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SUPERSEDING
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FEDERAL SPECIFICATION

MOTORS, ALTERNATING CURRENT, FRACTIONAL AND INTEGRAL
HORSEPOWER (500 HP and SMALLER)

This specification is approved by the Assistant Administrator,
Office of Federal Supply and Services, General Services Admin-
istration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers alternating current (ac) fractional and integral horsepower (hp) motors (for definitions see 6.5) of 500 hp or less for use in nontactical equipment.

1.2 Classification.

1.2.1 Types, classes, styles, kinds, and groups. Motors covered by this specification shall be of the following types, classes, styles, kinds, and groups as specified (see 3.1 and 6.2).

Type I - Single phase.

Class 1 - Induction motors.

Style A - Squirrel cage.

Kind 1 - Split phase.

Group A - Split phase resistance-start.

Kind 2 - Capacitor.

Group B - Capacitor-start.

Group C - Capacitor permanent-split.

Group D - Capacitor two-value.

Kind 3 - Shaded pole.

Style B - Wound rotor.

Kind 4 - Repulsion.

Kind 5 - Repulsion-start.

Kind 6 - Repulsion-induction.

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Class 2 - Universal motors.

- Style C - Series-wound.
- Style D - Compensated series-wound.

Type II - Polyphase.

Class 3 - Induction motors.

- Style E - Squirrel cage.
- Style F - Wound rotor.

Class 4 - Synchronous motor.

1.2.2 Enclosure. Motors covered by this specification shall be furnished in one of the following enclosure designs, as specified (see 3.1 and 6.2).

Enclosure 1 - Open machine.

- Design A - Dripproof.
- Design B - Splashproof.
- Design C - Semi-guarded.
- Design D - Guarded.
- Design E - Drip-proof fully guarded.
- Design F - Open externally ventilated.
- Design G - Open pipe, ventilated.
- Design H - Weather-protected, type I.
- Design I - Weather-protected, type II.

Enclosure 2 - Totally enclosed machine.

- Design J - Totally enclosed, nonventilated.
- Design K - Totally enclosed, fan-cooled.
- Design L - Explosion-proof.
- Design M - Dust-ignition-proof.
- Design N - Water-proof.
- Design O - Totally enclosed, pipe-ventilated.
- Design P - Totally enclosed, water-cooled.
- Design Q - Totally enclosed, water-air-cooled.
- Design R - Totally enclosed, air-to-air cooled.
- Design S - Totally enclosed, fan-cooled, guarded.
- Design T - Totally enclosed, air-over.

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

Federal Standard:

FED-STD-123 - Marking for Shipment (Civil Agencies).

(Activities outside the Federal Government may obtain copies of Federal specifications, standards, and commercial item descriptions as outlined under General Information in the Index of Federal Specifications, Standards, and

Commercial Item Descriptions. The Index, which includes cumulative bimonthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

(Single copies of this specification and other Federal specifications and commercial item descriptions required by activities outside the Federal Government for bidding purposes are available without charge from General Services Administration Business Service Centers in Boston, MA; New York, NY; Philadelphia, PA; Washington, DC; Atlanta, GA; Chicago, IL; Kansas City, MO; Fort Worth, TX; Houston, TX; Denver, CO; San Francisco, CA; Los Angeles, CA; and Seattle, WA.

(Federal activities may obtain copies of Federal standardization documents, and the Index of Federal Specifications, Standards, and Commercial Item Descriptions from established distribution points in their agencies.)

Military Specifications:

- MIL-V-173 - Varnish, Moisture and Fungus-Resistant (For Treatment of Communications, Electronic and Associated Equipment).
- MIL-E-16298 - Electric Machines Having Rotating Parts and Associated Repair Parts, Packaging of.

Military Standards:

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
- MIL-STD-129 - Marking for Shipment and Storage.
- MIL-STD-461 - Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference.
- MIL-STD-889 - Dissimilar Metals.

(Copies of military specifications and standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

MG1 - Motors and Generators.

(Application for copies should be addressed to the National Electrical Manufacturers Association, 2101 L Street, N.W., Washington, DC 20037.)

UNDERWRITERS' LABORATORIES, INC. (UL)

UL 674 - Motors and Generators, Electric, for use in Hazardous Locations.

(Application for copies should be addressed to the Underwriters' Laboratories, Inc., 333 Pfingsten Road, Northbrook, IL 60062.)

