

## SECTION 15010 GENERAL MECHANICAL REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 SCOPE

- A. The requirements of the General Conditions and modifications thereto written for this project and Division 1 apply to work performed under Division 15.
- B. The requirements of this Section of the Specifications apply to and form a part of the individual mechanical sections of the Specifications.
- C. Related Work In Other Sections:
  - 1. Division 1 - GENERAL REQUIREMENTS
  - 2. Division 3 - CONCRETE
  - 3. Section 05500 - METAL FABRICATIONS
  - 4. Division 9 - FINISHES
  - 5. Division 16000 - ELECTRICAL
- D. Provide labor, materials, tools, equipment and services necessary for and incidental to the furnishing and installation of plumbing, heating and air conditioning work, and related systems for the building as indicated on the Drawings, specified or required to make a finished installation ready for continuous and satisfactory service.
- E. Become familiar with the Architectural, Structural and Electrical Specifications and Drawings as well as the Mechanical Specifications and Drawings. Arrange the Work accordingly.

#### 1.2 REFERENCES

- A. Building Code - New York
- B. NFPA Standards
- C. ASHRAE Handbooks and Manuals
- D. SMACNA Manuals

#### 1.3 GENERAL DESCRIPTION

- A. The following is a general description of the work included in the Mechanical Division and as shown on the Mechanical Drawings.
- B. The work shall include, but not be limited to the following:
  - 1. Plumbing:

- a. Sanitary piping shall be extended from new and relocated fixtures and appliances requiring connection to the nearest existing sanitary line (4" min.).
- b. Domestic water piping shall be extended from new and relocated fixtures and appliances requiring connection to the nearest existing domestic water line.
- c. Gas piping shall be extended from new and relocated fixtures and appliances requiring connection to the nearest existing gas main.

2. HEATING AND AIR CONDITIONING

- a. The air rotation unit shall be relocated.
- b. The pharmacy shall be heated and air conditioned by split system A/C units with electric resistance heat.
- c. Exhaust ventilation shall be provided for battery charging and the bakery ovens.

1.4 WORK NOT INCLUDED IN THE MECHANICAL DIVISION

- A. Work not included in this Division, but specified in other Divisions or under separate contracts, shall be coordinated.
- B. The following items of labor and materials related to the installation of the Mechanical Work will be provided under other Divisions of the Specifications:
  - 1. Flashing of pipes, ducts, drains and fans through or on the roof. Flashing sleeves for pipes shall be furnished under this Division as specified hereinafter.
  - 2. Finish painting of equipment and piping in exposed areas.
  - 3. Louvers in doors.

1.5 DEFINITIONS

- A. Following are definitions of terms and expressions used in the Mechanical Sections in addition to definitions found in the Contract Conditions:
  - 1. "Piping" includes pipe, fittings, valves, hangers, and other accessories that comprise a system.
  - 2. "Ductwork" includes ducts, fittings, housings, dampers, hangers, and other accessories, which comprise a system.

1.6 QUALITY ASSURANCE

- A. See general and supplementary conditions for permit information.
- B. Regulatory Requirements
  - 1. Work shall conform to the requirements of the codes, laws and ordinances of the State of LOCATION OF PROJECT, the city of LOCATION OF PROJECT, National Fire Protection Association, American Society of Mechanical Engineers and other authorities having jurisdiction.
  - 2. Comply with applicable codes, laws, standard practices.

3. Comply with the standards of good practice as outlined in the ASHRAE Guide, the Sheet Metal and Air Conditioning Contractor's Association's "Duct Manual", and the Apprentice Training Manual of the Steam Fitters Union.
  4. The requirements of the authorities having jurisdiction shall take precedence over the Drawings and Specifications and changes required by the authorities shall be made after review by the Architect.
- C. Work in this Division shall be Year 2000 compliant.

