

PART 1 - GENERAL

1.1 REFERENCES

- .1 Canada Green Building Council (CaGBC)
 - .1 LEED Canada 2009 for Design and Construction, LEED Canada 2009 for Design and Construction Leadership in Energy and Environmental Design Green Building Rating System Reference Guide.
- .2 CSA Group
 - .1 CSA C22.2 No.46-M1988(R2011), Electric Air-Heaters.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for duct heaters and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit product data and include:
 - .1 Element support details.
 - .2 Heater: total kW rating, voltage, phase.
 - .3 Number of stages.
 - .4 Rating of stage: rating, voltage, phase.
 - .5 Heater element watt/density and maximum sheath temperature.
 - .6 Maximum discharge temperature.
 - .7 Unit support.
 - .8 Clearance from combustible materials.
 - .9 Internal components wiring diagrams.
 - .10 Minimum operating airflow.
 - .11 Pressure drop operating airflow.
- .3 Sustainable Design Submittals:
 - .1 LEED Canada submittals: in accordance with Section 01 35 21 - LEED Requirements.
 - .2 Construction Waste Management:

1.2 ACTION AND
INFORMATIONAL
SUBMITTALS
(Cont'd)

- .3 Sustainable Design Submittals: (Cont'd)
 - .2 Construction Waste Management: (Cont'd)
 - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.
 - .2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged.
 - .3 Recycled Content:
 - .1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-consumer and post-industrial content, and total cost of materials for project.
 - .4 Regional Materials: submit evidence that project incorporates required percentage 30% of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

1.3 DELIVERY,
STORAGE AND
HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
 - .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
 - .3 Storage and Handling Requirements:
 - .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect duct heaters from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
 - .4 Develop Construction Waste Management Plan related to Work of this Section and in
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1.3 DELIVERY,
STORAGE AND
HANDLING
(Cont'd)

- .4 (Cont'd)
accordance with Section 01 35 21 - LEED
Requirements.
- .5 Packaging Waste Management: remove for reuse
or return of pallets, crates, padding,
banding, and packaging materials as specified
in Construction Waste Management Plan in
accordance with Section 01 74 21 -
Construction/Demolition Waste Management and
Disposal and Section 01 35 21 - LEED
Requirements.

PART 2 - PRODUCTS

2.1 DUCT HEATERS

- .1 Duct heaters: flange type CSA approval.
- .2 Elements:
 - .1 Open coils of nickel chrome resistance
wire.
 - .2 Coils machine crimped into stainless
steel terminals extending at least 25 mm into
the air stream.
 - .3 All terminal hardware shall be stainless
steel.
 - .4 Coils shall be supported by ceramic
bushins staked into the supporting brackets.
- .3 Frames: Heater frames and boxes shall be
corrosion resistant steel.
- .4 Terminal box:
 - .1 NEMA 1 general purpose enclosure.
 - .2 Hinged, latching cover.
 - .3 Multiple concentric knockouts to accept
field wiring.
 - .4 Terminal blocks to accommodate field
wiring.
 - .5 All internal wiring to be complete with
105°C rated insulation.
- .5 Ratings:
 - .1 Heaters to be rated for voltage, phase
and KW capacity as indicated in schedule on
drawings.
 - .2 All three phase heaters to have equal,
balanced, three phase stages.

- 2.1 DUCT HEATERS .5 Ratings: (Cont'd)
 (Cont'd)
- .3 Supply heaters with size and quantity of
 fixed and proportional heating stages as
 indicated in schedule.
- .6 Controls:
- .1 Factory mounted and wired in control
 box. Use terminal blocks for power and control
 wiring.
- .2 Controls to include:
- .1 Magnetic contactors.
- .2 Fixed differential pressure switch.
- .3 Manual and automatic reset high
 limit.
- .4 Control transformers.
- .5 Solidy state relays.
- .6 Door interlocked disconnect switch
 (non-fused).
- .7 HRC load fuses.
- .8 Electronic hybrid step controller.
- .9 Heater to be controlled by 0-10 VDC
 or 4-20 mA remote control signal from the
 building automation system supplied and
 installed by the controls Contractor.
- .3 Performance: see schedule on drawings.
- .4 Provide heater complete with protective
 screens on inlet/outlet.

PART 3 - EXECUTION

- 3.1 EXAMINATION .1 Verification of Conditions: verify that
 conditions of substrate previously installed
 under other Sections or Contracts are
 acceptable for duct heaters installation in
 accordance with manufacturer's written
 instructions.
- .1 Visually inspect substrate in presence
 of Departmental Representative.
- .2 Inform Departmental Representative of
 unacceptable conditions immediately upon
 discovery.
- .3 Proceed with installation only after
 unacceptable conditions have been remedied and
 after receipt of written approval to proceed
 from Departmental Representative.

- 3.2 INSTALLATION .1 Make power and control connections to CSA C22.2 No.46.
- 3.3 FIELD QUALITY CONTROL .1 Perform tests in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements and Section 26 05 00 - Common Work Results for Electrical.
- .2 Perform tests in presence of Departmental Representative.
.1 Provide test report and include copy with Operations and Maintenance Manuals.
- 3.4 CLEANING .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal and Section 01 35 21 - LEED Requirements.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.