PART 1 - GENERAL

1.1 REFERENCES

.1 American National Standards Institute/Air Movement and Control Association (ANSI/AMCA)
- .1 ANSI/AMCA Standard 99-Latest Edition, Standards Handbook.
- .2 ANSI/AMCA Standard 210-Latest Edition/(ANSI/ASHRAE 51-07), Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.
- .3 ANSI/AMCA Standard 300-Latest Edition, Reverberant Room Method for Sound Testing of Fans.
- .4 ANSI/AMCA Standard 301-Latest Edition, Methods for Calculating Fan Sound Ratings from Laboratory Test Data.

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 HVAC fans and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Newfoundland and Labrador, Canada.
- .2 Provide:
  - .1 Fan performance curves showing point of operation, kW and efficiency.
  - .2 Sound rating data at point of operation.
- .3 Indicate:
  - .1 Motors, sheaves, bearings and shaft details.
  - .2 Minimum performance achievable with variable speed controllers and variable inlet vanes as appropriate.

1.3 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Materials:
.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
.1 Provide:
.1 Matched sets of belts.
.2 Furnish list of individual manufacturer's recommended spare parts for equipment, include:
.1 Bearings and seals.
.2 Addresses of suppliers.
.3 List of specialized tools necessary for adjusting, repairing or replacing.

1.4 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 HVAC fans from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

.1 Performance Requirements:
.1 Catalogued or published ratings for manufactured items: obtained from tests carried out by manufacturer or those ordered by manufacturer from independent testing agency signifying adherence to codes and standards in force.
.2 Capacity: flow rate, total static pressure, W, efficiency, revolutions per minute, power, model, size, sound power data and as indicated on schedule.
.3 Fans: statically and dynamically balanced, constructed in conformity with ANSI/AMCA Standard 99.
.4 Sound ratings: comply with ANSI/AMCA Standard 301, tested to ANSI/AMCA Standard 300. Supply unit with ANSI/AMCA certified sound rating seal.
.5 Performance ratings: based on tests performed in accordance with ANSI/AMCA Standard 210. Supply unit with ANSI/AMCA certified rating seal.

2.2 FANS GENERAL

.1 Motors:
.1 In accordance with Section 23 05 13 - Common Motors Requirements for HVAC Equipment supplemented as specified herein.
.2 For use with variable speed controllers.
.3 Sizes as indicated.

.2 Accessories and hardware: matched sets of V-belt drives, adjustable slide rail motor bases, belt guards, coupling guards fan inlet and or outlet safety screens inlet and outlet dampers and vanes.

.3 Factory primed before assembly in colour standard to manufacturer.

.4 Scroll casing drains: as indicated.

.5 Finish on fume hood exhaust fans: aluminum.

2.2 FANS GENERAL (Cont'd)

.6 Bearing lubrication systems plus extension lubrication tubes where bearings are not easily accessible.

.7 Vibration isolation: as indicated.

.8 Flexible connections: to Section 23 33 00 - Air Duct Accessories.

2.3 CENTRIFUGAL FANS

.1 Fan wheels:
.1 Welded aluminum construction.
.2 Maximum operating speed of centrifugal fans not more than 50% of first critical speed.
.3 Air foil forward curved and backward inclined blades, as indicated.

.2 Bearings: heavy duty split pillow-block flange mounted grease lubricated ball or roller self aligning type with oil retaining, dust excluding seals and a certified minimum rated life of 100,000 hours.

.3 Housings:
.1 Volute with inlet cones: fabricated steel for wheels 300 mm or greater, aluminum, for smaller wheels, braced, and with welded supports.
.2 For horizontally and vertically split housings provide flanges on each section for bolting together, with gaskets of non-oxidizing non-flammable material.
.3 Provide bolted or latched airtight access doors with handles.

