

MECHANICAL SPECIFICATIONS

PART 1 - GENERAL

1.1 Codes and Standards: The latest effective publications of all applicable standards, codes, etc., as they apply, form part of these specifications as if were written fully herein and constitute minimum requirements. The following will be referred to throughout in abbreviated forms.

A. National Electrical Code, (NFPA 70) (NEC).

B. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE).

C. Rules and regulations of local gas utility company.

D. National Electrical Manufacturer's Association (NEMA).

E. American National Standards Institute (ANSI).

F. Applicable local codes.

G. Underwriter's Laboratories, Inc. (UL).

H. National Fire Protection Association (NFPA).

I. International Mechanical Code (2006 IMC)

1.2 Scope of Work: Provide all work required for this division including all labor, materials, equipment, apprentices and services to provide complete mechanical systems as shown on the drawings and specified in this division of the specifications. The word "provide" shall mean "furnish and install complete and ready for use".

1.3 Site Review: The contractor shall visit the site prior to bid to determine the extent of the work. Lack of knowledge of existing conditions will not be considered a basis for change orders. Prior to ordering equipment, verify that equipment to be provided under this contract is acceptable, can fit into building and room. Expense incurred by the contractor, which in the engineer's opinion could have been avoided by this step, shall not be a basis for change orders.

1.4 Drawings and Specifications: The drawings are diagrammatic and indicate the general extent, character and arrangement of equipment, fixtures and piping systems. It is the intention of these specifications and drawings to fully cover all work and materials for a complete, first-class mechanical installation, and any devices usually employed in this class of work, though not specifically mentioned or shown on the drawings or in this specification, but which may be necessary for the satisfactory completion of the work, shall be furnished and installed by the contractor as a part of his total work under this division. Consult the specifications and drawings of all other trades and perform all mechanical work required therein. Cooperate with all other contractors or subcontractors to furnish complete workable systems.

1.5 Warranty: Provide a written warranty for a period of 12 months against defective workmanship and material after final acceptance at no additional cost to the owner.

1.6 As-Builts: During construction, keep an accurate record of all deviations between the work as shown on the contract drawings and that which is actually installed on a set of blue line prints of the mechanical drawings, and note changes thereon with red marks, in a neat and accurate manner. When all revisions have been shown on these prints to indicate the work as finally installed, the prints shall be delivered to the engineer, before final payment.

1.7 Tests: The right is reserved to inspect and test any portion of the installation/equipment during the progress of its erection. This contractor shall test the entire HVAC system for a period of 72 hours prior to occupancy. Test, adjust and balance systems as required and recommended by manufacturers.

1.8 Permits and Inspections: Secure and pay for all required permits and inspections. Inspection certificates from local authorities having jurisdiction shall be delivered to the owner before final payment.

1.9 Submittals: Submit shop drawings, product data and samples within thirty (30) days of award of contract and in accordance with the general conditions and supplementary conditions. Submittals are required for all items provided under this specification. Review of submittals by the engineer and any associated action taken by the engineer does not relieve the contractor of any requirements set forth by the contract documents. Incomplete submittals shall not be reviewed.

A. Shop Drawings and Product Data: Obtain approved shop drawings showing equipment, capacity, manufacturer's recommendations and hookup details, from other involved contractors for all equipment and comply therewith.

B. Tests and Reports: Prior to substantial completion, submit testing, adjusting and balancing report for review. An approved TAB report must be received from the Engineer prior to substantial completion.

1.10 Schedule of Work: The schedule of the mechanical work shall be arranged to suit the progress of work by the other trades and shall in no way retard progress of construction of the project. See architectural sheets for phasing plan.

1.11 Storage and Material: Space will be assigned to the contractor by the owner for the storage of materials. This contractor will be responsible for the protection and safekeeping of materials, tools, and equipment. All materials and equipment shall be kept in its assigned place until the time of its installation. Excess materials, dirt and refuse shall be promptly removed from the work site.

1.12 Provide all materials, tools, labor, and other related items to complete all work, including connections to all equipment in accordance with the local basic mechanical codes.

1.13 Labeling of Equipment: All HVAC equipment shall be identified by machine engraved laminated plastic designation plates permanently attached thereto with self-tapping screws or rivets. All parts of each item of equipment or device shall bear the manufacturer's nameplate, giving name of manufacturer, description, size, type, serial and model number and electrical characteristics in order to facilitate maintenance or replacement.

