

## PLUMBING FIXTURES AND TRIM

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### 1. GENERAL

#### 1.1 Scope

- .1 Plumbing fixtures and trim.

#### 1.2 General Requirements

- .1 Provide new fixtures, CSA approved, free from flaws and blemishes with finished surfaces clear, smooth and bright.
- .2 Provide CSA approved plumbing fittings. Visible parts of fixture brass and accessories shall be heavily chrome plated.
- .3 Fixtures shall be product of one manufacturer. Fittings of same type shall be of product of one manufacturer.
- .4 Protect fixtures against use and damage during construction.

#### 1.3 Job Conditions

- .1 Check millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

#### 1.4 Submittals

- .1 Submit shop drawings for review.

### 2. PRODUCTS

#### 2.1 Stainless Steel Sink SK-1

- .1 Bowl: 790 mm x 520 mm x 180 mm O.D., 20 gauge, 18-8 stainless steel, self-rimming bowl double compartment with under coating, 90 mm crumb cup, holes drilled in ledgeback complete with under deck clamps. KIL Steel Queen QDL-2031/7.
- .2 Trim: Sink supply faucet, lever handle, 200 mm swing spout with aerator, 200 mm centres, polished chrome finish Symmons S-23.

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**PLUMBING FIXTURES AND TRIM**

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**3. EXECUTION**

**3.1 Installation**

- .1 At completion thoroughly clean plumbing fixtures and equipment.
- .2 Provide chrome plated rigid or flexible supplies to fixtures with screwdriver stops, reducers and escutcheons.

**END OF SECTION**

## **FIRE EXTINGUISHERS**

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### **1. GENERAL**

#### **1.1 Scope**

- .1 Fire extinguishers.
- .2 Fire extinguisher cabinets and mounting hardware

#### **1.2 General Requirements**

- .1 Provide portable hand extinguishers where indicated on drawings and specified herein.

#### **1.3 Quality Assurance**

- .1 Fire protection equipment and installation shall be approved by local Fire Commissioner.
- .2 Equipment and installation shall meet the requirements of NFPA No. 10 Portable Fire Extinguishers. – latest edition

#### **1.4 Submittals**

- .1 Submit shop drawings for review. Submit with shop drawings Material Safety Data Sheets (MSDS) for each chemical used in the Fire Extinguishers.

### **2. PRODUCTS**

#### **2.1 Portable Hand Fire Extinguishers**

- .1 Multi-Purpose Dry Chemical: Pressurised with hose and shut-off nozzle or integral shut-off nozzle and mounting brackets 4.5 kg capacity rating 4A:60BC.

#### **2.2 Fire Extinguisher Cabinets and Brackets.**

- .1 Fire Extinguishers Cabinet: Surface type 16 gauge steel construction with 12 gauge fully opening door in adjustable frame, 5 mm glass full panel door, approved latching device, prime coat.

### **3. EXECUTION**

#### **3.1 Installation**

- .1 Install extinguishers so that the bottom of extinguisher is no more than 1200 mm above floor.

**END OF SECTION**

## CAST IRON BOILERS

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### 1. GENERAL

#### 1.1 Scope

- .1 Boilers.
- .2 Controls and boiler trim, including connections to building automation system.
- .3 Glycol connections.
- .4 Fuel connections.
- .5 Electrical connections.
- .6 Collector, draft hood and chimney connection.

#### 1.2 Quality Assurance

- .1 Comply with Provincial Regulations and have CSA approval.
- .2 Units shall be approved and labelled by Underwriter's Laboratories, and bear Canadian CRN registration number.

#### 1.3 Start-up

- .1 Provide services of factory trained representative to start up unit, test efficiency, and train operators.

#### 1.4 Submittals

- .1 Submit shop drawings indicating capacity rating, physical dimensions, wiring diagrams, materials of construction, code compliance, etc.
- .2 Provide operating and maintenance manuals with complete description of installation and operation of boilers. Refer to Division 1.

