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| Version | Date | Description of Revisions |
| 1 | August 30, 2006 | Approved final document. |
| 2 | November 16, 2009 | Modified ‘Related Sections’ and approved suppliers |
| 3 | September 28, 2010 | Minor revisions |
| 4 | December 2, 2014 | First draft review (AV) |
| 5 | June 8, 2015 | Second Draft for Review (AV) |
| **6** | **September 16, 2015** | **Updated, Finalized Specification – Reference eDOCS #5823760-v5 (AV)** |
| 7 | June 6, 2017 | Updated references to standard ASTM A106/A106M-15 **(AAM)** |
| 8 | August 17,2017 | Updated listed products. Those that were removed were replaced with performance specifications and standards. (CPD PMO, OMM) |

NOTE:

This is a CONTROLLED Document. Any documents appearing in paper form are not controlled and should be checked against the on-line file version prior to use.

**Notice:** This Document hardcopy must be used for reference purpose only.

**The on-line copy is the current version of the document.**

# GENERAL

## Related Sections

*[Under "Related Sections", identify other Sections that are related to, and/or dependent on, the work results or information specified elsewhere. The list should be limited to Sections with specific information that the reader might expect to find in this Section, but is specified elsewhere. For example, if hardware for aluminum entrances is specified in the aluminum entrance Section, a cross-reference would be appropriate in the finish hardware Section. The purpose of this cross-referencing is for information only, to aid in finding those other requirements—not to define the scope of the Section.*

*Cross-referencing here may also be used to coordinate assemblies or systems whose components may span multiple Sections and which must meet certain performance requirements as an assembly or system.*

*Contractor is responsible for coordination of the Work.*

*This Section is to be completed/updated during the design development by the Consultant. If it is not applicable to the Section for the specific project, it may be deleted.]*

*[List Sections specifying installation of products supplied but not installed under this Section and indicate specific items.]*

Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: Execution requirements for ...[item]... specified under this Section.

*[List Sections specifying products installed but not supplied under this Section and indicate specific items.]*

Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: Product requirements for ...[item]... for installation under this Section.

[List Sections specifying related requirements.]

* + 1. Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: [Optional short phrase indicating relationship].

#### Section 01300 – Submittals

#### Section 01425 – Computerized Maintenance Management System Data Requirements

#### Section 01430 – Operation and Maintenance Data

#### Section 01640 – Manufacturer’s Services

#### Section 01810 – Equipment Testing and Facility Commissioning

* 1. References

*[Delete .1 if Section 01060 – Regulatory Requirements is included in Contract Documents.]*

### Comply with the latest edition of the following statutes, codes, standards, and all amendments thereto:

#### Canadian Gas Association (CGA).

##### [Consultant to define the relevant CGA standards pertaining to this specification]

#### Air Movement and Control Association International, Inc. (AMCA):

##### ANSI/AMCA 300-14, Reverberant Room Method for Sound Testing of Fans (Bulletin 300).

#### American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE):

##### ANSI/ASHRAE/IES Standard 90.1-2013 - Energy Standard for Buildings Except Low-Rise Residential Buildings

#### Technical Standards and Safety Association (TSSA)

##### *[Consultant to amend with applicable TSSA standards]*

#### ASTM International (ASTM):

##### ASTM A106/A106M-15, Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service

#### National Fire Protection Association (NFPA):

##### NFPA 54, National Fuel Gas Code. 2015 Edition

##### NFPA 70, National Electric Code (NEC) 2014 Edition.

##### NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems, 2015 Edition.

#### Sheet Metal and Air Conditioning Contractors’ National Assoc., Inc. (SMACNA):

##### Ducted Electric Heat Guide for Air Handling Systems.

#### Underwriters Laboratories/Underwriters Laboratories of Canada (UL/ULC):

##### Product Directories.

#### ASME Boiler and Pressure Vessel Code (AMSE)

##### 2017 edition.

#### Canadian Standard Association (CSA).

##### *[Consultant to define the relevant CSA standards pertaining to this specification]*

#### Provincial Gas Code.

##### *[Consultant to define the relevant provincial Acts and Regulations pertaining to this specification]*

#### Provincial Energy Code

##### *[Consultant to define the relevant provincial gas code, Acts and Regulations pertaining to this specification]*

## Measurement and Payment

*[Choose one of the following payment language provisions that best suits the individual project.*

*If this Section is not specifically referenced by an item in the Bid Form, please use the following language:*

.1 The work of this Section will not be measured separately for payment. All costs associated with the work of this Section shall be included in the Contract Price.

