METROLINX

HVAC Water Treatment Specification

Specification 23 25 00

Revision 01

September 2025

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Metrolinx,

an Agency of the Government of Ontario

Amendment Record Sheet

Amendment in Clause No.	Date of Amendment	Description of Changes
Various	September 2018	Revised to coordinate with corresponding specifications.
1.7.7 a) 2)	September 2025	Deleted requirements not applicable to this Section of work.
1.7.8	September 2025	Revised list of shop drawings shall be provided to suit this Section of the specification.
1.8.1	September 2025	Deleted requirement not applicable to this Section of work.
1.8.1 a)	September 2025	Removed requirement for ISO certification qualification for manufacturers.
1.8.2 a)	September 2025	Deleted requirement not applicable to this Section of work.

Contents:

1. GENERAL

1.1. SCOPE OF WORK

1.1.1. Provide HVAC water treatment as required, scheduled and specified herein.

1.2. DESIGN REQUIREMENTS

1.2.1. Design requirements are also based on Part 2 specified requirements of products.

1.3. RELATED WORKS

1.3.1. Section 20 05 05 - Mechanical Work General Instructions.

1.3.2. Section 20 05 10 - Basic Mechanical Materials and Methods.

1.3.3. Section 20 05 40 – Mechanical Work Commissioning.

1.4. TRAINING

1.4.1. Training shall be a full review of all components, including but not limited to a full operation and maintenance demonstration, with abnormal events.

1.4.2. Include for 3 training sessions of maximum 7-hour duration per session for 5 Metrolinx people per session.

1.4.3. Refer to Section 20 05 05 for additional general requirements.

1.5. WARRANTY

1.5.1. Products shall be guaranteed by manufacturer, for a minimum of 2 years after acceptance by Metrolinx.

1.6. DELIVERY, STORAGE AND HANDLING

1.6.1. Handle and store products in accordance with manufacturer's instructions, in locations approved by Metrolinx. Include one copy of these instructions with product at time of shipment.

1.7. SUBMITTALS

1.7.1. Refer to submittal requirements in Section 20 05 05.

1.7.2. Submit shop drawings/product data sheets for all products specified in this Section.

1.7.3. Submit product literature sheets for all chemicals, as well as WHMIS Material Safety Data Sheets for all chemicals.

1.7.4. Submit water treatment manufacturer/supplier certification letters as specified in Part 3 of this Section.

1.7.5. Submit water treatment test sets and spare chemicals as specified below and in Part 3 of this Section.

1.7.6. Supply water softener salt minimum for 2 months of normal softener operation and store salt on-site where directed by Metrolinx.

1.7.7. Product Data

a) Submit product data sheets indicating:

1) Technical data, supplemented by bulletins, component illustrations, detailed views, technical descriptions of items, and parts lists;

2) Product transportation, storage, handling, and installation requirements; and

3) Product identification in accordance with Metrolinx requirements.

1.7.8. Shop Drawings

a) Submit shop drawings including:

1) Submit shop drawings/product data sheets for all water treatment chemical feed equipment and associated hardware; and

2) Submit product literature sheets for all chemicals, as well as WHMIS Material Safety Data Sheets for all chemicals.

1.8. QUALITY ASSURANCE

1.8.1. Manufacturers Qualifications

a) Manufacturer of product shall have produced similar product for a minimum period of five years. When requested by Consultant, an acceptable list of installations with similar product shall be provided demonstrating compliance with this requirement; and

b) Where manufacturers provide after installation onsite inspection of product installations, include for manufacturer's authorized representative to perform onsite inspection and certificate of approvals.

1.8.2. Installers Qualifications

a) Installers for work shall be performed by or work under licensed Mechanical Contractor;

b) Installers of equipment, systems, and associated work shall be qualified and experienced installers of respective products and work in which they are installing; and

c) Where manufacturers provide training sessions to installers and certificates upon successful completion, installers to have obtained such certificates and submit copies with shop drawings.

1.8.3. Regulatory Requirements

a) Products and work to comply with applicable local governing authority regulations, bylaws, and directives; and

b) Include required inspections and certificate of approvals of installation work from local governing authorities.

2. PRODUCTS

2.1. CHARACTERISTICS OF CHEMICALS AND SPARE CHEMICALS

2.1.1. Chemicals specified in this Section shall be non-toxic when released to atmosphere, non-corrosive, and non-staining if a leak occurs, and compatible with all system components.

