26 29 13 – VARIABLE FREQUENCY DRIVES

PART 1: GENERAL

1.1 Overview

1.1.1 This standard is intended to provide useful information to the A/E to establish a basis of design. The responsibility of the engineer is to apply the principles of this section such that the University of Texas at Dallas may achieve a level of quality and consistency in the design and construction of their facilities. Deviations from these guidelines must be justified through LCC analysis and submitted to the University for approval.

PART 2: PRODUCTS

2.1 General Requirements

2.1.1 Variable torque, variable voltage/frequency type for centrifugal fan and pump applications and suitable for use with both standard and high efficiency 3-phase, squirrel cage, induction motors.

2.1.2 Solid state with Pulse Width Modulation (PWM) output waveform. Six step and current source are not acceptable. Full wave rectifier (to prevent input line notching), AC line reactor, fuses, capacitors, and insulated bipolar transistors (IBGT's) as the output-switching device (SCR's, GTO's and Darlington transistors are not acceptable). All standard and optional features included within the VFD enclosure. Approved by the equipment manufacturer for the particular product(s) and application(s) involved.

2.1.3 Converter and an inverter section. Converter section shall convert fixed frequency and voltage AC utility power to a DC voltage. VFD shall also include three phase input fuses. The inverter section of the VFD shall invert the DC voltage into a quality output wave form, adjustable voltage and frequency output for stepless motor speed control.

2.1.4 Tested to ANSI/UL standard 508. Complete system listed by a nationally recognized testing agency such as UL, ETH CUC or CSA.

2.1.5 Power line noise limited to a voltage distortion factor and line notch depth as defined in IEEE 519-1992. Prior to installation, the VFD manufacturer shall estimate total harmonic distortion (THD) caused by the VFD. The results based on a computer aided circuit simulation of the total actual system, with information obtained from the power provider and the user.

2.1.6 Pre-wired 3-position mechanical type Hand/Off/Auto (H-O-A) selector switches and speed potentiometer. Means to communicate hand, off, or auto position.

2.1.7 Power on light to indicate that the VFD is being supplied line power. Fault light to indicate that the VFD has tripped on a fault condition.

2.1.8 Plain English, backlit LCD digital display (code numbers and letters not acceptable) and keypad.

2.1.9 Internal self-diagnostics.

2.1.10 Speed control shall be from a 4-20mA, 0-10vdc or 3-15psi pneumatic signal.

2.1.11 Enclosures shall be NEMA-1 for indoor applications and NEMA 3R for outdoor applications.

2.1.12 Acceptable manufacturers and models:

2.1.12.1 ABB ACH550.
2.1.12.2 Danfoss FC 100.

2.1.13 Integral bypass switch that allows operation of the motor via line power in the event of VFD failure.

2.2 Warranty

2.2.1 36 months from the date of certified start up. Include all parts, labor, travel time and expenses.

2.2.2 Local factory certified technicians for 24 hours, 7-day a week service. Throughout the warranty service period, response within 24 hours of initial contact for service.

2.2.3 Guaranteed spare parts availability to the University for a minimum of fifteen (15) years from date of purchase.

2.3 Training

2.3.1 On-site instruction included with each VFD and within 30 days of start-up. Factory trained and certified instructor. All training aids shall be provided by trainer. Content to include care, troubleshooting, servicing, and operation of the equipment and systems installed.

2.3.2 Classroom, on-site and in-the-field instruction.

2.4 Start-Up

2.4.1 Factory trained and certified technician shall check the installation, start the VFD's and place them into operation. Start-up within two weeks of notification.

2.4.2 Certified start-up report.

2.5 Communications

2.5.1 EIA-485 and EIA-232 ports as standard.

2.5.2 Communicate with PLC's, DDC's, via Modbus communication protocol. Components included for interface with the selected Building Automation System.

2.5.3 Serial port to download drive parameters and fault logs.

2.5.4 Programmable inputs and outputs.

PART 3: EXECUTION

3.1 Design Requirements

3.1.1 The 35% Contract Document review submission shall include specifications and details for VFD's.

3.1.2 Statement of deviations from standards. [Deviations to be approved by the University]

3.1.3 Incorporate the University's standard VFD documents and details into project contract documents.

3.1.4 Show VFD locations on mechanical plans. Ensure adequate mounting space and floor area including service access. VFD preferred location is adjacent to and within the same room as equipment served.

3.2 Coordination

3.2.1 All design work shall be coordinated between electrical, mechanical and the University.

3.2.2 Coordinate the following VFD options with the University:

3.2.2.1 External bypass switch to operate equipment while VFD is inoperative or being maintained.

3.2.2.2 Communications interface with building and temperature controls.

3.2.2.3 Input line reactors for harmonic suppression.

3.2.2.4 Output line reactors for motor protection.

3.2.2.5 6, 12 or 18 pulse shifting transformer or Active Harmonic filtering (AHF) to minimize total harmonic distortion.

3.2.2.6 Removable VFD keypad with LCD and memory storage.

3.2.2.7 External 3 contactor, DRIVE/OFF/BYPASS/TEST SWITCH that allows operation of the motor via line power in the event of VFD failure.

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