### 2. PRODUCTS

#### 2.1 Type

- .1 Provide glycol boiler suitable for forced draft with insulated jacket, sectional cast iron heat exchanger oil burning system, controls and boiler trim.
- .2 For forced draft firing, provide design consisting of water backed combustion area with water circulating all around firebox. Refractory chamber or separate base not required.

## CAST IRON BOILERS

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### 2.2 Construction

- .1 Assemble of cast iron sections conforming to ASME Code requirements and test for maximum working pressure of 206 kPa water.
- .2 Permanently seal sections using asbestos rope seal and short draw rods for each pair of sections.
- .3 Fuel passages shall be readily accessible without use of special tools. Provide adequate clean-out and access doors, and openings including observation ports and relief openings.
- .4 Provide structural steel base with front plate, removable panels and lifting lugs.
- .5 Insulate entire boiler with glass fibre and finish with steel cover jacket with factory applied baked enamel.

### 2.3 Hot Glycol Boiler Trim

- .1 Provide combination water pressure and temperature gauge, and ASME rated pressure relief valve set at 206 kPa.
- .2 Provide low water cut-off with manual reset to automatically prevent burner operation when boiler water falls below safe level.
- .3 Provide flow switch with each boiler.
- .4 Provide operating temperature controller and two high limit controllers.
- .5 Limit temperature controller shall control burner to prevent boiler water temperature from exceeding safe system temperature. One high limit to be automatic reset, one to be manual reset.
- .6 Provide boiler air vent tapping. Connect air vent tapping to expansion tank to bleed air.

### 2.4 Fuel Burning System

- .1 General: Burner operation shall be two stage LOW-HIGH.
- .2 Oil Burner: Pressure atomising type with electric ignition.
- .3 Controls: Pre-wired, factory assembled electronic controls in control cabinet with flame scanner or detector, programming control, relays and switches. Provide pre-purge and post-purge ignition and shut-down of burner in the event of ignition pilot and main flame failure with manual reset.

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## CAST IRON BOILERS

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### 2.5 Boiler Control Panel

- .1 Provide microprocessor control panel to control the two boilers and primary system pumps.
- .2 System to incorporate time delay to prevent boiler cycling, boiler and pump duty/standby control, temperature reset based on outdoor air temperature, boiler staging control.
- .3 Panel to contain digital display to manually step through set points and system data, LEDs to indicate lead stage and boiler operating status.

## 3. EXECUTION

### 3.1 Housekeeping Pads

- .1 Mount boilers on 100 mm housekeeping pads.

### 3.2 Performance

- .1 Refer to Equipment Schedules.

**END OF SECTION**

## TERMINAL HEAT TRANSFER UNITS

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### 1. GENERAL

#### 1.1 Scope

- .1 Wall fin radiation.
- .2 Unit heaters.
- .3 Related accessories and specialties.

#### 1.2 Quality Assurance

- .1 Terminal heat transfer units shall be product of manufacturer regularly engaged in production of such units who issues complete catalogue data on such products.

#### 1.3 Submittals

- .1 Submit, in addition to shop drawings, schedules of radiation heating elements and enclosure indicating length and number of pieces of element and enclosure, corner pieces, end caps, cap strips, access doors, pilaster covers and a comparison of specified heat required to actual heat output provided.

### 2. PRODUCTS

#### 2.1 General

- .1 Factory apply baked primer coat on metal surfaces of enclosure or cabinet of all wall fin and unit heaters.

#### 2.2 Wall Fin Radiation

- .1 Heating Elements: 15 mm seamless copper tubing, 1 mm minimum wall thickness, mechanically expanded into evenly spaced aluminum fins, suitable for sweat fittings.
- .2 Element Hangers: Quiet operating, ball bearing cradle type providing unrestricted longitudinal movement, on enclosure bracket.
- .3 Enclosures: 16 gauge steel c/w easily jointed components for wall to wall installation. Support rigidly, top and bottom, on wall mounted brackets at 900 mm centres maximum.
- .4 Provide access door at each shut-off, control valve and balancing valve. Access door shall be 150 mm x 175 mm, integral with cabinet.