1.14 The contractor shall be held responsible for, and be required to make good at his own expense, any and all damages to any work or materials in place on the premises, or included in this contract, during the execution of his contract. Contractor shall be responsible for clean-up of occupied space at the completion of each work period, completing clean-up in time to not cause interference with normal operations.

1.15 Operations and Maintenance Manuals: Provide to Owner in 3-ring binder at project completion: Manufacturer's operation and maintenance manuals, warranties (equipment), warranty (Contractor), TAB Report, record drawings. Indicate date of installation, names and phone numbers of general contractor, installing contractor, local manufacturer's representative, and contact for service.

PART 2 - PRODUCTS

2.1 Manufacturing Standards: Materials shall be new and approved and labeled by ASME, ASHRAE, UL, etc. wherever standards have been established by that agency. Defective equipment or equipment damaged in the course of installation or test shall be replaced or repaired in a manner meeting the approval of the owner. All items of the same type shall be identical.

2.2 Trade Names: Unless specifically identified otherwise, manufacturers' names and catalog numbers indicated herein and on the drawings are not intended to be proprietary designations. They are to indicate general type and quality of materials and equipment required. Equipment and materials by other manufacturers which in the opinion of the engineer are of equal quality and which will produce the same results will be considered acceptable.

2.3 Flexible Ductwork: UL-181, Class I and NFPA 90A, factory applied insulation, vapor barrier and end connections. Flame spread = 25, smoke developed = 50, secure with adhesives and metal clamp. Inner core shall be helically corrugated.

2.4 Ductwork: Supply and return ductwork shall be galvanized steel constructed and as recommended by SMACNA. Sheet metal gauges shall be in accordance with local mechanical code. Provide flexible glass fiber duct insulation with foil vapor barrier facing, 2 inches nominal thickness, equal to Owens-Corning fiberglass faced duct wrap series 100.

2.5 Valves and Piping Specialties:

A. Acceptable Manufacturers

1. Gate, Globe, Angle, Check, Drain and Ball Valves

a. Stockham

b. Lunkenheimer

c. Crane

d. Nibco

e. Milwaukee Valve Co., Inc.

f. Hammond Co.

2. Balancing Valves

a. Bell & Gossett

b. Armstrong

c. Taco

d. Griswold

B. Valve Connections

1. Provide valves suitable to connect to adjoining piping as specified for pipe joints. Use pipe size valves.

2. Thread or sweat pipe sizes 2 inches and smaller.

C. Butterfly Valves

1. Iron body, bronze disc, resilient replaceable liner seat, tapped lug body.

D. Ball Valves

1. Brass body, brass or stainless steel ball and stem.

2. Ball valves combined with strainers, balancing, or flow control valves to have unions to permit removal of all components without removing valve body.

E. Flexible Pipe Connections

1. For steel piping construct with stainless steel inner hose and braided exterior sleeve.

2. For copper piping construct with bronze inner hose and braided exterior sleeve.

3. Use connectors suitable for minimum 125 psi WSP and 450 degree F and 200 psi WOG and 250 degrees F.

F. Pressure Ratings

1. Unless otherwise indicated, use valves suitable for 200 psig and 250 degrees F. (water, oil, gas).

2. Valve pressure rating to match pipe in which it is installed.

3. Valves in insulated lines to have operators extended past insulation.

2.6 Packaged Rooftop Unit: Provide single package unit factory assembled, designed, tested, and rated in accordance with ARI 210/240 or ARI 340. Unit shall be ARI certified or rated in ARI UD. Provide guards to protect condenser fins. Unit shall be listed in UL EAUJED or ETL DLP.

Filter section: Provide UL listed throwaway one inch thick fiberglass filters, standard dust-holding capacity, 350 fpm maximum face velocity. Provide gasketed hinged access panel with quick opening half-twist latches at end of filter rack. Filter rack shall accept 2 inch thick filters.

Safety controls: Provide low refrigerant pressure protection and pressure relief device. Provide compressor motor with thermal and overload protection, 5 minute anti-recycle timer, and start capacitor kit. Provide compressor with electrical crankcase heater and internal high pressure protection. The above safety controls are not required when scroll compressors are provided.