.4 Variable volume control devices:
.1 The VFD package as specified herein shall be completely assembled and tested by the manufacturer in an ISO9001 facility. The VFD tolerated voltage window shall allow the VFD to operate ± nominal voltage as a minimum.
.1 Environmental operating conditions: 0 to 40°C continuous duty. VFD's that can operate at 40° C intermittently (during a 24 hour period) are not acceptable and must be oversized. Altitude 0 to 1000m

2.3 CENTRIFUGAL FANS (Cont'd)

.4 Variable volume control devices: (Cont'd)

.1 (Cont'd)

.1 (Cont'd)

above sea level, less than 95% humidity, non-condensing.

.2 Enclosure shall be type NEMA 1 and shall be UL listed as a plenum rated VFD. VFD's without these ratings are not acceptable.

.2 All VFD's shall have the following standard features:

.1 All VFD's shall have the same customer interface, including digital display, and keypad, regardless of horsepower rating.

.2 The keypad shall include Hand-Off-Auto selections and manual speed control. The drive shall incorporate "bumpless transfer" of speed reference when switching between "Hand" and "Auto" modes. There shall be fault reset and "Help" buttons on the keypad. The Help button shall include "on-line" assistance for programming and troubleshooting.

.3 There shall be a built-in time clock in the VFD keypad. The clock shall be used to date and time stamp faults and record operating parameters at the time of fault. The clock shall also be programmable to control start/stop functions, constant speeds, PID parameter sets and output relays.

.4 Plug-in modules to expand number of relays.

.5 1P20 and 1P66 protection.

.6 W/F control and voltage boost.

.7 The VFD shall allow the EMCS to control the drive's digital and analog outputs via the serial interface. This control shall be independent of any VFD function.

.3 RFI filters. All VFD's shall include RFI filters.

.4 FEATURES - Features to be furnished and mounted by the drive manufacturer. All features shall be UL Listed by the drive

2.3 CENTRIFUGAL FANS (Cont'd)

.4 Variable volume control devices:(Cont'd)

.4 (Cont'd)

manufacturer as a complete assembly and carry a UL508 label.

.1 Door interlocked, padlockable circuit breaker that will disconnect all input power from the drive and all internally mounted options.

.2 Fast acting fuses exclusive to the VFD - fast acting fuses allow the VFD to disconnect from the line prior to clearing upstream branch circuit protection.

.3 The drive shall provide single-phase motor protection in the VFD.

.4 Indicating lights (LED type) shall be provided. A test mode or push to test feature shall be provided.

.5 Mounting Arrangements:

.6 VFD units shall be mounted within close proximity to the motor it is controlling. Contractor is fully responsible for coordinating the exact location of the VFD unit with the Air Handling Unit. Avoid interference with all access doors, filter and drain locations and maintain appropriate clearances. Mounting support to be composed of unistrut.

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 HVAC fans 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

3.1 EXAMINATION (Cont'd)

.1 (Cont'd)
.3 (Cont'd)
after receipt of written approval to proceed from Departmental Representative.

3.2 FAN INSTALLATION

.1 Install fans as indicated, complete with resilient mountings and flexible electrical leads and flexible connections.

.2 Provide sheaves and belts required for final air balance.

.3 Bearings and extension tubes to be easily accessible.

.4 Access doors and access panels to be easily accessible.

3.3 VFD INSTALLATION

.1 Installation shall be the responsibility of the EMCS contractor. The contractor shall install the drive in accordance with the recommendations of the VFD manufacturer as outlined in the installation manual.

.2 Power wiring shall be completed by the electrical contractor. Three copper conductors and a ground wire are required. Separate the input power wiring from the output power wiring in individual metallic conduit. Do not combine. Provide a separate metallic conduit for control wiring. The contractor shall complete all wiring in accordance with the recommendations of the VFD manufacturer as outlined in the installation manual.

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

3.4 CLEANING (Cont'd)

.2 Final Cleaning:(Cont'd)
equipment in accordance with Section 01 74 11 - Cleaning.

END