

PIPING SPECIFICATIONS
For MAHG20-1053, Repair HVAC Data Center, B1101

A. BASE SPECIFICATION:

See the following sections of UFC, UFGS specifications, noted.

- 23-64-26 HVAC CHW, CFW & HW Piping
- 22-00-00 General Purpose Plumbing
- 23-05-93 Testing, Adjusting and Balancing for HVAC .

B. PIPE MATERIALS:

Chilled water piping shall be copper pipe per ASTM B88, Type L or M. Chiller water connections at CRACUs will be 2"IPS, 2-1/8"OD copper. (63gpm, 18ftHD)

Hot Water ReHeat piping shall be copper pipe per ASTM B88, Type L or M. HW RH connections will be 3/4"IPS, 7/8"OD copper. (8gpm, 3.7ftHD)

CFW Humidifier piping shall be copper tubing per ASTM B88, Type L or M, CFW Humidifier connection at CRAC units will be 1/4"OD copper.

Condensate Drain piping shall be PVC piping must be per ASTM D2665-14, 3/4" PVC SCH40. Condensate Drain connection at CRAC units will be 3/4"NPT FEM.

C. VALVES:

Chilled water valves at each of (4+1) CRAC units:

QTY 4, 2"IPS supply & return line, isolation valves ... at units 242, 243 only.

QTY 10, 1/2"IPS drains isolation valves;

QTY 5, 2"IPS balancing valves, 9gpm @ unit 246 & 63gpm @ four other units

Hot Water ReHeat valves at each of (4+1) CRAC units:

QTY 4, 3/4"IPS supply & return line isolation valves ... at units 242, 243 only.

QTY 10, 1/2"IPS drains isolation valves;

QTY 4, 3/4"IPS balancing valves @ 8gpm each ... no HW RH at unit 246.

CFW humidifier valve at each CRAC unit:

QTY 5, 1/4"OD supply line isolation valves

All isolation valves shall be brass or bronze, lead free, 2pc regular port ball valves, w/quarter turn hand levers and soldered ends. Shall be capable of 150#, 0-200degF system service.

See Apollo 70LF-200 series or approved equal.

All balancing valves shall be brass or bronze, NPT ends, Y-pattern body & non-rising stem, and shut-off capable. Valves shall have P/T plugs, adjustable at set-point indicator, and compatible with all flow meters. Shall be capable of 150#, 0-200degF system service.

See Apollo 58A series or approved equal.

CFW humidifier isolation valve shall be brass or bronze, ball valve, w/quarter turn hand lever and compression fitting ends. Shall be capable of 150#, 0-200degF system service.

See LASCO 17-0995 or approved equal.

D. FITTINGS & JOINTS:

CFW humidifier piping shall use brass or bronze compression type fittings per ASME B31.3.

Soldered joints shall be made in conformance with AWS B2.3, ASME B16.22, and ASTM B828 and are acceptable for all pipe sizes equal to or greater than 1/2"IPS. Soldering material shall conform to AWS B32, and contain <0.2% lead. Soldering flux shall be in paste or liquid form and conform to ASTM B813 requirements. Flux must also be as follows: lead-free; have a 100 percent flushable residue; contain slightly acidic reagents; contain potassium borides; and contain fluorides.

Threaded joints at balancing valves shall have American Standard taper pipe threads conforming to ASME B1.20.1. Only male pipe threads shall be coated with graphite or with an approved graphite compound, or with an inert filler and oil, or shall have a PTFE tape applied.

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Condensate Drain piping shall use ASTM D2466-17, F1866-18 PVC SCH40 threaded and socket fittings. PVC piping & socket fittings shall be joined with a two-step primer & solvent cement joint per ASTM D2855 using ASTM F656 primers & ASTM D2564 solvents. The safe handling and use of these primers, cements shall be followed per ASTM F402.

E. INSTALLATION:

Pipe and tubing shall be cut accurately to measurements established at the building by The Contractor and shall be worked into place without springing or forcing. Care shall be taken not to weaken the structural portions of the building. Installation of pipe and fittings shall be made in accordance with this specification and applicable manufacturer's recommendations. Mitering of joints for elbows and notching of straight runs of pipe for tees will not be permitted.

New CHW, HW, CFW, and drain piping shall install and route parallel / perpendicular to the lines of the building unless otherwise shown or noted in reference drawing MAHG 20-1053, B1101 Data Center HVAC noted in SOW.

F. HANGERS AND SUPPORTS:

Design and fabrication of pipe hangers, supports, and welding attachments shall conform to MSS SP-58 and ASME B31.9. Hanger types and supports for bare and covered pipe shall conform to MSS SP-69 for the temperature range.