Gas heating section: The heating section shall have a progressive tubular heat exchanger design using galvanized aluminum burners and heat exchanger. An induced draft combustion blower shall be used to pull the combustion products through the firing tubes. The heater shall use a direct spark ignition (DSI) system. After three unsuccessful ignition attempts, the entire heating system shall be locked out until manually reset at the thermostat/zone sensor. Units shall be suitable for use with natural gas.

Space temperature controls: provide digital electronic controls including adjustable programmable thermostats with cool-off-heat system switch and auto-on fan switch. Thermostats shall be provided by unit manufacturer. Provide relays, transformers, contactors, and control wiring between thermostats and unit.

Weatherproof casing: provide removable gasketed panels designed to exclude driving rain for access to fans, coils, filters, compressors, motors, and controls. Provide weatherproof outside air intake louvers or weatherproof hoods with moisture eliminators.

2.7 Flexible Duct Connectors: Provide airtight flexible duct connectors at duct connections to each air-handling unit, exhaust fan, and ventilating fan. Support connectors at each end with metal angle frame bands, securely bolt in place. Provide not less than 20-ounce glass fabric duct connectors coated on both sides with neoprene.

2.8 Concentric Air Duct Kit: Provide factory-fabricated metal units with edges rolled or rounded where exposed to view, and factory primed with white enamel finish. Provide each with aluminum double deflection supply grilles, egg crate return grille, and 14" internal duct liner.

2.9 Fuel Gas Piping: Galvanized for exterior applications, ASTM A53 or A120, Schedule 40, threaded ends for sizes 2 inches and smaller, otherwise beveled ends for butt welding. Threaded Fittings: ANSI B16.3 black malleable iron. Butt-Welding Fittings: ANSI B16.9. Unions: ANSI B16.39. Pipe supports shall be in accordance with MSS SP 69.

A. Pressure regulator: Spring-loaded diaphragm pressure regulation, vented or non-vented as indicated, pressure operating range as required for the pressure reduction indicated, volume capacity not less than indicated, and threaded ends for sizes 2 inches and smaller, otherwise flanged.

B. Gas Equipment Connectors

Flexible Connectors: ANSI Z21.45.

Quick Disconnect Couplings: ANSI Z21.41.

Semi-Rigid Tubing and Fittings: ANSI Z21.69.]

2.10 Duct Smoke Detectors: Where duct smoke detectors are indicated on the drawings, provide as a package, the detector, housing and sampling tube. Provide smoke detector as photoelectric type. The detector housing shall be UL listed per UL 268A specifically for use in air handling systems. The detector shall be capable of providing a trouble signal in the event that the front cover is removed. It shall be capable of local testing via magnetic switch or remote testing using a remote test station. The unit shall be reset by local reset button or remote test station. The duct smoke detector housing shall incorporate an airtight smoke chamber in compliance with UL 268A, standard for Smoke Detectors for Duct Applications. The housing shall be capable of mounting to either rectangular or round ducts without adapter brackets. An integral filter system shall be included to reduce dust and residue effects on detector and housing, thereby reducing maintenance and servicing. Sampling tubes shall either be telescoping or be easily installed by passing through the duct housing after the housing is mounted to the duct. Provide a remote test/notification station that includes a keyswitch for reset/test, LEDs for annunciation of power, trouble and alarm, sounder and strobe. Unit shall mount to single gang backbox on the wall below the duct detector location at 48" above the finished floor unless otherwise noted on the drawings.

2.11 Vibration Isolator:

A. Type 1: Spring Type Mount: 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. Based on Mason Model 5LF.

PART 3 - EXECUTION

3.1 Scheduling: Work under this division shall proceed in advance of the work of others whenever possible, eliminating all cutting and patching. When such procedure is impossible, cutting and patching shall be done in an approved manner. Cutting shall not endanger structural integrity in any way. Patching shall exactly match contiguous work. Actual work of cutting and patching of existing surfaces shall be performed by the subcontractor who originally prepared these surfaces, e.g., cutting and patching of masonry wall will be performed by the masonry subcontractor. Costs of such cutting and patching shall be borne by the mechanical subcontractor. Cutting shall be carefully done and damage to building, piping, wiring or equipment as a result of cutting shall be repaired by skilled mechanics of trade involved.