#### 1.7 SUBMITTALS

- A. Shop drawings are required for the following:
1. Plumbing
    - a. Drains
    - b. Plumbing Fixtures
    - c. Hose bibbs and wall hydrants
    - d. Valves
    - e. Insulation
  2. Heating and Air Conditioning
    - a. Insulation
    - b. Exhaust Fans
    - c. Heating and Air Conditioning Equipment
  3. Field Instructor's Name and Credentials.
  4. Maintenance Policy
- B. Review of shop drawings does not relieve the Contractor of responsibility for complying with the contract documents.
- C. Comply with the requirements of section 01340-Submittals and substitutions.

#### 1.8 PROTECTION

- A. Protect material and equipment from damage.
- B. Post notices prohibiting the use of water closets.
- C. Cap or plug openings in equipment, piping and ductwork with proper caps and plugs.

#### 1.9 VARIANCES

- A. Where conflicts exist within the contract documents, request clarification prior to the submission of a bid. If clarification is not requested, provide the work representing the higher cost and quality.

#### 1.10 WARRANTY

- A. In addition to warranty and correction of work obligations located in the general and supplementary conditions, correct the work of the several complete systems as indicated

by the specifications, free from medical and electrical defects for the length of the warranty.

- B. During the warranty period, make the proper adjustments of systems, equipment and devices installed and perform work necessary to ensure the efficient and proper operation of the systems, equipment and devices.
- C. Certain items of equipment shall be warranted for a longer time than the general warranty period. Provide for service or replacement required in connection with the warranty of these items.

## PART 2 - PRODUCTS

### 2.1 PRODUCTS TO BE USED

- A. Items are specified by designations such as trade name, manufacturer's name, catalog number and indicate the capacity and quality of the products or materials to be used on this project.
- B. Items of other manufacturers will only be considered for use on this project if the contractor has submitted and received acceptance of such items of other manufactures in allowance with the requirements of section 01000-General Requirements.
- C. Similar pieces of equipment, such as air conditioning units, etc. shall be provided by a manufacturer.

### 2.2 MATERIALS AND WORKMANSHIP

- A. Items shown and not specifically called for, or items specified and not specifically indicated or detailed on the Drawings, or items neither specified nor shown, but which are reasonably incidental to and commonly required to make a complete job, shall be provided.
- B. Comply with section 01000-General Requirements.

### 2.3 FOUNDATIONS AND EQUIPMENT SUPPORTS

- A. Provide foundations, supports, curbs and bases for equipment, as indicated or necessary for satisfactory installation and operation of equipment. Furnish and set anchor bolts.
- B. Provide concrete in accordance with the requirements of Division 3 - Concrete. Concrete pads shall be 4 inches thick minimum, thicker if necessary to accommodate a particular piece of equipment. Edges shall be beveled with outer edge extending 3 inches beyond equipment. Provide concrete pads for floor mounted equipment. Exterior pads shall be reinforced and shall have edges turned down to below the frost line. Exterior pads shall extend eight inches beyond edges of equipment and shall be sloped for drainage.
- C. Floor mounted stands or legs, where required, shall be constructed of structural steel shapes (angles, channels) of Kindorf or Unistrut or steel pipe and fittings securely braced

and fastened to flanges bolted to the floor. Minimum rod size shall be 3/8-inch diameter. Paint steel with rust inhibiting primer.

## 2.4 ROOF SUPPORTS AND CURBS

- A. Provide equipment supports and curbs for the equipment and piping installed on or through the roof. Roof curbs shall be approved for use by the National Roofing Contractors National Association and shall be a minimum of 14 inches high. Curbs shall be sloping roof type suitable for pitch of the roof and shall set the equipment level. Curbs shall be double wall insulated type.
- B. Provide wood blocking to raise the level of the bottom of the curb to be level with the top of the roof insulation.
- C. Pipe curb assemblies, except for plumbing vent pipes shall be constructed of 18 gauge galvanized steel with base plate, raised cant, wood nailer strip and galvanized steel counter flashing. Top shall be provided with acrylic clad ABS plastic cover and graduated neoprene boots secured to cover and pipes by stainless steel band clamps. Pipe curbs shall be Pate Company PCA-5 or equivalent of Thy Curb.
- D. Equipment supports shall be constructed of 18 gauge galvanized steel with base plate, raised cant, insulation, wood nailer strip and galvanized steel counter flashing. Equipment supports shall be Pate Company ES-5b or equivalent of Thy Curb.