*OR If this Section is specifically referenced in the Bid Form, use the following language and identify the relevant item in the Bid Form:*

.1 All costs associated with the work of this Section shall be included in the price(s) for Item No(s). \_\_\_ in the Bid Form.

*If the work of this Section is to be measured and paid for by several different methods, please amend the standard wording given above to reflect the different methods of measurement and payment.]*

## Submittals

### Action Submittals:

#### In accordance with Section 01300 – Submittals.

#### Complete specifications, descriptive drawings, catalog cuts, and descriptive literature which shall include make, model, dimensions, weight of equipment, and electrical schematics **[for the Products specified.] [for the following products:]**

##### [    ].

##### [    ].

#### Manufacturer’s standard finish colour selection for cabinet finishes.

#### Performance Data, including sound power level data (dB re. 1 pW) at design operating point, shall be based on AMCA Bulletin 300-14, Setup No. 1. *[Consultant to confirm reference and amend as required]*

### Informational Submittals:

#### In accordance with Section 01300 – Submittals.

#### Manufacturer’s test reports for the following:

##### Hot water unit heater(s) pressure.

##### Cabinet unit heater electric heating coil.

##### Booster heating coil.

##### Electric duct heater.

#### Recommended procedures for protection and handling of equipment and materials prior to installation.

#### [Detailed information on structural, mechanical, electrical, or other modifications necessary to adapt the arrangement or details shown to the equipment furnished.]

#### Operation and Maintenance Data: As specified in Section 01430 - Operation and Maintenance Data.

#### All equipment data required for upload to the Region’s CMMS in accordance with Section 01425 - Computerized Maintenance Management System Data Requirements.

## Quality Assurance

### Heating Equipment: Minimum operating efficiencies, specified in [Chapter 6 of ASHRAE 90A] [the Provincial Energy Code *[Consultant to define the relevant provincial gas code Acts and Regulations pertaining to this specification]*].

# PRODUCTS

## Gas-Fired Unit Heater

### Characteristics:

#### Aluminized heat exchanger.

#### Gas-fired burner.

#### Steel cabinet finished with baked enamel paint.

#### Horizontal discharge with face louvers and diffuser vanes adjustable for both horizontal and vertical blow.

#### Direct-drive motor of shaded pole design with oil-lubricated sleeve bearings and built-in thermal overload protection.

#### Nonferrous multi-blade propeller fan.

#### CGA certified.

#### Fan controls.

#### Automatic gas valve.

#### Electronic ignition.

#### Gas pressure regulator.

#### Manual shutoff valve.

#### High-limit switch.

#### [Flue vent fan.]

## Gas Vent Stacks for Gas-Fired Unit Heaters and Water Heaters

### Characteristics:

#### UL/ULC listed Type [B][PS] double wall, insulated gas vent pipe with rain cap.

#### [Galvanized steel outer jacket, aluminum inner sleeve.] [Stainless steel inner and outer jacket.]

#### Insulating thimble.

#### Pier section with cleanout where stack is offset.

#### Manufacturer’s standard fittings as required.

## Horizontal Hot Water Unit Heater

### Characteristics:

#### Arranged for horizontal air distribution.

#### 18-gauge cabinet finished with baked enamel paint.

#### Coil of single tube, single serpentine flow.

#### Copper tubes without turbulators.

#### Aluminum fins mechanically bonded to tubes.

#### Direct-drive motor of shaded pole design with oil-lubricated sleeve bearings and built-in thermal overload protection.

#### Non-ferrous multi-blade propeller type fan.

#### Adjustable horizontal louvers and vertical diffuser vanes on air discharge side.

## Vertical Hot Water Unit Heater

### Characteristics:

#### Arranged for vertical air distribution.

#### 18-gauge cabinet finished with baked enamel paint.

#### Coil of single-pass flow.

#### Copper tubes without turbulators.

#### Aluminum fins mechanically bonded to tubes.

#### Direct-drive motor of shaded pole design with oil-lubricated sleeve bearings and built-in thermal overload protection.

