade and less than 5 Hp. Roof mounted condensing units over 5 tons cooling capacity.

2.04 SPRING AND NEOPRENE HANGERS

A. Vibration hangers shall contain a steel spring and 0.3" deflection neoprene element in series. The neoprene element shall be molded with a rod insulation bushing that passes through the hanger box lower hole. Hole sizes shall be large enough to permit the hanger rod to swing through a 30 degree arc before contacting the hole and short circuiting the spring. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Submittals shall include a scale drawing of the hanger showing the 30 degree capability.

B. Hangers shall be type 30N as manufactured by Mason Industries, Inc. or equivalent by Vibration Eliminator Company or Amber Booth.

C. Application: Below 5 ton horizontal suspended heat pumps and fan/coil units, in-line exhaust fans.

2.05 PRE-COMPRESSED SPRING AND NEOPRENE HANGERS

A. Vibration hangers shall be spring and neoprene as described above, but they shall be pre-compressed to the rated deflection so as to keep the piping or equipment at a fixed elevation during installation. The hangers shall be designed with a release mechanism to free the spring after the installation is complete and the hanger is subjected to its full load. Deflection shall be clearly indicated by means of a scale.

B. Hangers shall be type PC3ON as manufactured by Mason Industries, Inc. or equivalent by Vibration Eliminator Company or Amber Booth.

C. Application: Horizontal fan/coil units above 5 ton capacity.

2.06 DUCT HANGERS

A. Vibration hangers shall contain a steel spring located in a neoprene cup manufactured with a grommet to prevent a short circuiting of the hanger rod. The cup shall contain a steel washer designed to properly distribute the load on the neoprene and prevent its extrusion. Spring diameters and hanger box lower hole sizes shall be large enough to permit the hanger rod to swing through a 30 degree arc before contacting the hole and short circuiting the spring. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Hangers shall be provided with an eye bolt on the spring end and provision to attach the housing to the flat iron duct

straps. Submittals shall include a scale drawing of the hanger showing the 30 degree capability.

B. Hangers shall be type W30 as manufactured by Mason Industries, Inc. or equivalent by Vibration Eliminator Company or Amber Booth.

C. Application: Ductwork in mechanical rooms below occupied spaces.

2.07 EQUIPMENT RAIL BASES

A. Vibration isolator manufacturer shall provide steel members welded to height saving brackets to cradle machines having legs or bases that do not require a complete supplementary rigid to prevent strains in the equipment.

B. Inverted saddles shall be type ICS as manufactured by Mason Industries, Inc. or equivalent by Vibration Eliminator Company or Amber Booth.

C. Application: Base mounted HVAC units.

2.08 FLOATING CONCRETE BASES

A. Vibration isolator manufacturer shall furnish rectangular structural beam or channel concrete forms for floating foundations. Bases for split case pumps shall be large enough to provide support for suction and discharge base ells. The base depth need not exceed 12" unless specifically recommended by the base manufacturer for mass or rigidity. In general, bases shall be a minimum of 1/12th of the longest dimension of the base, but not less than 6". Forms shall include minimum concrete reinforcement consisting of half-inch bars or angles welded in pa\lace on 6" centers running both ways in a layer 1 1/2" above the bottom, or additional steel as is required by the structural conditions. Forms shall be furnished with drilled steel members with sleeves welded below the holes to receive equipment anchor bolts where the anchor bolts fall in concrete locations. Height saving brackets shall be employed in all mounting locations. Height saving brackets shall be employed in all mounting locations to maintain a 1" clearance below the base.

B. Bases shall be type K as manufactured by Mason Industries, Inc. or equivalent by Vibration Eliminator Company or Amber Booth.

C. Application: Centrifugal pumps over 5 Hp and not slab on grade.

2.09 PIPE HANGERS

A. Combination neoprene and spring with 1/2", 1", 2" static deflection.

B. Application: Pipe hangers in boiler or mechanical room under occupied space.

PART 3 - EXECUTION

3.01 NEOPRENE PADS

A. Cut pads of size to fit base area of equipment. Install between roof curb or floor and equipment base.

3.02 NEOPRENE MOUNTINGS

A. Neoprene mountings are for indoor application only. When the equipment has a flush drain pan or tank on the bottom, they may be inverted so that the rectangular rubber covered steel baseplate provides support over a large area.