## TERMINAL HEAT TRANSFER UNITS

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### 2.3 Unit Heaters

- .1 Casing: 18 gauge steel with threaded connections for hanger rods.
- .2 Coils: Seamless copper tubing, 0.6 mm minimum wall thickness, silver brazed to steel headers, and with evenly spaced aluminum fins mechanically bonded to tubing.
- .3 Fan: Direct drive propeller type, statically and dynamically balanced. Horizontal models complete with sleeve bearings and fan guard.
- .4 Air Outlet: Adjustable pattern diffuser on projection models and four-way louvers on horizontal throw models.

## 3. EXECUTION

### 3.1 Installation

- .1 Provide each terminal heat transfer unit with shut-off valve on supply and lockshield balancing valve on return piping.
- .2 Provide each unit at high points with easily accessible manual air vent. If not easily accessible, extend vent to exterior surface of cabinet for each servicing.
- .3 All heating system piping shall be thoroughly cleaned, flushed, drained and refilled before radiant panels are connected to the system.

### 3.2 Performance

- .1 Refer to Equipment Schedules.
- .2 Radiation capacities are based on 18°C entering air temperature, 82°C average water temperature with an 11°C temperature drop.
- .3 Unit heater capacities are based on 15.6°C entering air temperature, 82°C average water temperature, with an 11°C temperature drop.

**END OF SECTION**



## COILS

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### 1. GENERAL

- .1 Scope
- .2 Glycol coils.
- .3 Coil installation.
- .4 Coil piping and accessories.

#### 1.2 Quality Assurance

- .1 Coils shall be the product of manufacturer regularly engaged in production of coils who issues complete catalogue data on such products.
- .2 Coil capacities, pressure drops, and selection procedures shall be certified in accordance with ARI Standards and bear ARI seal.

#### 1.3 Submittals

- .1 Shop drawings shall include dimensions, materials of construction and performance data to match specifications.
- .2 Submit coil selection sheets or computer calculations with shop drawings.

### 2. PRODUCTS

#### 2.1 General

- .1 Provide extended surface type coils with tubes of copper or brass, and plate of helical type fins of copper or aluminum.
- .2 Space fins 14 per 25 mm maximum. Helical fins may be crimped.
- .3 Mount coil section in galvanised steel casing designed for bolting to other sections of ductwork.

#### 2.2 Glycol Heating Coils

- .1 Design for maximum operating limits of 1380 kPa and 104°C.
- .2 Coil headers shall be cast iron, copper tube or steel pipe.
- .3 Face length shall not exceed 3 m.

## COILS

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### 3. EXECUTION

#### 3.1 Installation

- .1 Support coil sections on steel channel or double angle frames and secure to casings. Arrange supports for cooling coils so they do not pierce or short circuit drip pans. Level serpentine coils and install drainable tube coils with pitch within casing. Arrange galvanised steel casings for bolting to other section, ductwork or unit casings. Provide airtight seal between coils and duct or unit cabinets.
- .2 Make necessary connections to coils, including valves, air vents, unions and connections from drip pans. Provide isolating valve on supply line and eccentric plug valve on return line to each glycol coil.
- .3 Locate glycol supply at bottom of supply header and return glycol connection at top to provide self-venting and reverse return arrangement. Provide manual air vents at high points complete with stop valves. Ensure glycol coils are drainable and provide drain connection at low points.
- .4 Protect coils so fins and flanges are not damaged. Replace loose and damaged fins. Comb out bent fins unless required to be replaced.

#### 3.2 Performance

- .1 Refer to Equipment Schedules.

**END OF SECTION**

## FAN COIL UNITS

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### **I. GENERAL**

#### **1.1 Scope**

- .1 Indoor fan coil (air handling) unit, pre-manufactured type.

