UL 1004-10

Pool Pump Motors

Issue Number: 1

DATE

Summary of Topics

This First issue of the Outline for Pool Pump Motors, UL 1004-10, covers dedicated-purpose pool pump motors that are intended for use as new and replacement motors for dedicated-purpose pool pumps defined by 10 CFR, Part 431.462, Subpart Y, Pumps.

1 Scope

1.1 This Outline is intended to be read together with the Standard for Rotating Electrical Machines - General Requirements, UL 1004-1 and all other applicable UL 1004 series. The requirements in this Outline supplement or amend the requirements in UL 1004-1 and the applicable series. The requirements of UL 1004-1 and the applicable series apply unless modified by this Outline.

1.3 This Outline covers motors that are intended for use in all dedicated purpose pool pumps (DPPP) some of which are as defined by 10 CFR, Part 431.462 and Subpart Y, Pumps.

1.4 The motors covered by this Outline have a DPPP motor total horsepower (THP) up to 5 THP.

1.5 The following types of DPPP motors are not within the scope of this Outline:

a) Polyphase motors capable of operating without a drive and not provided with a drive that converts single-phase power to polyphase power;
b) Waterfall pump motors;
c) Rigid electric spa pump motors;
d) Storable electric spa pump motors;
e) Integral cartridge-filter pool pump motors; and
f) Integral sand-filter pool pump motors.

2 Glossary

2.1 For the purpose of this Outline, the following definitions apply.

2.2 CAPACITOR-START, INDUCTION-RUN – A single-phase induction motor configuration with a main winding arranged for direct connection to a source of power and an auxiliary winding connected in series with a capacitor. The motor configuration has a capacitor phase, which is in the circuit only during the starting period.

2.3 DEDICATED-PURPOSE POOL PUMP (DPPP) MOTOR - An electric motor that is single-phase or poly-phase and is designed and/or marketed for use in dedicated-purpose pool pump (DPPP) applications.

2.4 DESIGNED AND MARKETED - a DPPP motor designed to fulfill the intended DPPP application and is designated and marketed solely for that DPPP application, with

the designation on all the packaging and all publicly available documents (e.g., product literature, catalogs, and packaging labels).2.5

DESIGNED AND/OR MARKETED - a DPPP motor designed to fulfill the intended DPPP application and/or is designated and marketed for DPPP application, with the DPPP designation on the packaging and/or any publicly available documents (e.g., product literature, catalogs, and packaging labels).

2.6 DRIVE - A power converter, such as a variable-speed drive or phase-converter.

2.7 INTEGRAL CARTRIDGE-FILTER POOL PUMP MOTOR - A DPPP motor that is a component of an integral cartridge-filter pool pump as defined at 10 CFR 431.462. See Clause 1.5.

2.8 INTEGRAL SAND-FILTER POOL PUMP MOTOR - A DPPP motor that is a component of an integral sand-filter pool pump as defined at 10 CFR 431.462. See Clause 1.5.

2.9 MAXIMUM OPERATING SPEED - The rated full-load speed of a motor powered by a 60 Hz alternating current (AC) source.

2.10 RIGID ELECTRIC SPA PUMP MOTOR - A DPPP motor that does not have a C-flange or square flange mounting and that is labeled, and designed and marketed, for use only in rigid electric spas as defined at 10 CFR 431.462. See Clause 1.5.

2.11 SPLIT PHASE - A single-phase induction motor configuration with an auxiliary winding displaced in magnetic position from, and connected in parallel, with the main winding. The auxiliary circuit is open when the motor has attained a predetermined speed.

2.12 STORABLE ELECTRIC SPA PUMP MOTOR - A DPPP motor that is a component of a storable electric spa pump as defined at 10 CFR 431.462. See Clause 1.5.

2.13 VARIABLE-SPEED CONTROL DEDICATED-PURPOSE POOL PUMP MOTOR - A dedicated-purpose pool pump motor that meets the following requirements:

a) The motor shall be capable of operating at four or more discrete user- or pre-determined operating speeds, where one of the operating speeds is the maximum operating speed and at least:

1) One of the operating speeds is 75% to 85% of the maximum operating speed;
2) One of the operating speeds is 45% to 55% of the maximum operating speed; and
3) One of the operating speeds is less than or equal to 40% of the maximum operating speed and greater than zero.

b) The motor shall be provided either:

1) With a variable speed drive and with a user interface that changes the speed in response to pre-programmed user preferences and allows the user to select the duration of each speed and/or the on/off times;

2) With a variable speed drive and without a user interface that changes the speed in response to pre-programmed user preferences and allows the user to select the duration of each speed and/or the on/off times, provided that the motor is unable to operate without the presence of a user interface; or

3) Without a variable speed drive and with or without a user interface, provided that the motor is unable to operate without the presence of a variable speed drive.

c) Any high speed override capability shall be for a temporary period not to exceed one 24-hour cycle without resetting to default settings or resuming normal operation according to pre-programmed user preferences; and

d) Daily run time schedule:

1) Any factory default setting for daily run time schedule shall not include more hours at an operating speed above 55% of maximum operating speed than the hours at or below 55% of maximum operating speed;

2) If a motor is not provided with a factory default setting for daily run time schedule, the default operating speed after any priming cycle as defined in 10 CFR, Part 431 Subpart Y, (if applicable) shall be no greater than 55% of the maximum operating speed.

2.14 WATERFALL PUMP MOTOR - A dedicated-purpose pool pump motor with a maximum speed less than or equal to 1,800 RPM, and that is designed and marketed for waterfall pump applications and labeled for use only with waterfall pumps. See Clause 1.5.

