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BuildingName
The Description of the Project
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SPECIFICATION DIVISION 22

NUMBER SECTION DESCRIPTION

DIVISION 22 PLUMBING
SECTION 220519 - THERMOMETERS, PRESSURE GAUGES, AND ACCESSORIES

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DIVISION 22 PLUMBING
SECTION 220519 - THERMOMETERS, PRESSURE GAUGES, AND ACCESSORIES

REVISIONS:
2013-12-01: ADD MILJOCO, LEAD FREE FOR DOMESTIC, AND OTHER MINOR IMPROVEMENTS. D. KARLE FOR HYDRONICS/STM MTT.

2014-01-06: IMPROVED LEAD FREE REQUIRMENTS TO REFLECT U.S SAFE DRINKING WATER ACT REQUIREMENTS THAT WENT INTO EFFECT JAN. 4, 2014. D.KARLE FOR MTT.

2021-01-25: ADDED THE REQUIREMENT FOR A PRESSURE GAUGE ACROSS STRAINERS 2-1/2" AND ABOVE. D.KARLE FOR MTT.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

INCLUDE PARAGRAPH 1.1.A AND B IN EVERY SPECIFICATION SECTION. EDIT RELATED SECTIONS 1.1.B TO MAKE IT PROJECT SPECIFIC.

A. Drawings and general provisions of the Contract, Standard General and Supplementary General Conditions, Division 1 Specification Sections, and other applicable Specification Sections including the Related Sections listed below, apply to this Section.

1.2 SCOPE OF WORK:

A. Thermometers, pressure gauges, and accessories.

1.3 QUALITY ASSURANCE

A. Manufacturers and Products: The products and manufacturers specified in this Section establish the standard of quality for the Work. Subject to compliance with all requirements, provide specified products from the manufacturers named in Part 2.

B. Reference Standards: Products in this section shall be built, tested, and installed in compliance with the specified quality assurance standards; latest editions, unless noted otherwise.

1. UL Compliance: Comply with applicable UL standards pertaining to meters and gauges.
2. ASME and ISA Compliance: Comply with applicable portions of ASME and Instrument Society of America (ISA) standards pertaining to construction and installation of meters and gauges.
3. ASME/ANSI B40.1, Pressure Gauge Standard.
4. National Sanitation Foundation NSF/ANSI-61 (potable drinking water) and NSF-61 Annex G (listed as ≤ 0.25% weighted average lead content) (and/or NSF/ANSI-372) and Annex F. Applies to any item in contact with domestic (potable) water.
5. U.S Safe Drinking Water Act (any item in contact with domestic (potable) water).

PART 2 - PRODUCTS

2.1 THERMOMETERS:

SPEC EDITOR: "INDUSTRIAL" MERCURY TYPE THERMOMETERS HAVE BEEN REMOVED FROM THE MASTER SPECIFICATIONS BASED ON OSEH REQUIREMENT TO ELIMINATE UNNECESSARY USE OF MERCURY IN CONSTRUCTION. BI-METAL THERMOMETER DELETED PER HYDRONIC TEAM MEETING 10-19-01

SPEC EDITOR: CHOOSE BETWEEN THE TWO THERMOMETERS LISTED.

A. Digital Thermometer: electronic, with LCD display and solar cell, clear plastic window, adjustable angle, separable socket.

1. Range and accuracy: -40 to 300 deg.F, accuracy greater of (+/-) 1 deg.F or 1% of reading.
2. Manufacturers: Weiss Model DVBM25 (vari-angle), Tech Controls, Miljoco Corp.

B. Industrial Glass Thermometer: adjustable angle, scale to be 9" long with white aluminum back and black graduation, aluminum casing, blue appearing liquid tube, glass window. Stem for air duct shall be 6" long with protective aluminum slotted bulb guard and mounting flange. Stem for piping shall be 3-1/2" long aluminum, brass or stainless steel, stem to match specified thermometer well. Adjust stem length for insulation extension.

1. Range and accuracy: (+/-) 1 scale div. Except where otherwise noted, select range for maximum precision for system served:
2. Manufacturers: Ashcroft, H. O. Trerice, Marsh, Weksler, Weiss, Miljoco Corp.