2.1.2. Chemicals shall be approved by governing authorities for release into Municipal sewer system.

2.1.3. For each treatment system for which chemicals are supplied, supply and hand to Metrolinx, at Substantial Performance of the Work, spare chemicals in original containers/packaging for 2 months of treatment system operation.

2.2. MANUFACTURERS/SUPPLIERS OF CHEMICALS AND FEED EQUIPMENT

2.2.1. Standard of quality assurance manufacturers are:

a) Ashland Hercules Water Technologies;

b) Klenzoid Inc.;

c) Magnus Canada;

d) Chem-Aqua Canada; or

e) Approved equivalent.

2.3. EXISTING TREATMENT SYSTEMS

2.3.1. Confirm with Metrolinx if there is a contract with a treatment chemical supplier to maintain proper levels of chemical in building systems. New chemicals and/or treatment delivery hardware shall be supplied by this supplier. Obtain supplier's name during bidding process and obtain required pricing information.

2.4. PIPING SYSTEM FLUSHING AND CLEANING CHEMICAL

2.4.1. Liquid form alkaline type cleaner consisting of a concentrated blend of highly active penetrating agents and detergents with a 12.5 pH and specifically formulated to remove oil, mill scale and oxides from piping and equipment.

2.5. CLOSED HEAT TRANSFER SYSTEM TREATMENT

2.5.1. Chemicals, chemical feed equipment, and test equipment to control corrosion in closed heat transfer circulating systems as indicated on drawings and as specified below.

2.5.2. Enamelled steel or cast-iron by-pass feeders sized as shown, 2060 kPa (300 psi) rated and complete with 20 mm (¾") diameter NPT pipe connection tappings, and a screw-on cast iron cap with "Buna N," "O," ring or approved equivalent, seal.

2.5.3. By-pass filter and flow indicator assembly equal to a Shelco Inc. FOS78 or approved equivalent, 1725 kPa (250 psi) rated replaceable cartridge filter assembly with a stainless-steel housing and 20 mm (¾") diameter piping connections, sized for approximately 5% of rated circulating pump flow and complete with a minimum of 6, 20 micron filter cartridges, and a sight flow indicator Anderson Midwest Model 350SS or approved equivalent, with 20 mm (¾") diameter piping connections.

2.5.4. Piping tee mounting coupon holders, each complete with 25 mm (1") diameter NPT plugs with a minimum of one coupon for copper and one coupon for steel.

2.5.5. Chromate-free, nitrite/borate-type corrosion inhibitor suitable for use with both ferrous and non-ferrous metals.

2.5.6. Test kit for measuring inhibitor level.

2.6. OPEN HEAT TRANSFER SYSTEM TREATMENT

2.6.1. Chemicals, chemical feed equipment, and test equipment to control corrosion and scale formation and inhibit algae/bacteria growth in open heat transfer circulating systems as indicated on drawings and as specified below.

2.6.2. Chemical feed equipment consisting of following:

a) Surface wall wall-mounted PVC panel with shelf;

b) Water treatment controller equal to a Lakewood Instruments Model 1575e or approved equivalent, 115 VAC, 60 Hz, 1-phase, electronic, single circuit board design, field programmable, menu-driven controller housed in NEMA 4X surface mounting enclosure and complete with:

1) Power cord with plug, and 4 female receptacles;

2) 3 relays for feed control of treatment chemicals, with feed based on water makeup, percent of bleed time, percent of "on" time, or schedule, feed lockout upon low system flow condition, and bleed lockout when feeding biocide;

3) 2 water meter inputs, 2 drum switch inputs, conductivity sensor input, flow switch input, and one 4-20 mA output; and

4) Heavy-duty, stainless steel, domed, numeric 16 tactile pushbutton keyboard and illuminated LCD graphic display screen.

c) 3, electronic, 115 VAC, 60 Hz, 1-phase, diaphragm type metering pumps Idex Corp. "PULSEFEER" Series C Plus or approved equivalent, each complete with manually adjustable stroke rate and length, guided ball check valve systems, bleed valve assembly, a pipe mounting injection/back pressure valve assembly, foot valve strainer assembly, and required suction and discharge tubing;

d) Make-up water meter sized to water make-up pipe diameter, complete with hermetically sealed register, factory preset pulse rate, and contact head with 115 V, 10 A rated switch;

e) Flow sensor assembly Drew #9427-01-5 or #9426-01-7 or approved equivalent, to suit system flow rate;

f) CSA-certified, 1035 kPa (150 psi) rated, 12 mm (½") diameter, 115 VAC, 60 Hz, 1-phase, normally closed forged brass solenoid valve for system bleed; and

g) Pipe mounting conductivity sensor with conduit elbow and a minimum of 6 m (20 ') of cable.

