UL 1004-10

STANDARD FOR SAFETY

Pool Pump Motors

UL Standard for Safety for Pool Pump Motors, UL 1004-10

First Edition, Dated February 28, 2020

Summary of Topics

This revision of ANSI/UL 1004-10 dated March 24, 2022 adds a glossary term for "Factory Default Setting"; 2.7A.

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin.

The new requirements are substantially in accordance with Proposal(s) on this subject dated January 28, 2022.

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Standard for Pool Pump Motors

First Edition

February 28, 2020

This ANSI/UL Standard for Safety consists of the First Edition including revisions through March 24, 2022.

The most recent designation of ANSI/UL 1004-10 as an American National Standard (ANSI) occurred on March 24, 2022. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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INTRODUCTION

1 Scope

1.1 This Standard 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 (Standard for Impedance Protected Motors, UL 1004-2, Standard for Thermally Protected Motors, UL 1004-3, Standard for Electronically Protected Motors, UL 1004-7, or Standard for Inverter Duty Motors, UL 1004-8). The requirements in this Standard 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 Standard.

1.2 This Standard covers all dedicated-purpose pool pump (DPPP) motors defined in 2.3 with the characteristics listed in 1.3. This includes motors intended for use in DPPP as defined by 10 CFR, Part 431.462, Subpart Y, Pumps.

1.3 The motors covered by this Standard have a DPPP motor total horsepower (THP) less than or equal to 5 THP.

1.4 The following types of DPPP motors are not within the scope of this Standard:

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 Standard, 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 – Designed to fulfill the intended DPPP application and is designated and marketed solely for that DPPP application, with the designation on the packaging and any publicly available documents (e.g., product literature, catalogs, and packaging labels).

2.5 DESIGNED AND/OR MARKETED – 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 DEDICATED-PURPOSE POOL PUMP MOTOR TOTAL HORSEPOWER (THP) – The product of the DPPP nominal motor horsepower and the DPPP service factor of a DPPP motor based on the maximum continuous duty motor power output rating allowable for the motor's nameplate ambient rating and insulation class and calculated in accordance with the method provided in Section E.3.4 of Appendix C of 10 CFR, Part 431, Subpart Y, Pumps. The DPPP motor total horsepower (THP) is also referred to in the industry as service factor horsepower or motor capacity.

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

2.7A FACTORY DEFAULT SETTING – Upon application of power at initial installation, the program that the unit will run without outside interference or change by the user.

2.8 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, Part 431.462, Subpart Y, Pumps. See 1.4.

2.9 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, Part 431.462, Subpart Y, Pumps. See 1.4.

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

2.11 MULTI-SPEED DEDICATED-PURPOSE POOL PUMP MOTOR – A Multi-Speed DPPP motor that is capable of operating at more than two discrete pre-determined operating speeds separated by speed increments greater than 100 rpm, where the lowest speed is less than or equal to half of the maximum operating speed and greater than zero, and must be provided:

a) With an onboard pool pump control (variable speed drive and user interface or programmable switch) 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; or

b) Without an onboard pool pump control (variable speed drive and user interface or programmable switch) 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, but is unable to operate without the presence of such pool pump control.

NOTE: This is not a variable speed dedicated purpose pool pump motor defined in 2.16.

2.12 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, Part 431.462, Subpart Y, Pumps. See 1.4.

2.13 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.

2.14 STORABLE ELECTRIC SPA PUMP MOTOR – A DPPP motor that is a component of a storable electric spa pump as defined at 10 CFR, Part 431.462, Subpart Y, Pumps. See 1.4.

2.15 TWO-SPEED DEDICATED-PURPOSE POOL PUMP MOTOR – A Two-speed DPPP motor that is capable of operating at only two different pre-determined operating speeds, where the low operating speed is less than or equal to half of the maximum operating speed and greater than zero, and must be provided either:

a) With a pool pump control (variable speed drive and user interface or switch) that is capable of changing the speed in response to user preferences; or

b) Without a pool pump control that has the capability to change speed in response to user preferences, but is unable to operate without the presence of such a pool pump control.

2.16 VARIABLE-SPEED CONTROL DEDICATED-PURPOSE POOL PUMP MOTOR – A DPPP 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.

2.17 WATERFALL PUMP MOTOR – A DPPP 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 1.4.

3 Referenced Publications

3.1 Any undated reference to a code or standard appearing in the requirements of this Standard shall be interpreted as referring to the latest edition of that code or standard.

3.2 The following publications are referenced in this Standard:

10 CFR, Part 431, Subpart Y, *Pumps*

UL 1004-1, *Standard for Rotating Electrical Machines – General Requirements*

UL 1004-2, *Standard for Impedance Protected Motors*

UL 1004-3, *Standard for Thermally Protected Motors*

UL 1004-7, *Standard for Electronically Protected Motors*

UL 1004-8, *Standard for Inverter Duty Motors*

PERFORMANCE

4 General

4.1 Unless otherwise noted, all tests 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.

4.2 A DPPP motor shall not operate with a capacitor start induction run (CSIR) or split phase (SP) configuration at maximum operating speed.

4.3 Compliance with 4.2 shall be determined by inspecting the motor configuration provided by the DPPP motor manufacturer. When compliance cannot be determined by inspection, 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 4.2.

5 Operational Test for a Variable-Speed Control DPPP Motor

5.1 A DPPP motor with a total horsepower (as defined in 2.6) greater than or equal to 1.15 THP shall comply with 5.2 – 5.10 and 6.1 – 6.3.

5.2 The motor shall be capable of operating at four or more discrete user- or pre-determined operating speeds and comply with the definition of 2.16(a) in accordance with the manufacturer's instructions.

5.3 To verify compliance with 5.2, 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 5.2.

5.4 The motor shall be provided with one of the configurations that is described in the definition of 2.16(b).

5.5 Compliance with 5.4 shall be determined by inspecting the motor configuration provided by the DPPP motor manufacturer. When compliance cannot be determined by inspection, the motor shall be operated per the manufacturer's instructions, using the settings permitted by the motor drive and/or user interface. The configuration and settings shall be recorded and shall comply with 5.4.

5.6 If the motor is provided with a high-speed override function, the motor shall comply with the definition of 2.16(c).