## 2.5 HANGERS AND PIPE SUPPORTS

- A. Provide pipe hangers and supports to maintain required slope and alignment for equipment and piping. Pipe hangers shall be as manufactured by Carpenter & Patterson, Fee & Mason, Modern Hanger or Grinnell.
- B. Pipes may not be supported from other pipes. Trapeze hangers may be used for parallel runs of pipe with same slope.
- C. Provide sway bracing at sufficient intervals to prevent lateral motion of horizontal or vertical piping.
- D. For pipe and tubing, both horizontal and vertical, and regardless of the spacing of other supports, provide supports at or near changes in direction. Hangers shall be spaced at not over 6 feet apart for 1/2 inch pipe, not over 8 feet apart for 3/4 and 1 inch pipe and not over 10 feet for larger sizes.
- E. For steel bar joist construction, hanger rods shall be supported from the top chord of the joists or from panel points of the lower chord of the joists. Where piping runs parallel to joists or where hangers are required at other than joist locations, provide steel angles welded or bolted to joists to support hangers so that weight is supported from the top chord of the joists.
- F. Hangers for pipe shall be similar to Carpenter & Paterson "Clevis" figure 100. Hangers for insulated lines with vapor barrier and carrying fluids with temperatures below 70 degrees shall be large enough to permit continuous insulation. Hangers on vapor barrier

insulated piping shall be provided with rigid protector saddles with rigid core of insulation to thickness of adjacent insulation. Saddles shall be 16 gauge galvanized steel and shall cover one half of the circumference of the pipe covering. Saddle shall be secured to insulation with adhesive.

- G. Pipes upon or within close distance of walls shall be carried by wall brackets, Carpenter & Paterson, Fig. 221, 139, or 227 as approved.
- H. Support vertical lines at floor level with extension pipe clamps. Support lowest level of riser with pipe hanger as specified above on horizontal pipe as close to riser as possible.
- I. Special supports required shall be provided to suit the conditions.

## 2.6 OPENINGS, CHASES AND SLEEVES

- A. Determine the location and size of chases and openings necessary for the proper installation of the work and provide them during the erection of the work in which such chases and openings occur.
- B. Provide sleeves through walls and floors for pipes. Sleeves through walls shall be of sufficient size to permit the insulation, where specified, to continue through the sleeve. Sleeves through walls shall be flush with the walls.
- C. Prior approval from structural engineer shall be obtained before cutting of existing structural members or new building construction.
- D. Where non-combustible pipes pass through sleeves or around ductwork through openings in fire rated wall, floor-ceiling and ceiling-roof assemblies, seal openings with a Underwriters Laboratories classified firestop method. Firestop method shall be a one part, intumescent (expands with heat), latex elastomer capable of expanding a minimum of three times. Firestop materials shall be UL listed when tested in accordance with ASTM E814 for a two hour fire (F) and temperature (T) rating.
- E. If combustible piping materials are used, a UL listed firestop method shall be provided where the combustible materials penetrate fire rated wall, floor-ceiling and ceiling-roof assemblies. Firestop method shall be classified by UL as a through-penetration firestop device when tested in accordance with ASTM E814 for a two hour fire (F) and temperature (T) rating. Plastic piping materials, including, but not limited to PVC, CPVC and ABS, are combustible. Firestop method shall be similar to Nelson Firestop Products.
- F. Escutcheon plates shall be used to conceal sleeve opening on exposed uninsulated piping. Floor plates shall be split chrome plated cast brass similar to Ritter No. 36A.