2.6.3. Treatment chemicals: Drew Canada or approved equivalent, :

a) "Performax Millennium" Series #2395 corrosion inhibitor and deposit control in a drum-type container;

b) "Biocide T" slime control agent in a pail-type container;

c) "Biosphere 250" for control of bacteria, fungi, and algae, and supplied in pail or drum-type containers as required.

2.6.4. Chemical test equipment consisting of:

a) Organic or phosphate test kit; and

b) Alkalinity and chloride dropper test kit.

2.7. BOILER BOIL-OUT CHEMICALS

2.7.1. Boiler boil-out chemicals selected by chemical treatment manufacturer/ supplier in consultation with Consultant and boiler manufacturer, and chemicals selected shall be approved by boiler manufacturer.

2.8. STEAM BOILER SYSTEM TREATMENT

2.8.1. Chemicals, chemical feed equipment, and lost equipment to control corrosion and scale formation in steam boiler systems as indicated on drawings and as specified below.

2.8.2. Chemical feed equipment consisting of following:

a) Surface wall mounting PVC panel with shelf;

b) Water treatment controller equal to a Lakewood Instruments Model 1575e or approved equivalent, 115 VAC, 60 Hz,1-phase, electronic, single circuit board design, field programmable, menu-driven controller housed in NEMA 4X surface mounting enclosure and complete with:

1) Power cord with plug, and four female receptacles;

2) 3 relays for meter/timer feed control of treatment chemicals;

3) 2 water meter inputs, 2 drum switch inputs, conductivity sensor input, flow switch input, and one 4 to 20 mA output; and

4) Heavy-duty, stainless steel, domed, numeric, 16 tactile pushbutton keyboard and illuminated LCD graphic display screen.

c) 3, electronic, 115 VAC, 60 Hz, 1-phase, diaphragm type metering pumps equal to Idex Corp. "PULSEFEER" Series C Plus or approved equivalent, each complete with manually adjustable stroke rate and length, guided ball check valve systems, bleed valve assembly, a pipe mounting injection/back pressure valve assembly, foot valve/strainer assembly, and all required suction and discharge tubing;

d) Make-up water meter sized to water make-up pipe diameter, complete with hermetically sealed register, factory preset pulse rate, and contact head with 115 V, 10 A rated switch;

e) Flow sensor assembly equal to Drew #9427-01-5 or #9426-01-7, or approved equivalent, to suit system flow rate;

f) CSA certified, 1035 kPa (150 psi) rated, 12 mm (½") diameter, 115 VAC, 60 Hz, 1-phase, normally closed forged brass solenoid valve for system bleed, suitable for steam service at the pressure involved; and

g) Pipe mounting conductivity sensor with conduit elbow and a minimum of 6 m (20') of cable.

2.8.3. Treatment chemicals Drew Industrial or approved equivalent, chemicals:

a) "Drewtrol 706" liquid sludge conditioner type corrosion and deposit control chemical supplied in drum container;

b) CSW625 liquid oxygen scavenger to control pipe and equipment pitting and supplied in drum containers;

c) "Amercor 8548" liquid form neutralizing amine to neutralize carbon dioxide and other acidic contaminants, and supplied in drum containers; and

d) "LAC" alkaline boiler boil-out compound.

2.8.4. Chemical test equipment consisting of:

a) Alkalinity test kit;

b) Sulphide dropper test kit; and

c) Oakton "pHTestr 2" or approved equivalent, digital pocket-type pH meter for testing alkalinity, residual sulphite, and pH levels.