#### Non-ferrous multi-blade propeller type fan.

#### Adjustable louver-cone diffuser.

## Cabinet Unit Heater

### Characteristics:

#### Fiberglass fan scroll and wheels.

#### Direct-drive motor.

#### Heating coil.

#### Disposable filters.

#### Integral speed control switch.

#### Cabinet mounted.

### Cabinet:

#### 16-gauge steel arranged for [freestanding floor mounting] [    ].

#### Baked enamel finish of a color selected by the Region from the manufacturer’s standard color chart.

#### Insulated front panel.

#### Hinged access door for access to speed switch.

#### [Stamped grille for top discharge.] [    ].

#### [Toe-space return air opening.] [     ].

### Electric Heating Coil:

#### Low surface temperature type with sheath element inserted in finned-tube coil.

#### Factory wiring shall include operating and safety controls required by UL/ULC and NFPA 70, 2014 Edition, NEC, and carry the UL/ULC listing mark.

#### Three-speed PSC motor, operated through an integral fan speed switch from a unit mounted transformer.

### Hot Water Heating Coil:

#### Serpentine type with aluminum fins mechanically bonded to seamless copper tubes.

#### Three-speed PSC motor, operated through an integral fan speed switch.

## Booster Heating Coil

### Characteristics:

#### Aluminum extended surface type fins mechanically bonded to copper tubes at not more than eight fins per inch spacing.

#### Two rows minimum with same-end connections.

#### Tubes rolled into headers with copper bushings or brazed into nonferrous headers.

#### Furnished without flow turbulating devices.

#### Arranged for counter-flow between air and water.

#### 0.25 mm minimum fin thickness.

#### 0.64 mm minimum tube wall thickness.

#### Casing with slip-flange connections for direct attachment to ductwork.

## Electric Duct Heater

### Characteristics:

#### UL/ULC listed electric-resistance blast type coil.

#### [Open coils of high-grade wire insulated by ceramic insulators in aluminized steel brackets, supported in flanged aluminized steel frames with stainless steel terminal bolts, nuts, and washers. Provide protective screen on upstream side of coil.] [Finned tubular nickel/chrome coil encased in a grounded metal sheath and magnesium oxide filler and wrapped with a steel or copper fin.]

#### Arranged in accordance with NFPA 70, 2014 Edition,

#### Integral airflow safety switch.

#### UL/ULC listed integral manually resettable or replaceable secondary and automatically resettable primary thermal overload cutouts.

#### Clearly mark and match line terminals to an attached wiring diagram.

#### Integral fuse blocks with fusing in each leg of each power circuit.

#### Built-in disconnect switches for control and power wiring.

#### Magnetic contactors with 24-volt holding coils.

#### Factory prewired to terminal strips for line and control connections.

#### UL/ULC listed for 100,000 cycles of operation.

#### End mounted control cabinet.

#### Pressure drop shall not exceed [25 Pa][    ] water gauge.

#### Heaters with more than one stage shall have each stage cover the full face area of the coil.

## Gas-Fired Radiant Heaters

### Characteristics:

#### AGA certified infrared, gas-fired, radiant heating system.

#### Combustion chambers, gas-fired burners, and vacuum pumps.

#### Polished aluminum reflectors rated for inside areas.

#### Hangers and Supports:

##### Manufacturer’s standard for piping, reflectors, and combustion chamber.

##### Suspension Chain and Hanger Rods: As recommended by manufacturer for the designated spacing.

#### Controls:

##### *[Consultant to provide details]*

#### Piping:

##### ASTM A106/A106M-15 Schedule 40 black steel seamless pipe for high temperature service.

##### Black steel, screwed, malleable fittings.

#### Miscellaneous items required to provide a complete and operating system.

## Finned-Tube Convectors

### Characteristics:

#### Wall-hung steel enclosure.

#### 16-gauge [sloping] [    ] top.

#### Wall brackets with concealed fasteners.

#### Element supports.

#### Stamped louvered discharge grille.

#### [Outlet damper.]

#### Sponge rubber wall gasket.

#### 32 mm copper tube with [125 mm by 100 mm,] [100 mm by 100 mm,] [    ,] Series [     ] steel finned element.

#### Cabinet Finish: Baked enamel of a colour selected from the manufacturer’s standard color chart as approved by the Consultant.