## 2.7 VIBRATION ISOLATION

- A. Provide vibration isolators manufactured by a firm specializing in this type of work for equipment and piping that is capable of transmitting noise and vibration to the building structures.

- B. Isolators shall be designed to suit vibration frequency to be absorbed. Provide isolator units of area distribution to obtain proper resiliency under machinery load and impact. Where unequal distribution of weight occurs, design isolators for uniform deflection under imposed load.

## 2.8 ACCESS PANELS

- A. In general, valves, dampers and equipment shall be accessible through the removable panels in the ceiling. Where ceilings are not removable and in walls where access is required for service, access panels shall be provided. Access panels shall be appropriate for the finish in which they are installed, with a fire rating to match the wall or ceiling in which they are installed.
- B. Group valves, dampers and equipment together to keep the required number of access panels to a minimum.
- C. Access panels in the toilet rooms shall be stainless steel.
- D. Access panels in other areas shall be equal to Zurn No. 25000, prime coated, size 12"x12".

## 2.9 ELECTRICAL WORK

- A. Motors and heating elements for equipment specified under the mechanical Sections of the Specifications shall be provided with the equipment.
- B. Starters, disconnect switches, and work pertaining to equipment power connections are specified under Division 16 unless specified with the equipment of this Division of the Specifications. Electrical devices provided under this Division shall meet requirements for similar equipment specified under Division 16.
- C. Interlock wiring, and the provision of pilot devices such as push buttons, thermostats, flow switches and similar items and their related wiring associated with the Automatic Control System, shall be provided in accordance with the applicable requirements of Division 16. For ease of servicing, permanently identify both ends of conductors with W. H. Brady Co. self-sticking Perma-Code wire markers. Mark control diagrams accordingly.
- D. Control devices shall be suitable for operation on 120 volt current.
- E. Unless specifically noted otherwise, motors ½ HP and over shall be wound for 480 volts, 3 phase, 60 hertz current, and those under ½ HP for 120 volts, single phase, 60 hertz current. Motors shall be equipped with grease packed ball bearings. Motors shall be rated for continuous duty at 100 percent of rated capacity with an ambient temperature of 40 degrees C.
- F. Design motors in accordance with NEMA standards and affix to each a nameplate accurately listing pertinent data. Motors shall have sufficient capacity to start and operate the machine they drive without exceeding the motor nameplate rating at the speed specified or at speeds or loads which may be obtained by the drive actually furnished.

The motor HP or KW ratings are those estimated to be required by the driven equipment when operating at specified duties and efficiencies and are used to determine electrical feeder sizes. If the actual horsepower or KW required for the equipment proposed to be furnished is greater than the indicated horsepower or KW, it shall be provided. Changes required in starter, feeder, branch circuit or other electrical items shall be made.

- G. Unless otherwise indicated, polyphase motors shall be Class B, general purpose, squirrel cage, single speed, open induction type, stamped with NEMA Class B letter designation.
- H. Single phase motors except as noted shall be open, capacitor start type. Motors 1/6 horsepower and under shall be permanent split capacitor type with built-in reset thermal overload protection, unless specifically noted otherwise. Motors 1/12 horsepower and smaller that start with no load may be shaded pole with built-in reset thermal overload protection.
- I. Two speed motors shall be two winding, variable torque type with 100 percent and 50 percent speeds.
- J. Mechanical equipment with a factory wired control panel shall be wired in accordance with the National Electrical Code. Additionally, components within the panel shall bear the UL label.
- K. Motors 5 horsepower and over shall be provided with power factor correction devices to provide a power factor of 0.90 at design load.
- L. Equipment shall be UL listed or be tested by an independent electrical testing agency acceptable to the Architect to comply with requirements of the Authority having jurisdiction.
- M. Do not install equipment, ductwork or piping in the dedicated spaces above switchgear, panels and transformers as identified in the National Electrical Code.