3.03 SPRING MOUNTINGS

A. Install units with spring mountings with a minimum of 1/2", 1", 2" static deflection and available 50 per cent travel to solid. Level units and adjust isolators for proper deflection.
B. Isolators to be selected by vibration isolating company engineers for critical applications.
C. Roof mounted equipment shall be mounted on roof curbs with galvanized spring mountings between curbs and equipment bases.

3.04 SPRING AND NEOPRENE HANGERS

A. Hangers shall have a maximum rated deflection of 1.18" for equipment 20 lbs. and under and 1.75" for equipment over 20 lbs.
B. Average neoprene deflection shall be between 0.35" and 0.4".

3.05 PRECOMPRESSED SPRING AND NEOPRENE HANGERS

A. Hangers shall have a maximum rated deflection of 1.18" for equipment 20 lbs. and under and 1.75" for equipment over 20 lbs.
B. Average neoprene deflection shall be between 0.35" and 0.4".

3.06 DUCT HANGERS

A. Hangers shall have a maximum rated deflection of 1.18" for equipment 95 lbs. and under and 1.35" for equipment over 95 lbs.

3.07 EQUIPMENT RAIL BASE

A. Select the appropriate base to match equipment being provided. Base shall meet the exact dimensional and weight requirements at all points of the equipment.
B. Install as recommended by the vibration isolator manufacturer.
C. Adjust, place in service, and provide instructions.

3.08 FLOATING CONCRETE BASES

A. Select the appropriate base to match the equipment that is being provided. Base shall meet the exact dimensional and weight requirements at all points of equipment.
B. Install as recommended by the vibration isolator manufacturer.

END OF SECTION

SECTION 23 05 50 - FIRE STOPPING

PART 1 - GENERAL

1.01 SUMMARY

A. Refer to Section 23 05 00 for requirements which are applicable to this section.
B. Refer to International Building Codes.
C. Section includes.
   1. Through penetration firestops and smoke-stops for all fire rated bearing and non-bearing wall and floor assemblies, both blank (empty) and those accommodating penetrating items such as cables, conduits, pipes, ducts, etc.

1.02 REFERENCES

A. American Society for Testing and Materials Standards (ASTM):
   1. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials.
   2. ASTM E814: Standard Test method for Fire Tests of Through-Penetration Firestops.
B. Underwriters Laboratories, Inc.:
   1. UL 723 Surface Burning Characteristics of Building Materials
   2. UL 1479 Fire Tests of Through-Penetration Firestops.
C. UL Fire Resistance Directory:
   1. Through Penetration Firestop Devices (XHJI)
   2. Fire Resistive Ratings (BXUV)
   3. Through Penetration Firestop Systems (XHEZ)
   4. Fill, Void, or Cavity Material (XHHW)

1.03 DEFINITIONS

A. FIRESTOPPING: The use of a material or combination of materials in a fire rated structure (wall or floor) where it has been breached, so as to restore the integrity of the fire rating on that wall or floor.
B. SYSTEM: The use of a specific firestop material or combination of materials in conjunction with a specific wall or floor construction type and a specific penetrant(s), constitutes a “System.”
C. BARRIER: Any bearing or non-bearing wall or floor that has an hourly fire and smoke rating.
D. THROUGH-PENETRATION: Any penetration of a fire rated wall or floor that completely breaches the barrier.
E. MEMBRANE-PENETRATION: Any penetration in a fire rated wall that breaches only one side of the barrier.
F. CONSTRUCTION GAPS: any gap, joint, or opening, whether static or dynamic, where the top of a wall may meet a floor; wall to wall applications; edge to edge floor configurations; floor to exterior wall; or any linear breach in a rated barrier. Where movement is required, the firestopping system must comply with UL2079 for dynamic joints.

1.04 SUBMITTALS

NOTE: A “Certificate of Conformance,” from the manufacturers listed in Section “2.02 Acceptable Manufacturers,” is required with the “Submittal Package” to ensure that the material selected meets all of the criteria of this specification as set forth in Section “1.05 Quality Assurance.”

A. Submit manufacturer's product literature for each type of firestop material to be installed. Literature shall indicate product characteristics, typical uses, performance and imitation criteria, and test data. Submittal should be in compliance with Section 23 05 00.
B. Material Safety Data Sheets (MSDS): Submit MSDS for each firestop product.
C. UL Tested Systems: Submit drawings showing typical installation details for the methods of installation. Indicate which firestop materials will be used and thickness for different hourly ratings.
D. Engineering Judgments: Submit manufacturer's drawings for all non-standard applications where no UL rested system exists. All drawings must indicate the "Tested" UL system upon which the judgment is based so as to assess the relevance of the judgment to some known performance.
E. Submit manufacturer's installation procedures for each type of product.
F. Approved Applicator: Submit document from manufacturer wherein manufacturer recognizes the installer as qualified or submit a list of past projects to demonstrate capability to perform intended work.
G. Upon completion, installer shall provide written certification that materials were installed in accordance with the manufacturer's installation instructions and details.