2.9. WATER SOFTENER

2.9.1. Package type, automatic, water conserving counterflow design water softener assembly to remove hardness to not more than 0.3 grains per gallon as determined by an ASTM standard soap test method, sized for a continuous flow rate of system make-up requirements at maximum output, and complete with:

a) 2 fibreglass reinforced plastic vessels, each sized for 100 % of make-up requirements and complete with a moulded polypropylene structural base;

b) Controller for both automatic and manual regeneration, with electronic automatic regeneration based on adjustable totalized quantity of softened feed water, and designed to prevent simultaneous regenerations and permit time adjustment for backwash, brine, and rinse steps;

c) Full charge of cation exchange resin, which has a capacity of 68.8 kg/m^3 (4.3 lb/ft^3) of resin at a regeneration salt dosage level of 240 kg/m^3 (15 lb/ft^3) of resin;

d) High-density brine tank, sized to contain amount of salt required for 10 regenerations and complete with required PVC valves and tubing;

e) Softener inlet water meter, calibrated in m^3;

f) Softener salt required for initial brine tank fill and system start-up, and bags of salt as required for 2 months of system operation;

g) Test kit for conducting a soap hardness test; and

h) Factory secured seismic restraint connection hardware.

2.10. WATER TREATMENT TESTING COUNTER

2.10.1. Factory-made, 1.8 m (6 ') long, 915 mm (36") high, 600 mm (24") deep commercial-grade counter assembly with toe space, complete with:

a) At one end, a 508 mm x 520 mm x 175 mm (20" x 20-½" x 7") Type 316 stainless steel sink AMI #1017-C or approved equivalent, complete with 3-hole punched ledgeback, crumb cup strainer, and a drain fitting with 40 mm (2-½") diameter tailpiece;

b) Supply fitting Zurn #Z-831B4-Ict-25 or approved equivalent, with vandal-proof aerator and 100 mm (4") long blade handles;

c) Acid-resistant counter surface with minimum 250 mm (10") high splashback;

d) Set of double doors under sink;

e) Set of 4 drawers at end opposite sink;

f) Cupboard with 3 adjustable shelves adjacent to drawers;

g) All required hardware, including concealed hinges, drawer slides with stops, and door pulls; and

h) Acid-resisting white enamel finish on all wooden surfaces.

3. EXECUTION

3.1. PIPING SYSTEM FLUSHING AND CLEANING

3.1.1. After new heat transfer system piping has been installed and leakage testing has been satisfactorily completed, but before mechanical equipment start-up and performance tests, flush and chemically clean piping systems.

3.1.2. Provide required temporary piping connections, including bypass piping to isolate dirt-sensitive mechanical plant equipment. Remove instrumentation such as flow meters and switches, orifice plates, meter valves and similar devices and plug pipe openings. Reinstall when flushing and cleaning work has been certified complete by chemical manufacturer/installer. Ensure control valves are operational and completely open during flushing and cleaning.

3.1.3. Prior to chemical cleaning, flush piping, including dead ends, with water to remove loose solids. Clean all strainers. Replace chemical feeder line filters as required. Flush and drain until water runs clear.

3.1.4. When flushing with water is complete, fill systems with fresh, clean water. Meter amount of water required to fill each system or otherwise calculate system capacity. Ensure all air is vented from systems. Add cleaning chemical as instructed by chemical manufacturer, and circulate solution for a period of time and at a temperature as required to produce a clean piping system. Conduct daily pH, conductivity, and total iron tests in accordance with chemical supplier's instructions.

3.1.5. After chemical cleaning, when test results indicate a clean system, drain solution from piping, refill with clean water, and circulate water for a minimum of 24 hours to flush out remaining chemical solution, then drain water from piping using all drain points and again clean all system strainers and replace filters. Arrange for chemical supplier to check each system after flushing and cleaning is complete and to certify in writing that flushing and cleaning procedures have been properly performed. Submit a copy of the certification letter. Fill systems.

3.2. INSTALLATION OF CLOSED HEAT TRANSFER SYSTEM TREATMENT

3.2.1. After flushing and cleaning procedures have been certified complete, provide a by-pass chemical feeder, a cartridge filter assembly, and corrosion test coupons for each closed heat transfer system. Install in accordance with requirements of drawing details.

3.2.2. Chemicals shall be supplied and dosed into each system in the quantities necessary to achieve the required concentration levels. These concentration levels shall be maintained throughout the system until the Substantial Performance of the Work.

