

## DOCKETED

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## **Pool Pump Staff Workshop**

As a follow-up to the questions brought forth by Sean Steffensen;

1. Average product usage (hours per day, day per year): Approximately 8 hours a day, and 150 days a year
2. Pool pump motor design life: The design life is 3000 hours
3. PMSM motor efficiency: 50-60%
5. CSCR motor efficiency: 60-70%
6. A breakdown of total motor capacities (or average motor capacity for storable pumps):  
530 gal: 0.064HP  
1000 gal: 0.087HP  
1500 gal: 0.22HP  
2000 gal: 0.3HP
7. What is the rationale why PMSM motors cannot meet the efficiency target? I would like to understand if the motor cannot be redesigned to meet the standard or if it would be cost prohibitive to redesign, build or sell a compliant motor: Because the PMSM motor works within a water pump, and for the safety consideration, the motor has to be made with high IP grade (water resistance specifically) which makes the rotating parts completely separated from the live parts and hence increases the clearance between the rotor and stator. It will be difficult to improve the efficiency of this type of the PMSM motor, because doing so would decrease its grade of water resistance, which will affect the overall safety.

PMSM motors are generally regarded to be a very energy efficient design. The small "epoxy style" pumps used for the smaller storable pools are most closely identified with the characteristics of PMSM type motors. In discussing testing results with a 3rd party lab, the nature of this integrated pump motor construction, considering also their extremely low rated power, creates an issue in measuring the output. For instance, the use of a normal dyno will instantly lock the rotor. In order to obtain any result on output, a hybrid dyno had to be used. Even with using the hybrid dyno, the rotor tended to lock up very quickly. Output values utilizing the currently available measurement equipment may have a margin of error given the difficulty of preventing rotor lock-up. This may in part explain why the motor efficiency values determined during testing do not reflect the values anticipated for PMSM motors. Also, these small integrated filter pump motor combinations may not be easily tested for efficiency outside of their very specific application of use to circulate storable pool water.