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3.10 Inspections

1. Leave joints in piping systems uncovered until tests are completed and system inspected and approved by Engineer and N.S. Dept. of Labor - Boiler Inspector.
2. Engineer and authority having jurisdiction to inspect new piping prior to hydrostatic pressure tests for compliance with approved drawings and specifications.
3. Obtain from engineer requirements for inspection and testing of system modifications, design changes and repairs performed in-house.
4. Pay costs for inspections.

3.11 Hydrostatic Pressure Tests

1. Pressure tests are required to verify quality assurance.
2. Give engineer minimum of 48 hours notice of intention to perform pressure tests.
3. After installation and before concealing, subject piping to hydrostatic pressure tests to 1.5 times maximum working pressure and maintain test pressure without loss for 24 hours.
4. Prior to tests, isolate equipment and other parts which are not designed to withstand test pressure or test media.
5. Conduct tests in presence of engineer and as required by the boiler inspector.
6. Bear costs for tests, for repairs or replacement, retesting, making good.
7. Insulate or conceal work after approval and certification of tests by engineer.

3.12 Flushing and Cleaning

1. Cleaning Solutions:
 - Tri-sodium phosphate: 0.40 kg per 100 L water in system sodium carbonate: 0.40 kg per 100 L water in system low-foaming detergent 0.01 kg per 100 L water in system.
2. Timing
 - 1. Systems to be operational, hydrostatically tested and with safety devices functional, before cleaning is carried out.
3. Cleaning agency:
 - 1. Retain services of qualified water treatment specialist to perform system cleaning.
4. Conditions at time of cleaning:
 - 1. Systems to be free from construction debris, dirt and other foreign material.
 - 2. Control valves to be operational, fully open to ensure that terminal units can be cleaned properly.
 - 3. Strainers to be clean prior to initial fill.
 - 4. Install temporary filters on pumps not equipped with permanent filters.
 - 5. Install pressure gauges on strainers to detect plugging.
 - 6. Steam traps with spring hangers to be blocked for support.
5. Cleaning procedures:
 - 1. Provide detailed report outlining proposed cleaning procedures at least 4 weeks prior to proposed starting date. Report to include:
 1. Cleaning procedures, flow rates, elapsed time.
 2. Chemicals and concentrations to be used.
 3. Inhibitors and concentrations.
 4. Specific requirements for completion of work.
 5. Special precautions for protecting piping system materials and components.
 6. Complete analysis of water to be used. This is to ensure water being used will not damage systems or equipment.
6. Conditions at time of cleaning of systems
 - 1. Systems to be free from construction debris, dirt and other foreign material.
 - 2. Control valves to be operational, fully open to ensure that terminal units can be cleaned properly.
 - 3. Strainers to be clean prior to initial fill.
 - 4. Install temporary filters on pumps not equipped with permanent filters.
 - 5. Install pressure gauges on strainers to detect plugging.
7. Hydronic Systems:
 - 1. Fill system with water, ensure air is vented from system.
 - 2. Fill expansion tanks 1/3 to 1/2 full, charge system with compressed air to at least 35 kPa (does not apply to diaphragm type expansion tanks).
 - 3. Use water meter to record volume of water in system to +/- 0.5%.
 - 4. Add chemicals under direct supervision of chemical treatment supplier. Ensure minimum of 1% solution of Ferroxidol F07103 for 48 hours at maximum temperature of 55°C.
 - 5. Close loop systems: circulate system cleaner at 60°C for at least 36 h. Drain as quickly as possible. Refill with water plus inhibitors. Test concentrations and adjust to recommended levels.
 - 6. Flush velocity in system mains and branches to be adequate so as to ensure removal of debris. System pumps may be used for circulating cleaning solution provided that velocities are adequate.
 - 7. Add chemical solution to system.
 - 8. Establish circulation, raise temperature slowly to maximum design or 82°C minimum. Circulate for 12 h, ensuring flow in all circuits. Remove heat, continue to circulate until temperature is below 35°C. Drain as quickly as possible. Refill with clean water. Circulate for 6 h at design temperature. Drain and repeat procedures specified above. Flush through low point drains in system. Refill with clean water adding to sodium sulphite (test for residual sulphite).
8. Report on Completion of Cleaning:
 - 1. When cleaning is completed, submit report, complete with certificate of compliance with specifications of cleaning component supplier.

