

PART 1 - GENERAL

1.01 Intent of Document

The information included in this section is intended to identify the **SPECIFIC ITEMS** required by Oklahoma State University in the design and construction of facilities on the campus. Items of "normal, code, industry or standard construction practice" are not included in this section.

1.02 Design Criteria

- A. Provide motor driven systems that use "off the shelf" premium efficiency motors. If a motor fails, an appropriate replacement can be located in stock locally. Use NEMA rated 1800 RPM motors with class F insulation. Do not select motor speeds requiring V-belt reduction ratios greater than 6 to 1.
- B. Specify open drip-proof electric motors that are labeled "NEMA Premium" or meet the latest Federal Energy Management Program (FEMP) designated performance levels for all motors 1 HP and larger. Totally enclosed or explosion proof types shall be provided where conditions dictate.
- C. All motors shall conform to the latest IEEE or NEMA standards relating to characteristics, dimensions, tolerances, temperature rise, insulation, and ratings for noise and vibration.
 - 1. Motors shall not exceed 80 db rating when running at full speed and power range.
- D. Use NEMA class F insulation with Class B temperature rise and 1.15 service factor in an ambient temperature of 40°C maximum. Bearings shall have an ANSI/AFBMA L-10 rating of 200,000 hours for direct connected service. Sleeve bearings will be permitted only for fractional hp motors and where specifically recommended by the equipment manufacturer as the better type of bearing for the application.
- E. Shaded pole-type motors greater than 1/8 hp are not acceptable.
- F. Specify 480V, three phase electrical service for motors 1/2 hp and larger.
- G. All motors shall be mounted on the same base as the rotating equipment they serve (for alignment purposes).
- H. Specify variable frequency AC adjustable speed drives where economically feasible.
 - 1. The VFD shall be of sufficient capacity and provide a quality of output wave form so as to achieve full rated output of the motors. The VFD shall be capable of operating any standard NEMA Design B squirrel cage induction motor (3 phase, 60 Hz), with full load amp rating between 10 percent and

110 percent of the drive full load current capability, without requiring any modifications to the motor or drive.

2. Each VFD shall be of the pulse width modulation (PWM) design.
3. VFDs shall be equipped with factory installed reactors or separate isolating transformer to minimize the effects of harmonics and "line notching" on the building distribution system. Manufacturer shall optimize the impedance of reactors or transformer and provide calculations to the owner certifying that the installed system is within IEEE 519 standards. Care should be taken in specifying transformer impedance so the transformer can support across the line starting of the driven motor in a standby mode.
 - I. Motors used with variable frequency drives must, at a minimum, meet the requirements of NEMA MG-1, part 31 "Definite Purpose Inverter-Fed Motors".
 - J. Specify cast iron construction on 3 horsepower motors and above.
 - K. Specify that all belt drive motors over 5 HP shall have dual pushpull adjustment screws for the motor mounts. For retrofits, require that the motor mounts be replaced if not of this type.
 - L. Use the following motor voltage ratings:
 1. 120 or 208 VAC single phase for motors less than 1/2 HP.
 2. 460, 460/230/208, 3 phase for motors 1/2 HP and larger in continuous operation; connect to 480-volt source when available.

END OF SECTION 15055