3.2 Coordination: Cooperate and coordinate efforts with all contractors on the project. This is especially important in determining exact locations of all diffusers, registers, grilles, ductwork and fans. Arrange air inlets and outlets in accordance with the architectural reflected ceiling plans unless otherwise indicated. Coordinate lighting fixture locations with grilles, diffusers, access panels, etc. Verify ceiling and wall construction and material prior to ordering equipment or other devices to ensure proper device is furnished to match construction. This verification must be executed regardless of information placed on the drawings. Any cost incurred which in the opinion of the owner, could have been avoided by this step shall be the responsibility of the mechanical contractor.

3.3 Guarantee of Work: Contractor guarantees by his acceptance of the contract that all work installed is free from any and all defects in workmanship and/or materials, and that the apparatus will develop capacities and characteristics specified, and that if, during the period of one year or as otherwise specified, from date of certificate of completion and acceptance of the work any such defects in workmanship material or performance appear, he will, without cost to the owner, remedy such defects within a reasonable time to be specified in notice. In default thereof, the owner may have such work done and charge cost to contractor. Equipment guarantees from date of "start-up" will not be recognized.

3.4 Insulation: Install duct and pipe insulation after testing is complete.

3.5 Field Coordination: The exact location of pipes will be determined by the contractor after the working plans are made to avoid interference with ducts, lighting fixtures and piping.

3.6 Performance Testing: Before final acceptance of the work, test each system as in service to demonstrate compliance with these drawings and testing as specified in the local mechanical code.

3.7 Code Installation: Equipment which is required by code or is specified to have UL or similar listing, shall be installed as required to meet that listing.

3.8 TAB: Balance air side systems related to scope of work. Certified balance reports shall be furnished to the engineer for review and approval. Report format and procedure shall be in accordance with AABC or NEEB requirements by an AABC or NEBB Certified Professional.

3.9 Pipe Sleeves: Provide pipe sleeves at wall penetrations. Pipe sleeve shall be fire rated where required.

3.10 Roof Penetrations: (and equipment installations) Shall be in accordance with roofing manufacturer so as not to void roof warranty.

3.11 Smoke Detectors: Provide smoke detectors at air handling units as required by local mechanical codes.

3.12 Condensate Traps: Provide trapped condensate drains on air handling units.

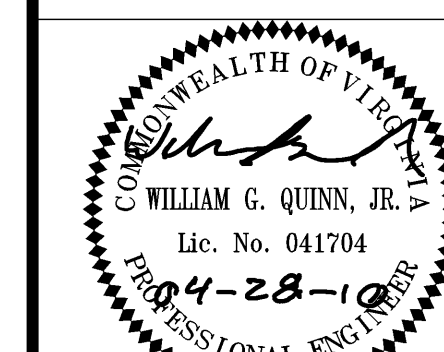
3.13 Conceal Installations: Run pipes and ductwork above ceilings in rooms with ceilings. Run exposed pipes as high as possible, in straight lines parallel or perpendicular to structure and/or walls.

3.14 Vibration Isolation: Installation of all vibration isolation materials and supplemental equipment bases specified in this specification shall be accomplished following the manufacturers written instructions. On completion of installation of all isolation materials and before start up of isolated equipment all debris shall be cleared from areas surrounding and from beneath all isolated equipment, leaving equipment free to move on the isolation supports. No rigid connections between equipment and building structure shall be made that degrades the noise and vibration isolation system herein specified. Electrical conduit connections to isolated equipment shall be looped to allow free motion of isolated equipment.

GENERAL NOTES & LEGEND

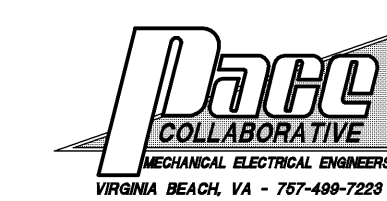
PROPOSED HEALTH CLUB

5813 WEST NORFOLK ROAD
PORTSMOUTH, VIRGINIA 23703-3324



ARCHITECT:
RANDOLPH T. HICKS, AIA
131 HANBURY ROAD, SUITE D
CHESAPEAKE, VIRGINIA 23322
PHONE: (757) 288-9354
FAX: (757) 366-9420
EMAIL: RandolphTH@aol.com

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