#### **1.2 Quality Assurance**

- .1 Unit construction shall be per the construction details included at the end of this section, and as described herein.
- .2 Air flow rates, external static pressures, water flow rates, coil face velocities, filter face velocities, water and air side pressure drops shall be the same or better than specified for alternate selections.
- .3 Provide all motors with thermal overload protection. Provide thermistors in motor windings. All motors shall be high efficiency type.
- .4 Start-up of unit shall be executed by manufacturer's personnel.
- .5 All components, paints and lining shall have a flame spread rating of not over 25 without evidence of continued progressive combustion and a smoke developed rating no higher than 50.

#### **1.3 Submittals**

- .1 Submit shop drawing, which shall include the following minimum information.
  - .1 Construction details: Indicate material and gauge of all construction components.
  - .2 Fan Performance Data: Submit fan performance curves as well as performance tables.
  - .3 Coils: Selection criteria indicating air side and fluid side capacities, in and out conditions, velocities, pressure drops and fouling factors.
  - .4 Air Filters: Media, efficiency rating, velocity, pressure drop charts and capacities. Indicate mounting method and arrangement.
  - .5 Vibration isolator shop drawings.

## FAN COIL UNITS

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### 2. PRODUCTS

#### 2.1 Components

.1 Air handling units shall consist of, but not be limited to, the following components:

- .1 Supply fan.
- .2 Heating coil.
- .3 Filter.

#### 2.2 Construction

- .1 Double wall post and panel construction from heavy gauge galvanized steel.
- .2 25 mm insulation sandwiched between double wall galvanized panels.
- .3 Gasketed service access panels both sides.
- .4 Factory installed mounting rails for unit suspension.

#### 2.3 Drain Pans

- .1 304 stainless steel construction, sloped to drain.

#### 2.4 Fan

- .1 Fan to be double width, double inlet, forward curved centrifugal type. Fan to be both statically and dynamically balanced. Wheel shall be constructed of high strength steel, welded construction, with straight bored cast iron hub keyed and set screwed to a turned, ground and polished (TGP) solid steel shaft conforming to ASTM A-108 and QQ-S-637 for 1045 TGP rounds.
- .2 Mount fans on steel shaft, on self-aligning ball bearings.
- .3 Provide variable sheaves for motors 11 kW and under.
- .4 Entire fan assembly including fan scroll, wheel and motor to be integrally mounted on a base and to be separated from unit casing with flexible connections and spring isolators.

#### 2.5 Filters

- .1 Filters containing asbestos, and urea formaldehyde are not acceptable.
- .2 50 mm pleated filter, average efficiency 25-30% on ASHRAE Test Standard 52-76. Non-woven cotton and synthetic fabric media. FARR 30/30.

## FAN COIL UNITS

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- .3 Mounting racks to be galvanised, to suit specified filter type.
- .4 Limit filter velocity based on face area to less than 2.5 m/s.

### 2.6 Coil Section

- .1 Enclose coil in coil section with headers and U-bends fully contained within the casing. Meet requirements of Section 15750.
- .2 Extend coil supply and return header connections, drain and vent fittings through casing. Coil connections shall be of same material as the coil headers.
- .3 Coil rack to be angle iron, providing completely independent support for each coil. Each coil is to be separately removable without disturbing the other coils. Provide removable coil access panels in the unit casing.
- .4 Limit heating coil face velocity to 3.0 m/s.

### 2.7 Spare Parts

- .1 Fan motor belt.
- .2 5 sets of spare filters.

## 3. EXECUTION

### 3.1 Assembly

- .1 Units are to be one-piece construction.
- .2 Pipe units to permit coil removal.
- .3 Any piping or conduit passing through the unit casings must be sealed with rubber grommets and retaining plates to prevent air or water leakage.
- .4 Insulate all piping as per Section 15200.

### 3.2 Air Handling Unit Schedule

- .1 Refer to Equipment Schedules.

**END OF SECTION**

## FANS

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### 1. GENERAL

#### 1.1 Scope

- .1 Centrifugal fans.
- .2 Fan accessories.

