

GENERAL:

The Work covered by this Section of the Specifications (the "Project") consists of providing all labor, equipment, appliances and materials, and in performing all operations in connection with the installation of the new heating system in the project.

Installation of the systems shall conform to the requirements of the Massachusetts State Building Code Eighth Edition, National Electric Code, International Energy Conservation Code, NFPA, all applicable codes and laws of the city of Acton and other agencies having jurisdiction, SMACNA HVAC Duct Construction Standards, American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), and the American Conference of Governmental Industrial Hygienists.

Scope of Work shall include labor, premium time, materials, tools, equipment, transportation, scaffolding, hoisting and rigging, etc. to perform the work as herein specified for a complete installation.

Intent: It is the intention of these specifications and drawings to require the equipment to be furnished complete in every respect, and this contractor shall furnish all equipment needed and usually furnished in connections with such systems. Equipment, materials and articles incorporated in the work shall be new and in the best grade of their respective kinds for the type of work involved.

Quality Assurance: Comply with all applicable federal and state laws and all local codes, by-laws and ordinances. Where provisions of the Contract Documents conflict with any codes, rules and regulations, the latter shall govern. Where the contract requirements are in excess of applicable codes, rules and regulations, the contract provisions shall govern unless the Engineer rules otherwise. Request inspections from authorities having jurisdiction, obtain all permits and pay for all fees and inspection certificates as applicable and/or required. All permits and certificates shall be turned over to the owners at the completion of the work.

Guarantee/Warranty: The HVAC Contractor shall submit manufacturer's warranties for new products as specified in this section. The HVAC Contractor shall warrant entire system for one year from owner's acceptance. All warranties shall be submitted to the owner prior to final payment.

Record Drawings: Provide record "as-built" drawings on AutoCad-2000 or higher. Furnish one set of electronic files and one set of reproducible drawings that neatly and accurately document the installation.

Equipment Submittals: Submit for approval, copies of descriptive literature giving performance data, physical size, wiring diagrams, capacity, materials, etc. for all materials and equipment specified herein and on the drawings.

Substitutions: Substitutions of equipment and materials other than those shown on the drawings or named in the specifications may be made only with the written approval of the engineer whom reserves the right to require adequate proof of the quality of the substitute before permitting its use.

Where a contractor proposes to use an item of equipment other than that specified or detailed on the drawings, which requires any redesign of the structure, partitions, foundations, wiring, piping, or any other part of the mechanical, electrical, or architectural layout, all such redesign and all new drawings and detailing required therefore shall, with the approval of the engineer and architect, be prepared by this contractor at his own expense.

Where such approved deviation requires a different quantity and arrangement of piping, wiring, conduit and equipment from that specified or indicated on the drawings, with the approval of the engineer and architect, contractor shall furnish and install any such piping, structural supports, insulation, controllers, motors, starters, electrical wiring and conduit, and any other additional equipment required by the system, at no additional cost to the owner.

SEISMIC RESTRAINT:

All piping, ductwork and equipment shall be installed and certified to remain in place when subjected to a seismic force not less than 0.5" gravity acceleration. All work shall comply to the Massachusetts State Building Code-780 CMR, Earthquake Control.

Applicability:

1. All ducts of a cross sectional area of 6 square ft. and larger
2. All roof mounted equipment
3. All piping of 2-1/2" in diameter and larger
4. All gas piping of 1" diameter and larger
5. All piping of 1-1/4" and larger in the Boiler Room
6. All runs of piping and ductwork at 40 feet and longer having a hanger length of 12" or more on any portion of the run

Bracing: Piping and ductwork in excess of 40 feet of straight run and having a hanger length of 12" or more on any part of the straight run shall have traverse braces at the rate of one brace per 40 feet of straight run.

Piping and ductwork in excess of 80 feet of straight run and having a hanger length of 12" or more on any part of the run shall have traverse braces at the rate of one brace per 40 feet of straight run and longitudinal braces at the rate of one brace per 80 feet of straight run.

Roof mounted equipment shall be secured to the curb and/or structure on all sides.

INSULATION:

PIPING INSULATION							
FLUID TEMPERATURE RANGE (F)	INSULATION CONDUCTIVITY		NOMINAL PIPE OR TUBE SIZE (IN)				
	CONDUCTIVITY (Btu*in/F*hr*sf)	MEAN RATING TEMP (F)	<1	1 TO <1-1/2	1-1/2 TO <4	4 TO <8	8 AND OVER
HEATING SYSTEMS (STEAM, STEAM CONDENSATE & HOT WATER)							
>350	0.32-0.34	250	2.5	3.0	3.0	4.0	4.0
251-350	0.29-0.32	200	1.5	2.5	3.0	3.0	3.0
201-250	0.27-0.30	150	1.5	1.5	2.0	2.0	2.0
141-200	0.25-0.29	125	1.5	1.5	2.0	2.0	2.0
105-140	0.22-0.28	100	1.5	1.5	2.0	2.0	2.0
NOTES							
1.) Insulation Material: Molded rigid fiberglass sectional pipe insulation rated to 500 °F. The insulation shall have a minimum density of 3.5 lbs. per cu. ft.							
2.) Materials shall be fire retardant as follows: Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, covering, sealers, mastics and adhesives) with flamespread index of 25 or less, and smoke-developed index of 50 or less, as tested by ASTM E 84 (NFPA 255) method. Exception: Outdoor mechanical insulation may have flame spread index of 75 and smoke developed index of 150. The insulation shall be manufactured by Armstrong, Knaf, OwensCorning or approved equivalent.							
3.) Jacket: Kraft paper bonded to aluminum foil reinforced with fiberglass yarn and a self sealing lap. The maximum permeability of the jacket shall be 0.02 perms. Outdoor Piping & Indoor piping at traffic level shall be covered with .015 thick PVC jacket. The jacket shall be outdoor grade, premolded one piece and UV resistant. Joints shall be sealed with silicone caulking.							
4.) Outdoor Insulation: Insulation Material shall be a closed cell elastomeric insulation. The Jacket shall be aluminum cladding. All seams shall be properly taped and sealed. The insulation shall be K-Flex Clad AL or approved equal.							