## 2.10 FLASHING

- A. Sanitary vent pipes passing through the roof shall be provided with conical neoprene boots for any pitch roof with base extending minimum of eight inches from vertical portion of boot. Provide clamp for securing boot to pipe.
- B. Flashing assemblies specified above shall be set in place as part of the work under this Division of this Specification, but will be finally installed as specified in another Division of this Specification.
- C. Base flashing of roof drains, ducts, fans and other equipment, if required, is specified in another division of this Specification. Cap flashings shall be provided to make a water tight seal.

## 2.11 IDENTIFICATION



- A. After piping has been installed, tested and insulated, it shall be identified with stenciled on letters at least 2 inches high. Stenciled on arrows shall be applied adjacent to the name and shall point away from the name in direction of flow.
- B. Stencils shall identify the piping system. Duct systems shall be similarly identified by noting the system and supply or return. Stencils shall be located where pipe enters and leaves a space and at 30 foot centers on normal runs.
- C. Equipment shall be identified with engraved plastic laminate or anodized aluminum nameplates with pressure sensitive backing. Plates shall also be provided with drilled holes and fastened to equipment with moly-rivets. Letters shall be at least 3/8 inch high and larger in proportion to the size of the piece of equipment. Identification shall be the same as noted on schedules on the Drawings. Labels shall be provided for the following equipment.
  - 1. Exhaust fans.

## PART 3 - EXECUTION

### 3.1 MANNER OF INSTALLATION

- A. Piping and ductwork shall be installed to preserve access to valves, dampers and equipment. Valves, dampers and equipment which require frequent service, adjustment or control and which cannot be located in a readily accessible and safe place, shall be provided with extension devices and remote operators, as necessary and as accepted for use by the Architect.
- B. Piping and ductwork shall be run to follow the lines of the building and to allow the maximum headroom consistent with proper pitch. Piping subject to thermal expansion shall be arranged to permit movement without damage to the piping, ductwork and equipment.
- C. The Drawings are generally indicative of the work to be installed, but they do not show all offsets, fittings and similar details required, which shall be provided to meet the job conditions. In areas where work is installed in close proximity to work of other trades or within trades covered by this Division of the Specifications, prepare larger scale drawings consisting of plans and sections to show how work is to be installed in relation to work of other trades.

### 3.2 RECORD DRAWINGS

- A. Prepare and submit in accordance with section 01000-General Requirements.

### 3.3 TESTING

- A. Before concealing piping and before insulating piping, test piping and prove tight.

- B. Replace and retest to Architect's satisfaction pipe or fittings broken or damaged under test.
- C. Before testing piping systems, remove or otherwise protect from damage, control devices, air vents, plumbing fixtures and other parts which are not designed to stand pressures used in testing piping.
- D. New sanitary piping shall be tested by a standing water test with no less than a 10 foot head of water. Fixtures shall be removed from system and piping capped or plugged. No drop in water level shall be allowed. Test systems for a period of four (4) hours.
- E. New domestic water system systems shall be tested hydrostatically, pumping the system to 150 psi test pressure and holding the system at the test pressure for one hours without additional pumping.
- F. New gas piping shall be air pressure tested at 50 psi test pressure for two hours without a drop in pressure during the test period.
- G. Provide additional tests such as smoke or pressure tests as required by the regulations or as directed by the authorities making the inspections.

#### 3.4 CLEANING OF SYSTEMS

- A. After satisfactory completion of pressure tests and before permanently connecting fixtures, equipment, strainers and other accessory items, clean systems. Remove burrs, cuttings and waste. Blow and flush piping until interiors are free of foreign matter.
- B. Clean strainers and dirt pockets as often as required to guarantee no system stoppage by end of warranty period.
- C. Dust shall be removed from ductwork before Substantial Completion. Filter media shall be new at Substantial Completion.
- D. If systems become stopped with refuse, remove the obstruction, replace, and repair work disturbed.
- E. Clean plumbing fixtures using non-scratching cleaners. Polish chromium plated work. Stilson type wrenches shall not be used on chrome plated work.
- F. Remove rust and clean surfaces to be insulated or painted.
- G. Leave systems in clean condition and running order.