#### 1.2 Quality Assurance

- .1 Conform to AMCA Bulletins regarding construction and testing. Fans shall bear AMCA certified rating seal.
- .2 Fans shall bear CSA label.
- .3 Motors to be high efficiency as specified in Section 15010.

#### 1.3 Submittals

- .1 Submit with shop drawings acoustical data and fan curves showing fan performance with fan and system operating point plotted on curves, including equipment weights and centre of gravity diagrams for suspended fans.

#### 1.4 Job Conditions

- .1 Do not operate fans for any purpose, temporary or permanent until ductwork is clean, filters are in place, bearings are lubricated and fan has been run under close supervision of unit manufacturer.

#### 1.5 Alternates

- .1 Equivalent fan selections shall not increase motor kilowatts, increase rpm, increase noise level, increase tip speed by more than 10%, or increase inlet air velocity by more than 20%, from that of the specified fan.

### 2. PRODUCTS

#### 2.1 General

- .1 Statically and dynamically balance fans so no objectionable vibration or noise is transmitted to occupied areas of the building.
- .2 Provide balanced variable sheaves for motors 11.2 kW and under.
- .3 Fans are to be capable of accommodating static pressure variations of  $\pm 10\%$  with no objectionable operating characteristics.

## FANS

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- .4 Fan suppliers to provide replacement sheaves for balancing purposes.
- .5 Provide cross linkage and inlet vanes on double inlet fan.
- .6 Size motors for parallel operating fans for non-overloading operation with only one fan operating.
- .7 External static pressure means external to the fan cabinet and all accessories such as backdraft dampers, mixing boxes, filters and coils, etc. These accessories if supplied as part of the unit are considered as internal losses for fan.

### 2.2 Centrifugal Fans

- .1 Fabricate with multi-blade wheels in heavy gauge steel housing reinforced for service encountered.
- .2 Provide V-belt drives with fan and motor mounted on reinforced, rigid steel base with adjustable motor mount.
- .3 Provide heavy duty, self-aligning, anti-friction bearings.
- .4 Provide fan cabinets lined with minimum 25 mm acoustic insulation, unless noted otherwise elsewhere in the specifications.

### 2.3 Spare Parts

- .1 Fan motor belt.

## 3. EXECUTION

### 3.1 Installation

- .1 Where inlet or outlet is exposed, provide safety screen.
- .2 Provide belt guards on belt driven fans complete with tachometer access.
- .3 Supply and install sheaves as necessary for final air balancing.

### 3.2 Priming

- .1 Prime coat fan wheels and housing at factory inside and outside. Prime coating on aluminum part is not required.

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**FANS**

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**3.3 Performance**

- .1 Fan performance based on sea level conditions.
- .2 Refer to Equipment Schedule.

**END OF SECTION**



## DUCTWORK

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### 1. GENERAL

#### 1.1 Scope

- .1 Ductwork and plenums.
- .2 Fasteners.
- .3 Sealants.
- .4 Duct cleaning.

#### 1.2 Definitions

- .1 Low Pressure: Static pressure in duct less than 500 Pa and velocities less than 10 m/s.
- .2 Duct sizes shown on plans are inside clear dimensions. For acoustically lined or internally insulated ducts, maintain sizes inside ducts.

#### 1.3 Quality Assurance

- .1 Ductwork shall meet the requirements of NFPA No. 90A - Air Conditioning and Ventilating Systems; NFPA No. 90B - Standard for the Installation of Warm Air Heating and Air Conditioning Systems.
- .2 Fabricate in accordance with SMACNA duct manuals and ASHRAE handbooks.
- .3 Flexible air duct shall conform to NFPA 90A and UL181 standard for factory made air duct materials and air duct connectors.

#### 1.4 Submittals

- .1 Submit shop drawings and samples of duct fittings for approval, including particulars such as gauge sizes, welds and configurations prior to start of work.

#### 1.5 Alternatives

- .1 Obtain written permission from the Engineer prior to making variations in duct configuration or sizes. Size alternatives using ASHRAE table for circular equivalents of rectangular ducts.