3.13 Start-up of Hydronic Systems

1. After cleaning is completed and system is filled:
 1. Establish circulation and expansion tank level, set pressure controls.
 2. Ensure all air is removed.
 3. Check pumps to be free from air, debris, possibility of cavitation when system is at design temperature.
 4. Demineralize system pumps used for cleaning, inspect, replace worn parts, install new gaskets and new set of seals.
 5. Clean out strainers repeatedly until system is clean.
 6. Commission water treatment systems as specified Section 15118 - HVAC Water Treatment Systems.
 7. Check water level in expansion tank with cold water with circulating pumps OFF and again with pumps ON.
 8. Repeat with water at design temperature.
 9. Check pressurization to ensure proper operation and to prevent water hammer, flashing, cavitation. Eliminate water hammer and all other noises.
 10. Bring system up to design temperature and pressure slowly over a 48 hour period.
 11. Perform TAB as specified Section 15050 - Testing, Adjusting and Balancing (TAB).
 12. Adjust pipe supports, hangers, springs as necessary.
 13. Monitor pipe movement, performance of expansion joints, loops, guides, anchors.
 14. Re-tighten all bolts, etc., using torque wrench, to compensate for heat-caused relaxation. Repeat several times during commissioning.
 15. Check operation of drain valves.
 16. Adjust valve stem packing as systems settle down.
 17. Fully open all balancing valves (except those that are factory-set).
 18. Check operation of over-temperature protection devices on circulating pumps.
 19. Adjust alignment of piping at pumps to ensure flexibility, adequacy of pipe movement, absence of noise or vibration transmission.

3.14 Demonstrations

1. Operate at design temperatures, pressures, flow rates for consecutive period of 48 hours to demonstrate compliance with design criteria and design intent.
2. Demonstrations also to show completeness of O & M personnel training.

3.15 Certificates

1. The contractor shall obtain a UI data form for new pressure vessels (including heat exchangers, boilers, tanks (etc.) from manufacture. Contractor shall submit UI data form and fee (at his expense), to appropriate body who will issue a certificate for pressure vessels.

3.16 Insulation

1. Pipework:
 1. Apply insulation materials, accessories and finishes in accordance with manufacturer's recommendations and as specified herein.
 2. Repair insulation in existing mechanical room (Convivor Room).
 3. Re-insulate where asbestos insulation has been removed.
 4. Install in accordance with ANSINFPFA 90A and ANSINFPFA 90B.
 5. Seal and finish exposed ends and other terminations with insulating cement.
 6. Flanges and unions at equipment, expansion joints, valves, other components requiring regular maintenance: omit insulation and bevel away from studs and nuts to permit use of tools without damage to insulation, install insulation pads and finish to permit easy disassembly and replacement without damage to adjacent insulation and finishes.

3.17 Plumbing - Water

1. Disinfection
 1. Flush out, disinfect and rinse system to requirements of authority having jurisdiction. Provide laboratory test report on water quality for approval.
2. Mechanically formed tee connections: water piping
 1. Mechanically formed tee connections, ball or approved equal, shall be permitted for use on copper tube water systems in Type I, copper.

2. Mechanically extracted collar shall be formed in continuous operation, consisting of drilling a pilot hole and drawing out the tube surface to form a collar having a height of not less than three times the thickness of a tube wall. The collaring device shall be fully adjustable so to ensure proper tolerance and complete uniformity of the joint.

3. The branch shall be notched to conform with the inner curve of the run tube, depth to ensure penetration of the branch tube into the collar is of sufficient depth for brazing and that the branch tube does not obstruct the flow in the main line tube.