PIPING, VALVES & FITTINGS:

Materials: All chilled water, hot water and condensate piping greater than 2-1/2" shall be schedule 40 black steel, ASTM Grade B, A-53; seamless or elect. res. Welded (ERW) for pipes 4" and under, and seamless for pipes greater than 4". Type L hard drawn tempered copper tubing conforming to ASTM B-88 shall be used for chilled water, hot water and condensate water piping 2-1/2" or smaller. All steam piping shall be schedule 40, black ASTM A-53. All steam condensate return piping shall be schedule 80, black ASTM A-53. All refrigeration piping shall be type "L" copper ACR with brazed joints. Piping connections to condensing unit shall include sight glass, filter-drier.

A safe and substantial means of support for all parts of the HVAC equipment and systems shall be provided. All piping and equipment shall be hung from the building structure and shall conform to the recommendations of the manufacturer. Hanging from existing or new pipes, ducts and equipment will not be permitted.

Dissimilar Metals: All connections between ferrous and nonferrous pipes and/or accessories shall be made with approved dielectric fittings.

All new piping shall be cleaned and thoroughly flushed to remove all scale, cutting oil, other debris, and cleaning chemicals prior to connecting to existing systems.

Provide factory fabricated valves recommended by manufacturer for use in the service indicated. Valves shall be of the types and pressure ratings indicated. Provide proper selection as determined by the contractor, to comply with the installation requirements. Provide end connections that properly mate with pipe, tube and equipment connections. Where more than one type is indicated, the selection is the contractor's option.

Gate Valves: (2-1/2" and smaller); Bronze, screw in bonnet, threaded ends or flanged ends, solid bronze wedge, non-rising stem, pressure rating to match the requirements of the adjoining pipe. (3 inch and larger); Cast iron body, bronze mounted construction, bolted bonnet, flanged ends, solid wedge, OS&Y rising stem, pressure rating to match the requirements of the adjoining pipe. Gate valves shall be manufactured by Jenkins or approved equal.

Ball Valves: (2-1/2" and smaller); Bronze body, stainless steel ball, threaded or flanged ends, pressure rating to match the requirements of the adjoining pipe. (3" and larger); Cast iron body, bronze mounted, stainless steel ball, flanged ends, pressure rating to match the requirements of the adjoining pipe. Ball valves shall be manufactured by Jenkins or approved equal.

INSTRUCTIONS AND MANUALS:

This contractor shall provide printed instructions covering operations and maintenance of each major item of equipment to the owner. Upon completion of the work and after all tests are completed, a time designated by the owner and it's engineer shall be set in which the contractor shall instruct a representative of the owner in proper operation and maintenance of the new air conditioning system. Both verbal and written instructions shall be furnished in detail. Written sets shall make reference to each item and describe it's proper functioning, adjustment, and maintenance. Provide five sets of bound and indexed manuals with instructions and include all shop drawing equipment and manufacturer's maintenance and operating instructions for each piece of equipment. Also include manufacturers parts list for each piece of equipment's operating characteristics, fan curves, etc.

TESTING, ADJUSTING & BALANCING:

The General Contractor shall obtain the services of an independent NEBB (or other) certified balancing and testing subcontractor engineer to balance all new and/or existing equipment as herein specified.

Contractor shall provide engineer with a pre-balance test report of the hot water pumps and equipment before any work is started. Reported data shall include boiler name plate and GPM, pump GPM, pressure drop, RPM, amperage and impeller size. Report shall also include flow pressure in & out and temperature in & out for all existing devices.

The balancing report shall record design vs. actual fan and motor rpm, motor amps and voltage. The balancing shall be conducted in accordance with NEBB.

The scope of water balancing shall include all new and existing equipment and piping within the building. Provide pump GPM, Pressure Drop, and Motor Amperage readings. Entire system shall be re-balanced after all work is complete to the pre-balance report readings.

SYSTEM START UP & FINAL INSPECTION:

This contractor shall start up and place all equipment into service. Equipment manufacturers standard startup procedures shall be followed.

When all work under this contract has been completed as indicated on the drawings and specified herein, an inspection shall be made by the engineer. At this time the HVAC Subcontractor shall demonstrate that the requirements of these specifications have been met.

SEQUENCE OF OPERATIONS:

HOT WATER CABINET UNIT HEATER: (CUH - #)
On a call for heat via wall-mounted thermostat, the unit heater shall stage on to maintain space temperature.



MEP Engineer



No.	Description	Date

Town of Acton
Memorial Library

486 Main Street
Acton, MA 01720

Project Number 213066
Date 1/24/2014
Drawn By AMB
Checked By WCC

M1
Scale 3/8" = 1'-0"