## DUCTWORK

### 2. PRODUCTS

#### 2.1 Materials

- .1 Ducts: Galvanised steel lock forming quality, having galvanised coating of 380 g/m<sup>2</sup> for both sides.
- .2 Aluminum ductwork for Pump House and Wet Well areas.
- .3 Fasteners: Use rivets and bolts throughout; sheet metal screws accepted on low pressure ducts. Weld kitchen exhaust ducts.
- .4 Sealant: Water resistant, fire resistive, compatible with mating materials.
- .5 Flexible Duct - Low Pressure: Flexible air duct shall be used where shown on drawings. Length of flexible duct shall not exceed 900 mm. Flexible duct shall be polymeric liner banded to a steel wire helix, wrapped with fiberglass insulation and outer fiberglass reinforced metallised vapour barrier jacket. Flexible duct rated for 12 m/s velocity and pressure rated for 500 pascal positive and 500 pascal negative.

Standard Acceptance: Thermaflex M-KE.

### 3. EXECUTION

#### 3.1 Duct Sealing

- .1 All supply, return and exhaust duct joints, longitudinal as well as transverse, should be sealed using:
  - .1 Low Pressure Ductwork:
    - Slip Joints: Apply heavy brush-on high pressure duct sealant. Apply second application after the first application has completely dried out. Where metal clearance exceeds 1.5 mm use heavy mastic type sealant.
    - Flanged Joints: Soft elastomer butyl or extruded form of sealant between flanges followed by an application of heavy brush-on high pressure duct sealant.
    - Other Joints: Heavy mastic type sealant.
  - .2 Duct tapes as sealing method are not permitted.
  - .3 Surfaces to receive sealant should be free from oil, dust, dirt, moisture, rust and other substances that inhibit or prevent bonding.
  - .4 Do not insulate any section of the ductwork until it has been inspected and approved of duct sealant application.

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## DUCTWORK

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### 3.2 Installation

- .1 Locate ducts with sufficient space around equipment to allow normal operation and maintenance activities.
- .2 Coordinate the location of duct access doors. Refer to Section 15835 - Duct Accessories.
- .3 Fabricate ductwork from field measurements and not from plans and shop drawings exclusively. Failure to do so will not constitute an extra to the contract.
- .4 Interrupt duct linings at fire, balancing backdraft and smoke dampers so as not to interfere with operation of devices. Provide sheet metal edge protection over linings on both sides of damper device.
- .5 Shield ductwork from dust and construction material during construction. Clean any ductwork found to be dirty at no extra cost to the Contract.
- .6 Clean duct systems and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment which may be harmed by excessive dirt with filters or bypass during cleaning.
- .7 Complete metal ducts within themselves with no single partition between ducts. Where width of duct exceeds 450 mm, cross brace for rigidity. Open corners are not acceptable.
- .8 Lap metal ducts in direction of air flow. Hammer down edges and slips to leave smooth duct interior.
- .9 Increase duct sizes gradually, not exceeding 15° divergence wherever possible. Maximum divergence upstream of equipment to be 30° and 45° convergence downstream.
- .10 Rigidly construct metal ducts with joints mechanically tight, substantially airtight, braced and stiffened so as not to breathe, rattle, vibrate or sag. Caulk duct joints and connections with sealant as ducts are being assembled. Seal seams on fresh air and exhaust ducts watertight with mastic or low velocity duct sealant.

**END OF SECTION**

## DUCT ACCESSORIES

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### 1. GENERAL

#### 1.1 SCOPE

- .1 Access doors.
- .2 Balancing dampers.
- .3 Flexible connections.
- .4 Backdraft dampers.

#### 1.2 QUALITY ASSURANCE

- .1 Access doors shall be ULC labelled.
- .2 Accessories shall meet the requirements of NFPA 90A, Air Conditioning and Ventilating Systems. Fabricate in accordance with ASHRAE Handbooks and SMACNA Duct Manuals.