#### 3.5 STERILIZATION

- A. The domestic water piping systems shall be sterilized with a chlorine water solution so that the piping system contains water with a chlorine concentration of 100 ppm at the end of a three-hour retention period. Systems shall be flushed before sterilization. After the chlorine water solution has remained in the piping system for the specified period and at the specified concentration, the system shall be drained, flushed with clear water until the chlorine concentration is less than 1.0 ppm. Obtain representative samples of the systems

water for analysis by a recognized bacteriological laboratory. If samples are not acceptable, the process shall be repeated until the samples are acceptable.

- B. The domestic water piping system may be sterilized by other methods approved by local plumbing codes or the Health Department.
- C. As a condition of acceptance of the system, furnish a certificate under seal to certify that the system has been sterilized to meet the requirements of the Health Department and that the system is satisfactory for human consumption.
- D. Comply with Section 01000 - GENERAL REQUIREMENTS.
- E. Protect material and equipment from the elements or other injury as soon as delivered on premises. Board over water closets and post notices prohibiting their use.
- F. Cap or plug openings in equipment and in piping systems to exclude dirt and other foreign material. Plugs of rags, wool, cotton, paper, waste, or similar materials may not be used in plugging.

### 3.6 PAINTING

- A. Provide painting in accordance with section 09900-Painting.
- B. Remove rust, scale, grease, and dirt from equipment and material and leave ready for finish painting. Equipment specified with factory baked enamel finish shall be touched up as required to provide a surface visually free of scratches, nicks and blemishes.
- C. Paint uninsulated ferrous piping, hangers and miscellaneous iron work in concealed spaces with one coat of Rust-O-Leum damp proof red primer.
- D. Where metal duct is visible through a register or grille, paint the interior of the duct with flat black paint.

### 3.7 OPERATING AND MAINTENANCE MANUAL

- A. Submit operating and maintenance instructions in accordance with section 01000-General Requirements. The manual shall include the following:
  - 1. A brief description of systems and their various components.
  - 2. Full, definite and explicit instructions for starting, stopping, controlling and changing over systems from one season to another.
  - 3. List of manufacturer's representatives with address and telephone numbers.
  - 4. Manufacturer's printed operating and maintenance instructions, parts lists, illustrations and diagrams for pieces of equipment.
  - 5. A complete schedule of periodic servicing and lubrication requirements for equipment.
  - 6. One copy of each shop drawing and Contractor's drawings.
  - 7. One copy of other items of equipment where not required as a shop drawing submittal.
  - 8. One copy of each wiring diagram.

9. Motor manufacturer's certificate for motors exposed to the weather.
10. The field test data specified in Section 15600 under Balancing and Adjusting.
11. Sterilization certificate for domestic water systems.

### 3.8 FIELD INSTRUCTION

- A. Upon completion of work, furnish services of a competent representative to instruct Owner's representative in the proper operation and maintenance of elements of the mechanical systems. Submit instructor's name and credentials to the Architect for approval.
- B. Spend not less than 24 hours in such formal instruction to prepare Owner to operate and maintain the systems.
- C. At least 8 hours of the specified 24 hours of instruction shall occur after thirty days operation by Owner's representative and may be divided into periods of 4 hours at different seasons of the year.

### 3.9 PERFORMANCE TEST

- A. Should the performance or capacity of the systems, equipment or devices furnished be questioned by written notice from the Architect after installation, provide necessary test equipment and complete a satisfactory test of the items in question. The test shall be run when and as directed by the Architect and in the presence of his representative. Should the items furnished not pass such a test, they shall be removed and replaced by systems, equipment or devices satisfactory to the Architect.

END OF SECTION