4. All joints shall be brazed in accordance with the latest addition of the AWS Brazing Manual and AWS C3.3 recommended practices for design, manufacture and inspection of critical brazed components and shall comply with the copper development association copper tube handbook using b-cup series filler metal.

5. All mechanically formed branch collars shall be listed or approved by the appropriate National, Provincial or Municipal codes in addition to the underwriters laboratory.

6. T-drill connection can be used on one (1) inch and above water pipe and where the branch line connection to the branch main is at least One (1) pipe size smaller than the branch main.

3.18 Plumbing - Drainage

1. Installation:
 1. Install buried pipe on 6 in. bed of clean washed sand, shaped to accommodate hubs and fittings, to line and grade as indicated. backfill with 6 in. of clean washed sand.
 2. Install piping parallel and close to walls and ceilings to conserve headroom and space, and to grade as indicated.
 3. Grade piping at 1/8" per foot.
 4. Install freestop rings and/or freestop floor sleeves at each floor or wall penetration.

3.19 Ventilation

1. Do work in accordance with ANSINFPFA 90A, ANSINFPFA 90B ASHRAE CSA B226.1 and SMACNA as indicated.
2. Do not break continuity of insulation vapour barrier with hangers or rods. Insulate strap hangers 4 in. beyond insulated duct.
3. Support risers in accordance with ASHRAE and SMACNA as indicated.
4. Install breakaway joints in ductwork on each side of fire separation.
5. Install proprietary manufactured flanged duct joints in accordance with manufacturer's instructions.
6. Strap Hangers: Install in accordance with SMACNA.
7. Angle Hangers: complete with locking nuts and washers.
8. Hanger Spacing: in accordance with ASHRAE, SMACNA - as follows:

DUCT SIZE (inches)	SPACING (inches)
TO 60"	120
61" AND OVER	100
9. Provide watertight duct for fresh air intake and exhaust air plenum.
10. Form bottom of horizontal duct without longitudinal seams. Seal all other joints with duct sealer.
11. Fit base of riser with 6 in. deep drain sump and 1 in. drain connected, with deep seal trap and discharge to open funnel drain. Sump shall be length of fouver and depth of plenum.
12. Apply sealant to outside of joint to manufacturer's recommendations.
13. Bed tape in sealant and recast with minimum of 1 coat of sealant to manufacturer's recommendations.

14. Flexible Connections - Installation

1. Install in following locations:
 1. Inlets and outlets to supply air units and fans.
 2. Inlets and outlets of exhaust and return air fans.
 3. as indicated.
2. Access Doors and Viewing Panels:
 1. Size:
 1. 24" x 24" for person size entry.
 2. 12" x 12" for service entry.
 3. 8" x 8" for viewing.
 4. 4" x 4" for quick opening doors for inspection at volume dampers.
 2. Location:
 1. at fire and smoke dampers.
 2. at control dampers.
 3. at devices requiring maintenance.
 4. at locations required by code.
 5. at coils, filters, fans, fresh air and exhaust air plenums, bottom of risers.
 6. at 30' intervals for duct cleaning.
3. Fire dampers: install in accordance with ANSINFPFA 90A and in accordance with conditions of U.L.C. listing; maintain integrity of fire separation.

END



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APPROVED AS REFLECTING STRUCTURAL DESIGN TEAM DECISIONS

RESTORATION ARCHITECT

PROJECT MANAGER

HEAD OF HISTORICAL RESOURCES

MANAGER, ASSET MANAGEMENT

FIELD UNIT SUPERINTENDENT

A	A detail no.	détail n°
B	B location dwg.	sur dessin n°
C	C drawing no.	dessin n°

date	scale/échelle
MAR. 2015	1/4" = 1'-0"

designed by/conçu par
V.J. BELLIVEAU
drawn by/tracé par
M. MORELL

project title / titre du projet
**REPURPOSING OF
SANTIER-VALLEE
MAGASIN HOUSES**

drawing title / titre du dessin
**MECHANICAL
SPECIFICATIONS
SHEET No.2**

reference no. n° de référence	dwg. no. n° de dessin
-	732

