

Part 2 Products – Not Used

Part 3 Execution

3.1 OPERATIONAL TESTS

- .1 Conduct operational tests after mechanical installations have been completed and pressure tested to demonstrate that equipment and systems meet specified performance requirements. Conduct these tests as soon as conditions permit. Make changes, repairs, adjustments, and replacements required as tests may indicate.
- .2 Conduct pre-operational tests, processes and inspections in presence of the Commissioning Facilitator, if so requested by the Departmental Representative.
- .3 Conduct final operational tests in presence of the Departmental Representative. Vary loads to illustrate start-up and shut down sequences. Simulate emergency conditions for safety shut downs, with automatic and manual reset. Repair and retest defects until satisfactory results are achieved. Make final adjustments to suit exact building conditions.

3.2 AIR SYSTEMS

- .1 Inspect air systems including ductwork layout, support, and vibration isolation before pressure testing any section of ductwork. Notify Departmental Representative when work is ready for inspection.
- .2 Pressure test sections of ductwork, in accordance with Section 23 08 43, prior to application of insulation or concealment. Notify Departmental Representative two working days prior to any system pressure test.
- .3 Test drop fire dampers in accordance with Section 23 08 83. Notify Departmental Representative two working days prior to fire damper testing.
- .4 Heat Recovery Ventilator start-up and performance verification using manufacturer's representative. Provide two working days notice to the Departmental Representative.
- .5 Start up coil circulators, exhaust air systems, etc.
- .6 Demonstrate operation of filters, freeze protect, fire alarm interlocks, etc.
- .7 Performance test fans, coils, etc. in accordance with Section 23 08 83.
- .8 Balance air systems in accordance with Section 23 08 83. Complete and submit Air Systems balance report to Departmental Representative.
- .9 If necessary change pulley drives to correct volume up or down on constant volume systems.
- .10 Perform acoustic survey in accordance with Section 23 08 83. Rectify any noise problems encountered.

- .11 Complete and submit Air Systems Start-up report as specified in Section 23 08 13.
- .12 Conduct Mechanical Systems Demonstration and Instruction in accordance with Section 23 08 93.

3.3 HYDRONIC SYSTEMS

- .1 Inspect piping layout, pipe support, expansion provisions, slope for draining and venting, vibration isolation, etc. before pressure testing any section of pipework. Notify Departmental Representative when work is ready for inspection.
- .2 Pressure test sections of pipework, in accordance with Section 23 08 43, prior to application of insulation or to concealment.
- .3 Pressure test each completed system, in accordance with Section 23 08 43, before any equipment is started. Notify Departmental Representative two working days prior to any system pressure test.
- .4 Start-up pumps.
- .5 Heating appliance: perform start-up and performance verification. Provide two working days notice to the Departmental Representative.
- .6 Rough balance system to ensure fluid circulation in every circuit. Rough balance heating systems by temperature drop measurement.
- .7 Chemically clean water filled system in accordance with Section 23 25 . Notify Departmental Representative two working days prior to any system cleaning.
- .8 Chemically treat water filled systems in accordance with Section 23 25 13.
- .9 Fine balance systems in accordance with Section 23 08 83. Complete and submit Hydronic Systems balance report to Departmental Representative.
- .10 Check system for fluid or pump noise in pipes. Rectify as necessary.
- .11 Provided the flow rate exceeds that specified, shave impeller on pumps larger than 1.5 kW if current draw exceeds motor full load amps or if there is excess flow which results in excessive pipe noise in adjacent occupied areas.
- .12 Complete and submit Hydronic systems Start-up report as specified in Section 23 08 13.
- .13 Conduct Mechanical Equipment and Systems Demonstration and Instruction in accordance with Section 23 08 93.

3.4 CONTROL SYSTEMS

- .1 Pressure test completed pneumatic system, in accordance with Section 23 08 43, before any equipment is started. Notify Departmental Representative two working days prior to system pressure test.
- .2 Load Physical Point Data Base, start/stop schedules, alarms, run time logs, trend logs, etc. into EMCS control panels in accordance with Division 25.
- .3 Commence 30 day trial use period by Departmental Representative.
- .4 Perform EMCS Physical Point verification and calibration in accordance with Division 25. Complete and submit Control Systems verification report to the Departmental Representative.
- .5 Load and debug custom control software in accordance with Division 25.
- .6 Provide Operator training at EMCS terminal in accordance with Section 23 09 23.

