

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:
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- 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 Temrinal blocks to accomodate 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.

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- 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.