

ENGINEERING DATA SHEET

<i>Chempump Winding Life</i>		
Date	Supersedes	No.
04/01/99	05/02/83	10E

Chempump motor windings are designed to give long trouble-free service. However, like windings in conventional motors, various factors relating to the application and installation of Chempump windings affect their operating life. Consideration relative to obtaining maximum winding life and eliminating the possibility of premature winding failure are included in the following:

A. Effect of Voltage

Polyphase induction motors are designed to operate successfully under the following conditions of voltage and frequency variation:

1. Where the voltage variation does not exceed 10% above or below normal.
2. Where the frequency variation does not exceed 5% above or below the normal.
3. Where the sum of the voltage and frequency variation does not exceed 10% (provided the frequency variation does not exceed 5%) above or below normal.

The above statements presuppose the same line voltage in each phase. When line voltages applied to a polyphase induction motor are not exactly the same, unbalanced currents will flow in the stator winding, the magnitude depending upon the amount of unbalance. A small amount of voltage unbalance may increase the current an excessive amount.

Such unbalance will cause the temperature to rise considerably. Torque and full-load speed will decrease slightly. The locked rotor current will be unbalanced to the same degree as the voltage unbalance but the full speed current will be greatly unbalanced, in the order of approximately 6 to 10 times the percentage voltage unbalance, making selection of overload protective devices difficult.

Chempump motors are designed for operation for 230/460 volt, 3 phase, 60 cycle or 190/380, 3 phase, 50 cycle power. Electric input power outside their ranges requires a special motor. Chempump fabricates their own motors, therefore a special voltage request adds little to the price and delivery of the unit. Following is a table showing 50 and 60 cycle rated voltages and allowable voltage variations for standard Chempump motor windings:

60 Cycle		50 Cycle	
<u>Rated Voltage</u>	<u>Voltage Variation</u>	<u>Rated Voltage</u>	<u>Voltage Variation</u>
230	207-253	190	171-209
460	414-506	380	342-418
* 575	518-632	480	432-528

* 575 volt rating has been included here since, although it is basically a special winding, it is a quite common plant voltage in Canada and parts of the United States.

B. Effect on Operating Conditions

1. Since the motor load produced by a centrifugal pump increases with an increase in flow, momentary rises in current are not usually encountered. However, at start-up, it is recommended that the discharge valve be open just a bit to allow some circulation of the fluid through the system and to vent any vapors present in the pump. This eliminates excessive heating up of the pumped fluid in the pump and motor as would occur if the valve were completely closed. The valve should then be opened gradually to the rated capacity. The unit should not be permitted to operate beyond its full load point if the unit does not have a non-overloading characteristic throughout its entire operating range since winding life would be substantially reduced.
2. Short cycling (starting and stopping) should be avoided due to high in-rush currents and motor heat build-up.
3. Motors must not exceed the temperature vs. KW limits.
4. Improper circulation through the rotor section, insufficient NPSH, starved suction, insufficient coolant flow through water jacket or heat exchanger will also cause premature insulation breakdown.
5. Improper lead connections, incorrectly sized overload protection, TCO improperly connected, or moisture in the conduit box can also cause premature motor failures.
6. The TCO must not have more than rated contact current passing through it. Therefore, the holding coil of the starter must not have more current passing through it than the contacts are capable of handling.

Maximum holding coil current for our Chempump's TCOs are as follows:

<u>Volts</u>	<u>AC Amperes</u>	<u>Volts</u>	<u>AC Amperes</u>
115	3.1	460	0.8
230	1.6	575	0.6

For maximum TCO contact life, it is recommended that 115 volt holding coil circuit be used and the holding coil current be kept to a minimum.

Note: Heaters in motor starters should be sized for the amperage shown on the Chempump nameplate. In order to provide as complete protection as possible for Chempump motors under all conditions, it is recommended that "quick trip" type heaters be used in the starters.

Standard heaters provide adequate protection for Chempump motors under starting or normal running conditions, but require a greater length of time than "quick trip" type heaters to cut out, when, and if, the motor is subject to locked rotor or overload conditions.