G. TESTS:

Upon completion of the chilled water system piping modification, prior to start-up testing of the NEW CRAC units; CHW piping shall be tested at a hydrostatic pressure of 38psig (1.5x 58ftHD WP), and proved tight at that pressure.

Upon completion of the hot water reheat piping modifications, prior to start-up testing of the NEW CRAC units; HW RH piping shall be tested at a hydrostatic pressure of 61psig (1.5x 93ftHD WP), and proved tight at that pressure.

CHW system test & balance must accomplish with both chillers running and 2 of 3 CHW pumps running. Pumps must prove 300-320gpm CHW flow capacity. Test & balance contractor must set CRAC unit CHW balancing valves at 63gpm each and 9gpm for unit 246. B1101 AHUs & FCUs should demand approx. 105gpm CHW flow at MAX. Confirm VFD pump drops to "low flow" with each of B1101 chilled water loads shut-off. Confirm CHW pumps keep both chillers operational at "low flow". CHW T&B report shall be turned over to VECTRUS CM.

HW system test & balance must accomplish with a single boiler running and 1 of 2 HW pumps running. Pumps must prove 50gpm HW flow capacity. Test & balance contractor must set CRAC unit HW-RH balancing valves at 8gpm each. No HW-RH is required at unit 246. B1101 AHUs & FCUs should demand approx. 30gpm HW flow at MAX. Confirm VFD pump drops to "low flow" with each of B1101 HW loads shut-off. Confirm HW pumps keep both boilers operational at "low flow". HW T&B report shall be turned over to VECTRUS CM.

CFW humidifier piping shall be visually inspected for leaks during CRAC unit start-up tests.

Condensate drain piping shall be gravity tested, while plugged full of water. The PVC drain fittings shall be inspected visually for leaks. As water is allowed to drain, water shall flow into the existing floor drain with no spillage onto floor around the floor drain.

Where a portion of the water piping system is to be concealed before completion, this portion shall be tested separately in the same manner as specified for the entire system.

Contractor shall provide a chilled water, hot water re-heat test report, prior to Vectrus CM.

Contractor and Vectrus CM shall witness the inspection of CFW humidifier and Condensate Drain

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leak and flow inspections.

Manufacturer shall provide a Start-Up Test Procedure.

Manufacturer's installation review and subsequent start up test must be accomplished to prove the manufacturer's warranty acceptable, EMCS control signal function, High Heat alarm & Smoke Detection shut downs, Liquid Sensor alarm, 2-WAY CHW and HW isolation valve actuation, Standby CRAC unit start upon Running CRAC unit shut-down.

Manufacturer shall provide start-up, operational test report to contractor and VECTRUS CM.

H. PIPE INSULATION

CHW and HW RH piping will require insulation.

All pipe, joints, fittings, and valves shall be insulated with factory pre-molded, precut or field-fabricated insulation. The type and thickness of insulation required shall be as listed herein.

CHW and HW RH piping shall use black flexible EPDM elastomeric-based unicellular insulation. See Armacell, AP Armaflex Tube or equal. Seal all insulation joints and secure jacket with adhesive, per ArmaFlex 520 adhesive or equal.

3/4" HW piping shall use 1-1/2" thick; 2" CHW piping shall use 1" thick.

Insulation shall be continuous through hangers. Extend all surface finishes to protect all surfaces, ends, and raw edges of insulation. Bevel and seal the edges of exposed insulation. Where pipes penetrate fire walls, provide mineral-fiber insulation inserts and sheet-metal sleeves. Insulate flanges, unions, valves and fittings in accordance with manufacturer's published instructions. Cover circumferential joints

with butt strips, not less than 3-inches wide, of material identical to the jacket material. Overlap longitudinal laps of jacket material not less than 1-1/2 inches. Use a vapor barrier coating on the ends of section of insulation that butt against flanges, unions, valves and fittings and joints. Apply this vapor barrier coating at all longitudinal and circumferential laps. At penetrations by pressure gauges and thermometers, fill the voids with the vapor barrier coating. Seal with a brush coat of the same coating.

I. PIPE IDENTIFICATION:

Label pipe with direction of flow and system clarification, as noted.

CHWS	Chilled Water Supply
CHWR	Chilled Water Return
CFW	CFW Humidifier
HWS	Hot Water ReHeat Supply
HWR	Hot Water ReHeat Return
DRN	Condensate Drain

Interior B1101 Data Center raised floor piping must use plastic tape pipe markers. Plastic tape pipe markers shall be of flexible, vinyl film tape with adhesive backing and printed markings as manufactured by W.H. Brady Company. For insulated & non-insulated indoor pipe use Brady B350.

Pipe identification is to be installed at ten foot intervals, as a maximum.