3.5 DOMESTIC WATER SYSTEMS

- .1 Inspect domestic water systems including piping layout, pipe support, expansion provisions, and slope for draining and venting, before pressure testing any section of pipework. Notify Departmental Representative when work is ready for inspection.
- .2 Pressure test sections of pipework, in accordance with Section 23 08 43, prior to application of insulation or to concealment.
- .3 Pressure test each completed system, in accordance with Section 23 08 43, before any equipment is started. Notify Departmental Representative two working days prior to any system pressure test.
- .4 Domestic hot water heating appliance: perform start-up and performance verification. Provide two working days notice to the Departmental Representative.
- .5 Balance Domestic Hot Water system return circulation circuits by temperature drop measurement.
- .6 Sterilize Domestic water systems in accordance with Section 22 11 20. Notify Departmental Representative two working days prior to any system sterilization.
- .7 Ensure all air chambers and expansion compensators are properly installed.
- .8 Ensure entire system can be completely drained.
- .9 Check operation of water hammer arrestors. Let one outlet run for ten seconds, then shut water off quickly. If water hammer occurs, replace water hammer arrestor. Repeat for each outlet and flush valve.

- .10 Complete and submit Domestic Water systems Start-up report as specified in Section 23 08 13.
- .11 Conduct Mechanical Equipment and Systems Demonstration and Instruction in accordance with Section 23 08 93.

3.6 PLUMBING DRAINAGE SYSTEMS

- .1 Inspect plumbing drainage systems including above ground drainage piping layout, pipe support, slope, venting, before pressure testing or concealing any section of the work. Notify Departmental Representative when work is ready for inspection.
- .2 Hydraulically test above ground installations within buildings in accordance with Section 23 08 43. Notify Departmental Representative two working days prior to any system pressure test.
- .3 Ensure all traps are fully primed.
- .4 Ensure all fixtures are properly anchored and connected to system.
- .5 Flush each valve, drain each sink and operate each fixture to ensure drainage and trap anti-siphon venting is effective.
- .6 Open each cleanout, cover with linseed oil and reseal each cleanout. Ensure each cleanout is fully accessible and access doors are properly installed.
- .7 Ensure roof drain metal domes are installed. Ensure storm piping is free of debris or roof insulation ballast. Remove caps as required. Verify insulation on piping is as specified in Section 23 07 01.
- .8 Complete and submit Drainage systems Start-up report as specified in Section 23 08 13.
- .9 Conduct Mechanical Equipment and Systems Demonstration and Instruction in accordance with Section 23 08 93.

3.7 SPRINKLER SYSTEMS

- .1 Inspect sprinkler systems including piping layout, pipe support, slope for draining, before pressure testing any section of pipework. Notify Departmental Representative when work is ready for inspection.
- .2 Pressure test Sprinkler systems, in accordance with Section 23 08 43, before any equipment is started. Notify Departmental Representative two working days prior to any system pressure test.
- .3 Ensure all equipment used has ULC labels visible.
- .4 Ensure all valves in sprinkler system are monitored and are clearly visible.
- .5 Ensure all flow switches are installed and are operational.

- .6 Flush systems as follows:
 - .1 Fill with water, let stand at full operating pressure for one week. Drain each riser separately, then drain main.
 - .2 Repeat above procedure three times.
- .7 Perform flow tests required by:
 - .1 Alberta Building Code.
 - .2 Authorities having jurisdiction.
 - .3 NFPA 13 - Installation of Sprinkler Systems.
- .8 Record incoming water pressure to building once a day for ten days prior to activating system.
- .10 Test and place sprinkler valve into operation. Adjust pressure switches.
- .11 Coordinate verification of fire alarm system with Division 26.
- .12 Record inlet water pressure.
- .13 Complete and submit Sprinkler systems Start-up report as specified in Section 23 08 13.
- .14 Conduct Mechanical Equipment and Systems Demonstration and Instruction in accordance with Section 23 08 93.

END OF SECTION