2.15 DPPP motor total horsepower (THP) - the product of the DPPP nominal motor horsepower and the DPPP service factor of a motor used on a DPPP based on the maximum continuous duty motor power output rating allowable for the motor's nameplate ambient rating and insulation class. The DPPP motor total horsepower (THP) is also referred to in the industry as service factor horsepower or motor capacity.

4 PERFORMANCE

4.0 Unless otherwise noted, all tests below shall be conducted with the motor connected to a supply of rated voltage and rated frequency, with the output shaft mechanically loaded such that the motor is operating at rated THP.

4.1 A Dedicated-Purpose Pool Pump (DPPP) Motor shall not operate with a capacitor start induction run (CSIR) or split phase (SP) configuration at maximum operating speed.

4.1.1 The motor shall be operated at the maximum speed setting. After start-up, while running at the maximum speed setting, the motor circuit shall be inspected to determine compliance with 4.1.

4.2 Operational Test for Variable-Speed Control Dedicated-Purpose Pool Pump Motor

4.2.1 A Dedicated-Purpose Pool Pump (DPPP) motor with a marked total horsepower greater than or equal to 1.15 THP shall comply with 4.2.1.1 – 4.2.1.4 and 4.3.

4.2.1.1 The motor shall be capable of operating at four or more discrete user- or pre-determined operating speeds and comply with the definition of 2.13 (a) in accordance with the manufacturer's instructions.

4.2.1.1.1 To verify compliance with 4.2.1.1, the motor shall be operated at each speed setting, and the speed shall be recorded. The speed at each setting shall be compared to the maximum operating speed and shall comply with 4.2.1.1.

4.2.1.2 The motor shall be provided with one of the following configurations and comply with the definition of 2.13 (b).

4.2.1.2.1

Compliance to Clause 4.2.1.2 shall be determined by inspecting the motor configuration provided by the DPPP motor manufacturer. When compliance cannot be determined via inspection, to verify compliance with 4.2.1.2, the motor shall be operated per the instructions, using the settings permitted by the motor drive and/or user interface. The configuration and settings shall be recorded, and shall comply with 4.2.1.2.

4.2.1.3 If the motor is provided with a high speed override function, the motor shall comply with the definition of 2.13 (c).

4.2.1.3.1 Compliance to Clause 4.2.1.3 shall be determined by inspection, review of user manual, and review of the relevant documentation provided by the DPPP motor manufacturer. When compliance cannot be determined via inspection, to verify compliance with 4.2.1.3, the motor shall be operated and the high speed override setting shall be enable such that the motor is deliberately operating at high speed. The motor shall be allowed to continue operating in this mode without further manual intervention, or until it automatically changes back to default or pre-programmed user settings other than high speed, whichever comes first. The time period of high speed shall be recorded, and shall comply with 4.2.1.3.

4.2.1.4 If the motor is provided with a function for daily run time schedule, the motor shall comply with the definition of 2.13 (d).

4.2.1.4.1 If there is a factory default setting for the function of daily run time schedule, compliance to Clause 4.2.1.4 shall be determined by inspection, review of user manual, and review of the relevant documentation provided by the DPPP motor manufacturer. When compliance cannot be determined via inspection, and if provided with a factory default run time schedule, to verify compliance with 4.2.1.4, the motor shall be operated per the instructions for minimum of 24 hours at the default run times. The speed and time duration during the 24 hour period shall be measured, and shall comply with 4.2.1.4.

4.2.1.4.2 If there is no factory default setting for the function of daily run time schedule, the motor shall be operated at its default operating speed (after the priming cycle) in accordance with the manufacturer's instructions. The default operating speed shall be measured, and shall comply with 4.2.1.4.

4.3 Operational Test for Dedicated-Purpose Pool Pump (DPPP) Motor with Freeze Protection Controls

4.3.1 A Dedicated-Purpose Pool Pump (DPPP) motor provided with freeze protection controls shall be shipped with the freeze protection disabled, or with the following default, user-adjustable settings:

a) The default dry-bulb air temperature setting shall be no greater than 40 °F;

b) The default run time setting shall be no greater than 1 hour (before the temperature is rechecked); and

c) The default motor speed in freeze protection mode shall not be more than half of the maximum operating speed.

4.3.1.1 Compliance to Clause 4.3.1 (a) – (b) shall be determined by inspection, review of user manual, and review of the relevant documentation provided by the DPPP motor manufacturer. When compliance cannot be determined via inspection, to verify compliance with 4.3.1 (a) – (b), the motor shall be operated per the instructions, and observed to confirm if any freeze protection is enabled. If enabled as a default setting, the motor shall be operated in freeze protection mode, and the temperature setting and the run time until temperature rechecking occurs shall be recorded. The results shall comply with 4.3.1 (a) – (b).

4.3.1.2 To verify compliance with 4.3.1 (c), the motor shall be operated at its default operating speed in freeze protection mode in accordance with the manufacturer's instructions. The default operating speed shall be measured, and shall comply with 4.3.1 (c).

5 MARKINGS

5.1 The nameplate shall be permanently marked clearly with the following information:

a) The dedicated-purpose pool pump motor total horsepower in one of the following forms: “Dedicated-purpose pool pump motor total horsepower _____,” “DPPP motor total horsepower _____,” “motor total horsepower _____,” “motor THP _____,” or “THP _____”; and

b) The speed configuration (either single-speed, two-speed, multi-speed, or variable-speed control). Motors rated greater than 1.15 THP shall not be marked for single-speed, two-speed, or multi-speed.