Arrange for chemical supplier to check chemical levels in each system, to certify in writing that feed equipment is properly installed and water in each system is properly treated with chemical. A copy of the certification letter shall be submitted to Metrolinx.

3.2.3. Hand test sets shall be supplied to Metrolinx at site.

3.2.4. In addition to work described above, a pot feeder shall be provided in valved by-pass piping around each pump.

3.3. INSTALLATION OF OPEN HEAT TRANSFER SYSTEM TREATMENT

3.3.1. After flushing and cleaning procedures have been certified complete, provide a PVC panel-type backboard, a water treatment controller, 3 metering pumps, a make-up water meter, a flow sensor, a solenoid valve, and a conductivity sensor for each open heat transfer system. Install in accordance with requirements of drawing detail.

3.3.2. Chemicals shall be supplied and dosed into each system in the quantities necessary to achieve the required concentration levels. These concentration levels shall be maintained throughout the system until the Substantial Performance of the Work.

3.3.3. Arrange for chemical supplier to check chemical levels in each system, to certify in writing that feed equipment is properly installed and water in each system is properly treated with chemical. A copy of the certification letter shall be submitted to Metrolinx.

3.3.4. Hand test sets shall be supplied to Metrolinx at site.

3.3.5. In addition to work described above, a pot feeder shall be provided in valved by-pass piping around each pump.

3.4. BOILER BOIL-OUT AND CLEANING

3.4.1. When boiler installation is complete, inspect each boiler and remove all visible debris, rust, scale, and oil, then thoroughly flush each boiler with clean water. Provide required temporary piping connections.

3.4.2. When flushing is complete, boil-out each boiler with a chemical solution approved by boiler manufacturer to remove remaining grease, oil, and dirt. Operate each boiler at 50% of normal operating pressure for a minimum of 48 hours or until all contaminants are removed, then again flush each boiler with fresh water until all traces of chemical solution are removed.

3.4.3. When boilers are clean and have been flushed, immediately fill each boiler with water which is chemically treated as specified in this Section.

3.5. INSTALLATION OF STEAM BOILER SYSTEM TREATMENT

3.5.1. After flushing and cleaning procedures have been certified complete, provide a PVC panel-type backboard, a water treatment controller, 3 metering pumps, a make-up water meter, a flow sensor, a solenoid valve, and a conductivity sensor for steam boiler system. Install in accordance with requirements of drawing detail.

3.5.2. Boil-out boiler(s) using chemical specified in accordance with both chemical manufacturer's recommendations and boiler supplier's recommendations.

3.5.3. Chemicals shall be supplied and dosed into each system in the quantities necessary to achieve the required concentration levels. These concentration levels shall be maintained throughout the system until the Substantial Performance of the Work.

3.5.4. Arrange for chemical supplier to check chemical levels in system, to certify in writing that feed equipment is properly installed and water in each system is properly treated with chemical. A copy of the certification letter shall be submitted to Metrolinx.

3.5.5. Hand test sets shall be supplied to Metrolinx at site.

3.6. INSTALLATION OF WATER SOFTENER

3.6.1. Provide a package-type water softener assembly and secure in place on a concrete housekeeping pad.

3.6.2. Brace and secure assembly in accordance with local governing building code and authority requirements for seismic control and restraint.

3.6.3. Install equipment and components supplied loose with softener in accordance with softener manufacturer's instructions. Provide required valved piping, including drain piping terminated at a funnel floor drain combination.

3.6.4. Install initial charge of softener salt. Hand soap test kit to Metrolinx at site.

3.7. INSTALLATION OF WATER TREATMENT TESTING COUNTER

3.7.1. Provide a counter assembly with sink and trim for use during water treatment testing of circulating system samples. Confirm exact location prior to rough-in of services.

3.7.2. Store treatment test kits and a WHMIS Material Safety Data Sheet for each treatment chemical in the counter assembly.

3.8. MANUFACTURER'S CERTIFICATION, START-UP, AND TRAINING

3.8.1. For all water treatment equipment, include on-site certification, start-up supervision, and system training by treatment chemical manufacturer's representative as follows:

a) Refer to Section entitled Basic Mechanical Materials and Methods for equipment/system manufacturer certification requirements; and

b) Refer to Section entitled Basic Mechanical Materials and Methods for equipment/system start-up requirements.

END OF SECTION