

**Part 1            General**

**1.1                QUALITY ASSURANCE**

- .1      Test equipment and material where specified or required by authority having jurisdiction to demonstrate its proper and safe operation.
- .2      Test procedures shall be in accordance with applicable portions of ASME, ASHRAE, SMACNA, NFPA, CSA and other recognized test codes as far as field conditions permit.
- .3      Provide notice to the Departmental Representative and Commissioning Facilitator before tests.
- .4      Do not conceal or cover piping, ductwork, fixtures or equipment until inspected, pressure tested and approved by the Departmental Representative. Provide ample written notice to the Departmental Representative before concealing any part of any system.

**1.2                SUBMITTALS**

- .1      Obtain certificates of approval and acceptance from authorities having jurisdiction and include same in Operating and Maintenance Manuals.
- .2      On completion of mechanical installation, provide certification of tests with detailed data as required. Itemize tests as to time performed and personnel responsible. Include copy of field data in Operating and Maintenance Manuals.
- .3      Include following information on pressure test certificate:
  - .1      Project name and location.
  - .2      System, sub-system or portion of system tested.
  - .3      Time and date.
  - .4      Test pressure and duration of test.
  - .5      Results of test.

**1.3                LIABILITY**

- .1      During tests, assume responsibility for damages in the event of injury to personnel, building or equipment and bear costs for liability, repairs and restoration.

**Part 2            Products - Not Applicable**

**Part 3 Execution**

**3.1 PRESSURE TESTS**

- .1 Piping, fixtures or equipment shall not be concealed or covered until inspected and approved by the Departmental Representative.
- .2 Provide equipment, materials and labour for tests. Use test instruments from approved laboratory or manufacturer and furnish certificate showing degree of accuracy. Install permanent gauges and thermometers just prior to tests to avoid changes in calibration.
- .3 Carry out hydraulic tests for 8 hours and maintain pressure. Where leakage occurs, repair and re-test.
- .4 Heating Water Piping: Test to 1-1/2 times maximum working pressure or minimum 1034 kPa water pressure.
- .5 Domestic Water Piping: Test to 1-1/2 times maximum working pressure or 1034 kPa water pressure measured at system low point.
- .6 Drainage Systems: Test by filling with water to produce water pressure of 30 kPa minimum and 75 kPa maximum. Check for proper grade and obstruction by ball test.
- .7 Natural Gas Piping: Test as required by authority having jurisdiction.
- .8 Sprinkler System: Test as required by authorities having jurisdiction.
- .9 Low Pressure Ducts: Test for tightness such that leakage is inaudible and not detectable by feel. Check for audible leaks at 500 Pa above duct design operating pressure.
- .10 Check systems during application of test pressure including visual check for leakage of water test medium, soap bubbler test for air or nitrogen test medium and halide torch for refrigerant medium.
- .11 During heating and cooling piping system tests, check linear expansion at elbows, U-bends, expansion joints and offsets for proper clearance.
- .12 When using water as test medium for system not using water or steam, evacuate and dehydrate the piping and certify the lines are dry. Use agency specializing in this type of work.
- .13 Should tests indicate defective work or variance with specified requirements, make changes immediately to correct the defects. Correct leaks by re-making joints in screwed fittings, cutting out and re-welding welded joints, re-making joints in copper lines. Do not caulk.

**3.2 PERFORMANCE TESTS**

- .1 Conduct performance tests to demonstrate equipment and systems meet specified requirements after mechanical installations are completed and pressure tested. Conduct tests as soon as conditions permit. Make changes, repairs and adjustments required as tests may indicate prior to operating tests.

- .2 Gas fired appliances rated in excess of 117 kW shall be subjected to an operational test established by the Gas Protection Branch and shall pass this test before being approved for operation.
- .3 Make operating tests for minimum of 7 days during heating season and cooling season of first year of operation and at times when directed, for proper setting of controls under peak load conditions.
- .4 Conduct final operating tests in presence of the Departmental Representative. Vary loads to illustrate start-up and shutdown sequence and simulate emergency conditions for safety shutdowns, with automatic and manual reset. Make final adjustments to suit exact building conditions.
- .5 Provide services of one job mechanic, ladders, tools and associated equipment required to assist the Departmental Representative in final tests.
- .6 Lubricate bearings, adjust and/or replace and set direct and "V"-belt drives for proper alignment and tension.
- .7 Calibrate and adjust thermostats, thermometers, gauges, linkage and dampers. Control valves shall operate freely.
- .8 Operate and test motors and speed switches for correct wiring and sequences. Check overload heaters in motor starters.
- .9 Fasten loose and rattling pieces of equipment to ensure quiet operation.

**END OF SECTION**