1.05 QUALITY ASSURANCE

A. Firestopping systems (materials and design):
   1. Shall conform to both Flame (F) and Temperature (T) ratings as required by local building codes and as tested by nationally accepted test agencies per ASTM E814 or UL 1479 fire tests in a configuration that is representative of field conditions.
   2. The F rating must be minimum of one (1) hour but not less than the fire resistance rating of the assembly being penetrated. T rating when required by code authority shall be based on measurement of the temperature rise on penetrating item(s). The fire test shall be conducted with a minimum positive pressure differential of 0.01 inches of water column joints, must be tested to UL 2079 with movement capabilities equal to those of the anticipated conditions.
B. Firestopping materials and systems must be capable of closing or filling through openings created by 1) the burning or melting of combustible pipes, cable jacketing, or pipe insulation materials, or 2) deflection of sheet metal due to thermal expansion (electrical & mechanical duct work).
C. Firestopping material shall be asbestos and lead free and shall not incorporate nor require the use of hazardous solvents.
D. Firestopping sealants must be flexible, allowing for normal pipe movement.
E. Firestopping materials shall not shrink upon drying as evidenced by cracking or pulling back from contact surfaces.
F. Firestopping materials shall be moisture resistant, and may not dissolve in water after curing.
G. All firestopping materials shall be manufactured by one manufacturer (to the maximum extent possible).
H. Installation of firestopping systems shall be performed by a contractor (or contractors) trained or approved by the firestop manufacturer.
I. Material used shall be in accordance with the manufacturer's written installation instructions.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver material in the manufacturer's original, unopened containers or packages with the manufacturer's name, product identification, lot number, UL label and mixing and installation instructions as applicable.
B. Store materials in the original, unopened containers or packages and under conditions recommended by the manufacturer.
C. All firestop materials will be installed prior to expiration of shelf life.

1.07 PROJECT CONDITIONS

A. Conform to manufacturer's printed instructions for installation and when applicable, curing in accordance with temperature and humidity. Conform to ventilation and safety requirements.
B. Verify the condition of the substrates before starting work.
C. Weather Conditions: Do not proceed with installation of firestop materials when temperatures fall outside the manufacturer's suggested limits.
D. Care should be taken to ensure that firestopping materials are installed so as not to contaminate adjacent surfaces.

1.08 SEQUENCING

A. Schedule firestopping after installation of penetrants but prior to concealing the openings.
B. Firestopping shall precede gypsum board finishing.

1.09 PROTECTION

A. Where firestopping is installed at locations which will remain exposed in the completed work, provide protection as necessary to prevent damage to adjacent surfaces and finishes, and protect as necessary against damage from other construction activities.

PART 2 - PRODUCTS

2.01 GENERAL

A. Firestopping materials and systems shall meet the requirements specified herein.
B. Architect must approve in writing any alternates to the materials and system specified herein.
C. All firestop products and systems shall be designed and installed so that the basic sealing system will allow the full restoration of the thermal and fire resistance properties of the barrier being penetrated with minimal repair if penetrants are subsequently removed.
D. For applications where combustible penetrants are involved, i.e., insulated and plastic pipe, a suitable intumescent material must be used.

2.02 ACCEPTABLE MANUFACTURERS

NOTE: Inclusion of materials in this specification does not indicate that the listed products have been evaluated for conformance to this specification. Therefore, the user/contractor must certify in the submittal package, with a "Certificate of Conformance" from the manufacturers listed below, that the material selected meets all of the criteria set forth in Section "1.05 Quality Assurance" of this specification.