#### End panels wherever enclosure does not abut a finished wall.

#### 150 mm wide access panel at each end of every enclosure section for access to valves and balance fittings.

## Hot Water Tanks

### Must be able to store [ ] litres of water.

### Shall have a minimum R-value of [ ].

### Shall comply with the ASME Boiler and Pressure Vessel Code.

## Accessories

### Equipment Identification Plates: Furnish 16-gauge [Type \_\_\_\_\_ ] stainless steel identification plate securely mounted on each separate equipment component [and control panel] in a readily visible location. Plate shall bear [10] [6] mm high [engraved][die-stamped] block type [black enamel filled] equipment [identification number][and letters] indicated in this Section [and as shown on the Drawings].

### Lifting Lugs: Furnish suitably attached for equipment assemblies and components weighing over 45 kg.

### [     .]

## Source Quality Control

### [Factory Tests and Adjustments]:Test [equipment] [actually] [identical to that] furnished.

#### Functional Test: Perform [manufacturer’s standard], [motor] test on [equipment]. [Include vibration test, as follows]:

##### Dynamically balance rotating parts of each [     ] and its driving unit before final assembly.

##### Limits:

###### **Driving Unit Alone: Less than [80] [     ] percent of NEMA MG1 limits.**

###### **Complete Rotating Assembly Including [Coupling,] [and Motor:] Less than [90] [    ] [percent.]]**

#### Hot Water Cabinet and Standard Unit Heaters:

##### No leaks when tested underwater with 2,070 kPa (gauge) air.

#### Hot Water Booster Coil:

##### Test underwater with 1,380 kPa (gauge) air; no leaks.

#### Electric Duct and Cabinet Unit Heaters:

##### Test with 2,000-volt dielectric test.

# EXECUTION

## Installation

### Gas-Fired, Hot Water, and Cabinet Unit Heaters:

#### Install in accordance with the manufacturer’s recommendations.

#### Mount bottom of unit at [2.4] [    ] m above the floor, except where noted otherwise on the Drawings.

### Gas Vent Stacks:

#### Install in accordance with the manufacturer’s recommendations.

#### Install in accordance with the requirements of “National Fuel Gas Code” (NFPA 54, 2015 Edition) and Provincial Gas Code *[Consultant to define the relevant provincial gas code Acts and Regulations pertaining to this specification].*

### Booster Heating Coil:

#### Provide duct transition from main duct to coil flange size.

#### Where a booster coil is installed in sound-attenuated ductwork, omit the duct liner for 150 mm on either side of the coil.

#### Install level and in accordance with the manufacturer’s instructions.

### Electric Duct Heaters:

#### Install in accordance with the manufacturer’s recommendations, NFPA 70, 2014 Edition and NFPA 90A, 2015 Edition, and SMACNA “Ducted Electric Heat Guide for Air Handling Systems.”

#### Do not locate heaters closer than 1200 mm from an elbow, takeoff, or balancing damper.

#### Install unit with control cabinet mounted on side of duct unless the heater is specifically designed for other mounting.

### Gas-Fired Radiant Heaters:

#### Install in accordance with the manufacturer’s instructions.

#### Mount combustion chambers horizontally.

#### Support vacuum pumps on wall brackets [as shown on the Drawings].

#### Pitch discharge line from vacuum pump downward for drainage, and fit outlet with 6 mm mesh bird screen.

#### Fit pump inlet with a condensate trap, and pipe to a floor drain.

#### Make gas piping connection to the burner with the manufacturer’s standard U-tube connector.

#### Connect combustion chambers and vacuum pumps in series with ASTM A106/A106M-15 Schedule 40 black seamless steel pipe.

### Finned-Tube Convectors:

#### Install in accordance with the manufacturer’s instructions.

## Manufacturer’s Services

### Provide the manufacturer’s representative at Site in accordance with Section 01640 - Manufacturers’ Services, for installation assistance, inspection and certification of proper installation, equipment testing, startup assistance, and training of the Region’s personnel for specified equipment.

## Commissioning

### For all commissioning activities on systems where components of this Specification are integral to functionality, refer to Section 01810 – Equipment Testing and Facility Commissioning. All inspection and testing activities shall be completed in accordance with documentation provided to the Consultant prior to the start of commissioning activities.

## Supplements

### The supplements listed below, following “End of Section,” are a part of this Specification.

#### 15760-01: Schedule of Hot Water Unit Heaters.

#### 15760-02: Schedule of Finned Tube Radiators.

#### 15760-03: Schedule of Cabinet Unit Heaters.

#### 15760-04: Schedule of Electric Unit Heaters.

**END OF SECTION**