#### 1.3 SUBMITTALS

- .1 Submit shop drawings of factory fabricated assemblies.

### 2. PRODUCTS

#### 2.1 DUCT ACCESS DOORS

- .1 Fabricate rigid and close-fitting doors of galvanised steel with sealing gaskets and suitable quick fastening locking devices. Duct access panels with screws are not acceptable. Install minimum 25 mm thick insulation with suitable sheet metal cover frame for insulated ductwork.
- .2 Fabricated with two butt hinges and two sash locks for sizes up to 450 mm two hinges and two compression latches with outside and inside handles for sizes up to 600 mm x 1200 mm and an additional hinge for larger sizes.

#### 2.2 BALANCING DAMPERS

- .1 Fabricate of galvanised steel, minimum 1.6 mm. Full blade-length shafts of hollow square construction with blades rigidly fastened along entire blade length.
- .2 Lockable quadrant type operating mechanism with end bearings on accessible rectangular ducts up to 400 mm deep and on accessible round ducts.

## DUCT ACCESSORIES

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- .3 Wide pitch screw operating mechanism with crank operator and end bearings on accessible rectangular ducts 425 mm and over in depth and on all inaccessible rectangular and round ducts.
- .4 On rectangular ducts up to 275 mm deep construct of single blade (butterfly) type.
- .5 On rectangular ducts 300 mm to 400 mm deep construct of two opposed blades mechanically interlocked with pivots at quarter points.
- .6 On rectangular ducts over 425 mm deep construct of multiple opposed blades mechanically interlocked with blades no greater than 200 mm deep and pivots equally spaced.
- .7 On round ducts construct of single blade (butterfly) type. On 500 pascal class and on all dampers over 300 mm diameter fabricate with full blade-length shaft.
- .8 Provide over-ride limiting stops on all operating mechanisms.
- .9 On round ductwork install operating mechanism on a steel mounted base firmly secured to the ductwork.
- .10 On externally insulated ductwork, install operating mechanisms on a steel bridge type mounting base to permit continuity of insulation under the mechanism.

### 2.3 FLEXIBLE CONNECTIONS

- .1 Fabricate of ULC approved neoprene coated flameproof glass fabric approximately 150 mm wide tightly crimped into metal edging strip and attached to ducting and equipment by screws or bolts at 150 mm intervals. Flexible connection airtight at 500 Pa. Do not use flexible connections to connect kitchen ductwork to kitchen fans where the fan is mounted inside the building enclosure. Fan connections in these cases shall be governed by NFPA 96 (flanged connections).

### 2.4 BACKDRAFT DAMPERS

- .1 Construct of minimum 1.3 mm aluminum channel frame.
- .2 Construct of minimum 0.6 mm aluminum blades, complete with stiffeners along trailing edge. Fabricate single blade dampers for duct sizes to 240 mm, multiblade dampers for ducts greater than 240 mm.
- .3 Provide full blade-length shafts complete with brass or nylon bearings.
- .4 Provide neoprene anti-clatter blade strips on pivot side of blades.
- .5 Construct blade connecting linkage of minimum 2.0 mm aluminum rod with eyelet, pin bearings, and adjustable counter weight to assist blade opening action.
- .6 Maximum blade length of 750 mm.

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## DUCT ACCESSORIES

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- .7 Backdraft damper suitable for 10 m/s face velocity.

### 3. EXECUTION

#### 3.1 APPLICATION

- .1 Provide access door minimum 450 mm x 350 mm or 50 mm smaller than duct dimension for cleaning and inspection at positions indicated by drawings and as follows:
- At all locations of internally duct mounted devices including automatic dampers, damper motors and control sensors and devices.
- .2 Provide balancing dampers at points on supply and exhaust systems where branches are taken from larger ducts as required for proper air balancing.
- .3 Install ducts associated with fans and equipment subject to forced vibration with flexible connections, immediately adjacent to equipment and/or where indicated on drawing.