A. Specified Technologies, Inc./GE Pensil® (STI), Somerville, NJ 08876, Phone: (800) 992-1180.
B. 3M Fire Protection Products, St. Paul, MN

2.03 MATERIALS

A. Intumescent Firestop Sealants and Caulks:
   1. STI SpecSeal SSS100
   2. 3M Fire Barrier Caulk CP25WB+

B. Latex Firestop Sealant
   1. STI SpecSeal LC150 Sealant
C. Elastomeric Water-Based Sealant
   1. STI SpecSeal ES100 Elastomeric Sealant
D. Silicone Firestop Sealants and Caulks:
   1. STI SpecSeal Pensil 300\
   2. 3M Fire Barrier Silicone Sealants
E. Firestop Putty:
   1. STI SpecSeal Firestop Putty Bars and Pads
   2. 3M Fire Barrier Moldable Putty
F. Firestop Collars:
   1. STI Spec Seal Firestop Collars
   2. 3M Fire Barrier PPD's.
G. Wrap Strips:
   1. SpecSeal Wrap Strip
   2. 3M Fire Barrier FS195 Wrap Strip.
H. 2-Part Silicone Firestop Foam:
   1. STI SpecSeal Pensil 200
   2. 3M Fire Barrier 2001 Silicone Foam.
I. Firestop Mortar:
   1. STI SpecSeal Mortar.
J. Firestop Pillows:
   1. STI SpecSeal Pillows
K. Elastomeric Spray:
   1. STI SpecSeal AS Elastomeric Spray
L. Composite Board:
   1. 3M Barrier Sheet Material
M. Accessories:

2.04 Forming/Damming Materials: Mineral fiberboard or other type as per manufacturer recommendation.

PART 3 - CONDITIONS REQUIRING FIRESTOPPING

A. General:
B. Provide firestopping for conditions specified whether or not firestopping is indicated, and if indicated, whether such material is designed as insulation, safing, or otherwise.
C. Through-Penetrations:
D. Firestopping shall be installed in all open penetrations and in the annular space in all penetrations in any bearing or non-bearing fire-rated barrier.
E. Membrane-Penetrations:
F. Where required by code, all membrane-penetrations in rated walls shall be protected with firestopping products that meet the requirements of third party time/temperature testing.
G. Construction Joints/Gaps:
H. Fire Stopping shall be provided:
   1. Between the edges of floor slabs and exterior walls.
   2. Between the tops of walls and the underside of floors
   3. In the control joint in masonry walls and floors
   4. In expansion joints.
I. Smoke-Stopping:

3.02 As required by the other Sections, Smoke-Stops shall be provided for Through-Penetrations, Membrane-) Penetrations, and Construction Gaps with a material approved and tested for such application.

3.03 EXAMINATION

A. Examine the areas and conditions where firestops are to be installed and notify the architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected by the contractor in a manner acceptable to the architect and in accordance with Section 01039.
B. Verify that environmental conditions are safe and suitable for installation of firestop products.
C. Verify that all pipe, conduit, cable and other items which penetrate fire-rated construction have been permanently installed prior to installation of firestops.

3.04 INSTALLATION

A. General:
   1. Installation of firestops shall be performed by an applicator/installer qualified and trained by the manufacturer. Installation shall be performed in strict accordance with manufacturer's detailed installation procedures.
   2. Apply firestops in accordance with fire test reports, fire resistance requirements, acceptable sample installations, and manufacturer's recommendations.
   3. Unless specified and approved, all insulation used in conjunction with through-penetrants shall remain intact and undamaged and may not be removed.
   4. Seal holes and penetrations to ensure an effective smoke seal.
   5. In areas of high traffic, protect firestopping materials from damage. If the opening is large, install firestopping materials capable of supporting the weight of a human.
   6. Insulation types specified in other sections shall not be installed in lieu of firestopping material specified herein.
   7. All combustible penetrants (e.g., Non-metallic pipes or insulated metallic pipes) shall be fire stopped using products and systems tested in a configuration representative of the field condition.
B. Dam Construction: When required to properly contain firestopping materials within openings damming or packing materials may be utilized. Combustible damming material must be removed after appropriate curing. Non-combustible damming materials may be left as a permanent component of the firestop system.

3.05 FIELD QUALITY CONTROL

A. Prepare and install firestopping systems in accordance with manufacturer's printed instructions and recommendations.
B. Follow safety procedures recommended in the Material Safety Data Sheets.
C. Finish surfaces of firestopping which are to remain exposed in the completed work to a uniform and level condition.
D. All areas of work must be accessible until inspection by the applicable Code Authorities.
E. Correct unacceptable firestops and provide additional inspection to verify compliance with this specification.

3.06 CLEANING

A. Remove spilled and excess materials adjacent to firestopping without damaging adjacent surfaces.

B. Leave finished work in neat, clean condition with no evidence of spill overs or damage to adjacent surfaces.

END OF SECTION