SPEC EDITOR: VERIFY SPECIFIED RANGE FOR EACH PROJECT

Service	Range (deg. F)
Domestic Cold Water	30-130 or 0-120
Domestic Hot Water	30-180
Chilled Water / Condenser water	30-130 or 0-120
Heating Water	30-240
All other locations	shown on drawings

C. Thermometer Wells: Brass or stainless steel, with neck extension for insulated piping, with cap and chain fastened to well. 3/4"NPT, 2 1/2" insertion length, and extension length as required to extend well to outside of insulation. Lead free when used for domestic water applications.

D. Outdoor thermometers shall be ultraviolet proof and specifically manufactured for outdoor use.

2.2 PRESSURE GAUGES

SPEC EDITOR: THIS SPEC IS GEARED TOWARD MAINSTREAM HVAC APPLICATIONS. EDIT FOR CRITICAL APPLICATION. SOME DISCUSSION ON OPTIONS FOLLOW: STAINLESS MOVEMENT IS A BIT MORE EXPENSIVE THAN BRASS, BUT PROBABLY WORTHWHILE FOR ALL APPLICATIONS.
BRASS SOCKET IS SUITABLE FOR ALL BUT VERY AGGRESSIVE SYSTEMS. STAINLESS STEEL IS ALSO AVAILABLE.

1/2" SOCKET WORKS WELL WITH 1/2" ISOLATION AND MANIFOLD WE TYPICALLY USE - ALSO LESS PRONE TO PLUGGING THAN 1/4".
2 1/2" AND 4 1/2" ARE MOST COMMONLY USED IN THE INDUSTRY, AND SUITABLE FOR MOST LOCATIONS, EXCEPT WHERE GAUGES ARE DIFFICULT TO GET TO AND READ.
ACCURACY (OF FULL RANGE) OF 2%, 1% AND 1/2% ARE AVAILABLE. COST INCREASES SIGNIFICANTLY WITH IMPROVED ACCURACY. 1% IS REASONABLE FOR MOST APPLICATIONS. SPECIFY 1/2% FOR CRITICAL APPLICATIONS ONLY.
GLYCERIN FILL HELPS REDUCE VIBRATION AT PUMP, BUT TURNS CLOUDY ABOVE 150 DEG. F, NECESSITATING THE USE OF NEEDLE VALVES TO DAMPEN ABOVE THAT TEMP. DAMPENERS ARE NOT TYPICALLY REQUIRED. THEY PREVENT PRESSURE SURGES WITH A SMALL ORIFICE. DAMPENERS ARE PRONE TO PLUGGING UP AND ARE THEREFORE NOT TYPICALLY SPECIFIED.

A. Unless otherwise noted, provide all pressure gauges with clear glass window, cast aluminum, stainless steel or polypropylene case, black on white face, stainless steel wetted parts, brass 1/2" MPT socket, 1% full scale accuracy complying with ASME/ANSI B40-1 Grade 1A. Lead free when used for domestic water applications.

B. Water and Compressed Air Services through 2" piping (Utility/Economy): 2 1/2" diameter face, stainless steel case, brass or stainless steel 1/4" MPT socket, 2% full scale accuracy.

C. Water and Compressed Air Services over 2" piping: 4 1/2" diameter face, 6" diameter face for location more than 8 feet above floor, sealed glass window, glycerin filled for connections within 10 feet of pumps. For applications exceeding 145 deg. F, provide 316 stainless steel needle valves rated minimum 500 psi, in lieu of glycerin filled.

D. Steam Service: 4 1/2" diameter face, 6" diameter face for location more than 8 feet above floor, sealed glass window, brass or stainless steel coil siphon tube with a minimum pressure rating of 1000 psi.

SPEC EDITOR: EDIT OR DELETE THE FOLLOWING

E. Critical System Pressure Gauges: Stainless steel socket, 1/2% of full range accuracy, 6" diameter face, in accordance with AMSE/ANSI B40-1 Grade 2A. Applicable for the following locations:

SPEC EDITOR: LIST APPLICATIONS

SPEC EDITOR: EDIT OR DELETE THE FOLLOWING

F. Differential Pressure Gauges: 4 1/2" diameter face, 6" diameter face for location more than 8 feet above floor, sealed glass window, glycerin filled for connections within 10 feet of pumps. For applications exceeding 145 deg. F, provide 316 stainless steel needle valves rated minimum 500 psi, in lieu of glycerin filled. Applicable for the following locations:

SPEC EDITOR: LIST APPLICATIONS

G. Except where noted otherwise, select range for twice normal operating pressure:

Service	Range
Water (CW and HW)	0-100 psig
Steam(15#)	30" Hg vac. - 30 psig
Steam(60#)	30" Hg vac. - 100 psig
Comp. Air	0-100 psig

H. Outdoor gauges shall be ultraviolet proof and specifically manufactured for outdoor use.

I. Manufacturers: Ashcroft, H. O. Trerice, Marsh, Weksler, Weiss, Miljoco Corp.

2.3 PRESSURE/TEMPERATURE TEST PLUGS AND KITS:

A. Provide 1/4" brass pressure and temperature test plugs where shown on drawings, with two core Nordel rated for 275 degrees and 300 psig.

SPEC EDITOR: THE FOLLOWING IS NOT TYPICALLY REQUIRED, BUT CAN BE INCLUDED ON LARGE PROJECTS.

B. Provide one readout meter kit including required hoses with a minimum 3-1/2" dial differential pressure gauge. Gauge shall read 0 to 60 psig and have end connections to match both the flow valves and plugs. Included in the case shall be two pocket thermometers (25 to 125 and 0 to 220 degrees), one gauge adapter, and one pocket pressure gauge (0 to 160 psig). Meter shall become property of U of M (hand over to project engineer) after completion of work.

C. Manufacturers:

1. Plugs: Petes, Sisco, Schrader, Miljoco Corp.
2. Meter: Auto Flow, Griswold

PART 3 - EXECUTION

3.1 THERMOMETERS INSTALLATION

A. Install and orient wells and thermometers so thermometer can be read from the floor. Digital thermometers shall be located in areas with adequate light, where possible.

B. Thermometer Wells: For piping 2" and below, install in piping tee where thermometers are indicated, in vertical position. For piping below 2 1/2" and above, "weldolets" may be used. Fill well with oil or graphite and secure cap.

C. Install in the following locations and elsewhere as indicated:

SPEC EDITOR: EDIT LIST BELOW TO SUIT PROJECT REQUIREMENTS.

1. At inlet and outlet of each hydronic zone.
2. At inlet and outlet of each hydronic boiler and chiller.
3. At inlet and outlet of each hydronic coil in air-handling units over 5000 cfm.
4. At inlet and outlet of each hydronic heat exchanger.
5. At inlet and outlet of each hydronic heat recovery unit.
6. At inlet and outlet of each thermal storage tank.
7. At outside air intake ductwork.
8. At mixed air plenums.

9. At hot/cold deck plenums.
10. At each zone supply duct of multi-zone systems.
11. At supply duct of single zone systems.

3.2 INSTALLATION OF PRESSURE GAUGES

A. Install pressure gauges with 1/2" isolation ball valve. Where needle valves are specified as a substitute for glycerin filled in Part 2, install the needle valve between the ball valve and the gauge. Locate gauges to be readable from the floor preferably at eye level. Mount gauges securely to prevent excessive vibration, adjust needle valve to dampen pulsations. Install syphon tubes for steam pressure gauges, connected after the isolation ball valve. Do not install pressure gauges on bottom of piping.

SPEC EDITOR: EDIT LIST BELOW TO SUIT PROJECT REQUIREMENTS.

B. Install in the following locations, and elsewhere as indicated on drawings:

1. At suction and discharge of each pump.
2. At inlet and outlet of each pressure-reducing valve.
3. At building water service entrance.
4. At inlet and outlet of hydronic equipment (HW boilers, chillers, heat exchangers, filters).
5. Across strainers 2-1/2” pipe size and larger. Unless indicated otherwise, provide one pressure gauge connected to a ball valve at the inlet and a ball valve at the outlet of the strainer.

3.3 INSTALLATION OF TEST PLUGS

A. Test Plugs: Install in piping tee where indicated, located on pipe at most readable position. Secure cap.

3.4 ADJUSTING AND CLEANING

A. Adjusting: Adjust faces of meters and gauges to proper angle for best visibility.

B. Cleaning: Clean meters and gauges. Replace cracked and broken windows. Touch up scratches.

END OF SECTION 220519