PART 1 - GENERAL

1.1 REFERENCE STANDARDS

.1 CSA Group
- .1 CSA C22.2 No.46 (Latest Edition), 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 minimum airflow.

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 off ground 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.

PART 2 - PRODUCTS

2.1 DUCT HEATERS

.1 Duct heaters: insert type.

.2 Elements:
- .1 Helical coils of nickel chrome alloy resistance wire.
- .2 Finned tubular.
- .3 Incoloy sheathed.

.3 Staging:
- .1 Staged heaters: balanced line current at each stage.
- .2 Each stage: uniform face distribution.

.4 Maximum temperature at discharge: 35 degrees Celsius.

.5 Controls:
- .1 Factory mounted and wired in control box. Use terminal blocks for power and control wiring to thermostat and sail switch.
- .2 Controls mounted in a CSA Type NEMA 1 enclosure and to include:
  - .1 Magnetic contactors.
  - .2 Control transformers.
  - .3 SCR and/or Step controller.
- .3 Where controls are mounted in heater, exercise care in mounting contactors to minimize switching noise transmission through ductwork.
- .4 High temperature cutout manual and automatic reset, and air proving switch.

.6 Electrical:
- .1 Duct heater rating:
  - .1 15 kW.
  - .2 208 voltage.
  - .3 3 phase.
- .2 Stages:
  - .1 3 number.
  - .2 2 stages of step control + 1 stage SCR.
  - .3 5 kW.
  - .4 208 voltage.
  - .5 3 phase.

.7 Main isolation disconnect switch.

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.

END OF SECTION