nyb | The New York Blower Company®
7660 QUINCY ST.—WILLOWBROOK, IL 60521-5596
TEL: (630) 794-5700 • FAX: (630) 794-5776
WEB: http://www.nyb.com • E-MAIL: nyb@nyb.com

Motor Voltage Limitations

SALES BULLETIN

SB-603

August 24, 1989

The purpose of this sales bulletin is to clarify proper motor selection for application on 200 and 208V power systems. This issue can be confusing because of the variety of motor ratings available including the "tri-voltage" rating of 208-230/460 V. In addition, some motor manufacturers state that their motors are designed with enough safety factor to operate at greater than standard voltage tolerances while others definitely do not. Consult page 3 of Engineering Letter No.22, *Integral Motors for Centrifugal Fans*, for additional information on this subject.

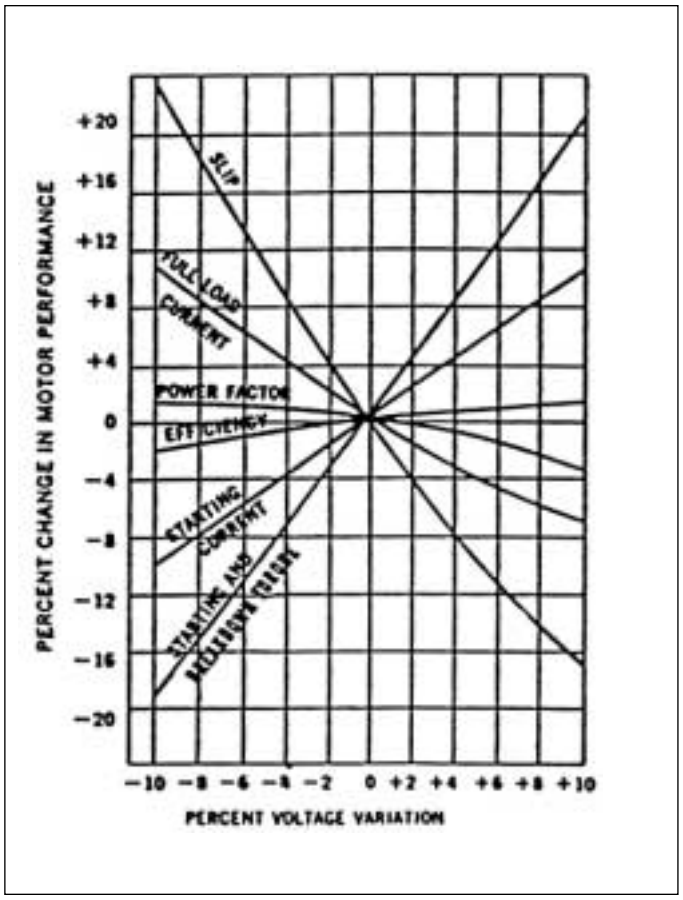
There are still a number of municipalities and numerous plant facilities that maintain 208V power systems. It is important to select the proper motor at the correct voltage to operate on these systems to ensure the longest possible motor life. At times, motor availability, first cost or other project issues may appear to outweigh the technical selection criteria, but motor life suffers if system voltages vary beyond 10% of nameplate voltage.

The key to determining what motor so select is understanding that manufacturers design their motors to operate successfully within 10% of nameplate voltage. This 10% variance applies to all nameplate voltages with the exception of the tri-voltage 208-230/460V rating. In essence, the 208 aspect of the rating is the lower limit of the 230V rating (230V minus 10% = 207V). In actuality, 208-230/460V motors are typically nothing more than standard 230/460V motors. The bottom line is that the 208V rating does not have a 10% variance.

Power system voltage will fluctuate around the nominal system voltage by considerable margins. Hence, 208V systems may actually be operating at voltages in the high 100's, well beyond the tri-voltage motor's voltage range. The result is high motor operating temperature and shortened motor life.

The current NEMA code discusses operation of 230V motors on 208V systems. The code states "...induction motors intended for operation on 208V systems should be rated for 208 or 200V. Operation of a motor rated 230V on a 208V system is not recommended because utilization voltages are commonly encountered below the minus 10% tolerance of the voltage rating for which the motor was designed. Operation at these conditions will generally result in excessive over-heating and serious reduction in torques."

Other aspects of motor performance deteriorate as well at decreased voltages. While the degree of change is different for different vendors, motors and sizes, the graph on the left, below, provides a good "rule of thumb".



The following table is a guide to which motor nameplate voltage should be utilized for nominal power system voltages.

Power Systems Voltage	Motor Nameplate Voltage
200V	200V
208V	200V
240V	230V
480V	460V
600V	575V