**END OF SECTION**

## **BREECHING AND CHIMNEYS**

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### **1. GENERAL**

#### **1.1 Scope**

- .1 Site fabricated breeching.
- .2 Manufactured chimneys for oil fired equipment.

#### **1.2 Quality Assurance**

- .1 Vents and Chimneys: Labelled by Underwriters' Laboratory of Canada.

#### **1.3 Definitions**

- .1 Vent: Enclosed passageway for conveying flue gases from the appliances to outdoors.
- .2 Breeching: Portion of vent from the appliance to the chimney.
- .3 Chimney: Primary vertical portion of vent.
- .4 Draft: Flow of air or combustion products or both, through an appliance and its venting system.
- .5 Mechanical Draft: Draft produced by a mechanical device such as a fan, blower, or aspirator which may supplement natural draft.
- .6 Forced Draft: A mechanical draft produced by a device upstream of the combustion zone of an appliance.
- .7 Induced Draft: A mechanical draft produced by a device downstream from the combustion zone of an appliance.
- .8 Natural Draft: A draft other than mechanical draft.

#### **1.4 Submittals**

- .1 Comply with requirements of Section 15010, supply shop drawings for all fabricated and pre-manufactured breeching and fuel elements.

### **2. PRODUCTS**

#### **2.1 Vents**

- .1 Type A: To CAN 4-S604.
  - .1 Application: Gas and liquid fuel fired appliances.

## BREECHING AND CHIMNEYS

- .2 Service Temperature: Maximum flue gas temperature of 540 °C.
- .2 Type A-2 Vent: To CAN 4-S629.
  - .1 Application: Gas, liquid and solid fuel fired appliances.
  - .2 Service Temperature: Maximum flue gas temperature of 650 °C.

### 2.2 Breeching

- .1 Breeching Type 1: For natural draft, gas burning appliances with draft hoods, use one of the following:
  - .1 Galvanised steel with thicknesses as follows:

<u>Vent Diameter</u>	<u>Min. Thickness</u>
Smaller than 125 mm	0.4 mm.
125 mm to 200 mm	0.5 mm.
  - .2 Breeching constructed of same vent components as chimney.
- .2 Breeching Type 2: For forced, induced, or natural draft with dilution, gas or liquid fuel fired appliances, use one of the following:
  - .1 Mild steel, all welded construction with thicknesses as follows:

<u>Vent Diameter</u>	<u>Min. Thickness</u>
300 mm and smaller	1.3 mm
  - .2 Breeching constructed of same vent components as chimney.

### 2.3 Accessories

- .1 Cleanouts: Bolted, gasketed type, full size of breeching area.
- .2 Barometric Damper: single acting sized to 70% of full size of breeching area.
- .3 Appurtenances: Raincap, thimbles, support brackets and guys, flashing and counter flashings, fly ash screen, and other materials required to complete the assembly.



## BREECHING AND CHIMNEYS

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### 3. EXECUTION

#### 3.1 Vent Installation

- .1 Install vents, complete with accessories and appurtenances, in accordance with latest editions of CAN 1-B139 National Building Code, manufacturer's instructions and as follows:
  - .1 Type A: To CAN 4-S604.
  - .2 Type A-2: To CAN 4-S629.
  - .3 Type B: To CAN 4-S605.
  - .4 Type BW: To CAN 4-S605
  - .5 Type L: To ULC S609.
- .2 Do not penetrate flue gas chamber of vent with screws or mechanical fasteners.
- .3 Install breeching with positive slope upward from appliance, min. 2%.
- .4 Suspend breeching using trapeze hangers at *1500 mm* centres.
- .5 Install cleanout at base of chimney.
- .6 Provide properly sized barometric damper as required.
- .7 Support chimney at bottom, roof and intermediate levels.
- .8 Install thimbles where penetrating roof.
- .9 Install raincap on chimney outlet.
- .10 Install counterflashing where chimneys pass through roof.
- .11 Provide for expansion and contraction of chimney and breeching.

**END OF SECTION**