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An American National Standard

Standard Guide for Ordering Low Voltage (1000 VAC or Less) Alternating Current Electric Motors for Shipboard Service—Up to and Including Motors of 500 Horsepower[1]

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1. Scope

1.1 This guide covers the required basic ordering information for low voltage (1000 VAC or less) general-purpose, commercial, universal, ~~small~~small-, and ~~medium sized~~ medium-sized alternating current electric motors for shipboard use, up to and including motors of 500 hp.

1.2 The electric motors covered by this guide are general-purpose (GP) motors intended to drive common shipboard mechanical machinery such as fans, blowers, centrifugal and screw pumps.

1.3 This guide is not intended to be used to order special-purpose (SP) motors or definite-purpose motors (for example, cryogenic service) or motors for use in hazardous (classified) locations as defined by the National Electrical Code (NFPA 70).

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *Canadian Standards Association (CSA):*[2]
CSA Standard C390-93C Energy Efficiency Test Methods for Three-Phase Induction Motors General Instruction No.1

2.2 *Institute of Electrical and Electronic Engineers (IEEE):*[3]
IEEE Standard 45 Recommended Practice for Electrical Installations on Shipboard
IEEE Standard 112 Standard Test—Procedure for Polyphase Induction Motors and Generators

2.3 *National Electrical Manufacturers Association (NEMA) Standard:*[4]
NEMA Standard MG-1 Motors and Generators

2.4 *National Fire Protection Association (NFPA):*[5]
NFPA 70 National Electrical Code

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 ~~*closed-coupled—*~~*closed-coupled, n—*a special design where the motor features a face mounting flange that the pump casing mounts to, and a motor shaft extension on which the pump impeller is mounted.

3.1.2 ~~*dripproof—*~~*dripproof, n—*a machine enclosure that allows the motor to be cooled by ambient air having ventilation openings that allow operation when drops of liquid or solid particles strike the enclosure at any angle from zero to 15°.

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[2] Available from Canadian Standards Association (CSA), ~~5060 Spectrum Way, Mississauga, ON L4W 5N6, Canada, http://www.csa.ca.~~178 Rexdale Blvd., Toronto, ON M9W 1R3, Canada, http://www.csagroup.org.

[3] Available from Institute of Electrical and Electronics Engineers, Inc. (IEEE), 445 Hoes Ln., ~~P.O. Box 1331,~~ Piscataway, NJ ~~08854-1331,~~08854-4141, http://www.ieee.org.

[4] Available from National Electrical Manufacturers Association (NEMA), 1300 N. 17th St., Suite ~~1752, Rosslyn,~~900, Arlington, VA 22209, http://www.nema.org.

[5] Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02169-7471, http://www.nfpa.org.

3.1.3 *drive ~~method—~~method, n—*the method of driving the equipment, such as direct, belt, gearbox, or chain.

3.1.4 *efficiency ~~classes—~~classes, n—*standard efficiency classes established by NEMA based on motor performance.

3.1.5 *end ~~shield—~~shield, n—*a machined flange or base which have rabbets and bolt holes for mounting equipment to the motor or for overhanging the motor on a driven machine.

3.1.6 *frame ~~size—~~size, n—*standard sizes established by NEMA based on motor power and speed.

3.1.7 *mounting ~~arrangement—~~arrangement, n—*the installed operating position of the motor, such as horizontal, vertical shaft up, or vertical shaft down.

3.1.8 *~~multi-speed—~~multi-speed, n—*a motor that can operate at more than one speed, typically at two or three speeds.

3.1.9 *NEMA design ~~classes—~~classes, n—*design classifications designated by NEMA (see NEMA Standard MG-1) for motors that provides information to the end user on characteristics such as motor starting, torque, voltage, and so forth.

3.1.10 *NEMA insulation ~~classes—~~classes, n—*NEMA system that classifies motor insulation systems by their ability to withstand a specified temperature for a specified length of time with minimum deterioration.

3.1.11 *polyphase medium ~~motors—~~motors, n—*motors which have windings so arranged to accept to polyphase voltage sources.

3.1.12 *service ~~factor—~~factor, n—*service factor for an ac motor is a multiplier, which when applied to the rated horsepower, indicates a permissible horsepower loading which may be carried under the conditions specified for the service factor.

3.1.13 *single-phase fractional horsepower ~~motors—~~motors, n—*motors with ratings up to 1 hp which use single-phase power.

3.1.14 *single-phase integral horsepower ~~motors—~~motors, n—*motors with ratings of 1 hp up to and including 10 hp, which normally use single-phase power but at the upper end of their specified range may also utilize polyphase power.

3.1.15 *~~slip—~~slip, n—*the difference between synchronous speed and full load speed. Normal slip is less than 5 %.

3.1.16 *~~speed—~~speed, n—*the number of revolutions per minute (r/min) at which an induction motor operates, which is dependent upon the input power, frequency, and the number of magnetic poles in the machine.

3.1.17 *temperature, ~~ambient—~~ambient, n—*the temperature of the air surrounding the machine.

3.1.18 *temperature ~~rise—~~rise, n—*the difference between the hot spot temperature and the ambient temperature times a constant (see NEMA MG-1).

3.1.19 *totally-enclosed air over ~~(TEAO)—~~(TEAO), n—*an enclosure similar to a TEFC except the cooling air is provided by a fan that is not part of the motor.

3.1.20 *totally-enclosed fan-cooled ~~(TEFC)—~~(TEFC), n—*a totally-enclosed machine equipped for exterior cooling by means of a fan or fans integral with the machine but external to the enclosed parts.

3.1.21 *totally-enclosed non-ventilated ~~(TENV)—~~(TENV), n—*a machine enclosed to prevent the free exchange of air between the inside and outside of the case, but not sufficiently enclosed to be airtight.

3.1.22 *totally-enclosed water-air cooled ~~(TEWAC)—~~(TEWAC), n—*a totally-enclosed machine with integral water-to-air heat exchanger and internal fans to provide closed-loop cooling of the windings.

3.1.23 *universal ~~motors—~~motors, n—*typically small motors, which can operate on ac or dc current, or both.

3.1.24 *variable speed drive ~~(VSD)—~~(VSD), n—*a method used to permit an operator to vary the speed of a motor.

3.1.25 *weather ~~protected—~~protected, n—*a machine with ventilating passages so constructed as to minimize the entrance of rain, snow and airborne particles to the electrical components.

4. Significance and Use

4.1 The selection criteria is to be applied for uses of (*1*) new motors and (*2*) replacement motors.

4.2 For the selection of new or replacement motors, this practice defines the choice criteria in terms of the ordering data below.

5. General Requirements for Electric Motor Ordering

5.1 *Electric Motor Ordering Requirements:*

5.1.1 With each electric motor ordered for marine service, provide the following, to the greatest extent ~~practicable:~~practicable, for each speed at which the motor is to operate:

5.1.1.1 *Electrical Input*—Voltage, phases and frequency.

5.1.1.2 *Speed (Synchronous or Full Load)*—r/min.

5.1.1.3 *Power*—The horsepower of the motor must be stated as a standard NEMA rating. At a minimum, consideration should be given to the needed starting torque, capability to accelerate the load to full running speed and maximum overload.

5.1.1.4 *Enclosure*—Select in accordance with IEEE Standard 45. DP or TEFC are normally specified for below deck applications and WP for above deck applications.

5.1.1.5 *Duty Cycle*—Continuous duty is normally specified since it demands operation at an essentially constant load for an indefinitely long time. If intermittent or varying duty cycles are required, special motor selection criteria will apply.