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SOCIETY OF AUTOMOTIVE ENGINEERS, INC. (SAE)

J534 - Standard for Lubrication Fittings.

(Application for copies should be addressed to the Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS

3.1 Description. Unless otherwise specified (see 6.2), electric motors (see 1.2.1) and enclosures (see 1.2.2) covered by this specification shall conform to the applicable definitions and requirements of NEMA MG1.

3.2 First article. When specified (see 6.2), the contractor shall furnish one motor for first article inspection and approval (see 4.2.1 and 6.4).

3.3 Standard commercial product. The motors shall, as a minimum, be in accordance with the requirements of this specification and shall be the manufacturer's standard commercial product. Additional or better features that are not specifically prohibited by this specification, but are a part of the manufacturer's standard commercial product, shall be included in the motors being furnished. A standard commercial product is a product that has been sold or is being currently offered for sale on the commercial market through advertisements or manufacturer's catalogs or brochures and represents the latest production model.

3.4 Materials. Materials used shall be free from defects that would adversely affect the performance or maintainability of individual components or the overall assembly. Materials not specified herein shall be of the same quality used for the intended purpose in commercial practice. Unless otherwise specified herein, all equipment, material, and articles incorporated in the work covered by this specification are to be new and fabricated using materials produced from recovered materials to the maximum extent possible without jeopardizing the intended use. The term "recovered materials" means materials that have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. None of the above shall be interpreted to mean that the use of used or rebuilt products are allowed under this specification unless otherwise specified.

3.5 Design and construction. Except as otherwise specified herein, the motors shall conform to the applicable manufacturing standards of NEMA MG1.

3.6 Fire and casualty hazards. Each bidder shall submit proof to the contracting agency that the electric motors he proposes to supply for use in hazardous locations under this specification conform to the applicable requirements of UL674. The listing mark of the UL may be accepted as evidence that the electric motors conform to this requirement. In lieu of the listing mark, the bidder may submit independent proof satisfactory to the contracting agency that his electric motors conform to the applicable requirements of the published standards including methods of test of the UL674. Compliance with

the above preliminary requirements in regard to fire and casualty hazards does not absolve the bidder from complete compliance with the requirements of this specification in order to secure acceptance of his product.

3.7 Voltage and frequency rating. Motors shall be furnished with voltage and frequency ratings as specified (see 6.2).

3.7.1 Type I, class 1.

60 Hertz (Hz) - 115 and 230 volts (V).
50 Hz - 110V and 220V.

3.7.2 Type I, class 2.

60 Hz - 115V and 230V.

3.7.3 Type II, classes 3 and 4.

60 Hz - 115V**, 200V, 230V, 460V, 575V, 2,300V, 4,000V, 4,600V,
and 6,600V.
50 Hz (three-phase) - 220V and 380V.

**Applies only to motors rated 15 hp and smaller.

3.8 Hp and speed rating. The hp and speed ratings shall conform to tables I, II, III, or IV, as specified (see 6.2). Type I, class 1 and type II, class 3 fractional-hp motors shall conform to table I. Type I, class 2 fractional-hp motors shall conform to table II. Type I, class 1, style A, kind 2, and type I, class 1, style B integral hp motors shall conform to table III. Type II, class 3 integral-hp motors shall comply to table IV.

3.9 Time rating. The time rating of the motor shall be for continuous operation. When short time ratings are desired, the time rating shall be as specified (see 6.2).

3.10 Electrical insulation system. Motors shall have electrical insulation systems conforming to NEMA MG1, class A, B, F, or H as specified (see 6.2).

3.11 Performance. Except as otherwise specified, motors shall conform to the applicable requirements of NEMA MG1 (see 6.2).

3.12 Frame size. Except as otherwise specified, (see 6.2), the motor frame size, shaft size, and dimensions shall conform to NEMA MG1.

3.13 Code letters for locked rotor kilovolt-ampere per horsepower (kVA/hp). Motor code letters shall be selected as applicable from table V (see 6.2) to meet desired locked rotor current requirements.

3.14 Bearing. Except for vertical motors, unless otherwise specified (see 6.2) ball, roller, plate or sleeve bearing may be supplied. For all motors the design shall incorporate means for removal and replacement of all bearings except for sleeve-bearings, with a minimum disturbance of other parts of the motor.

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3.15 Lubrication.

3.15.1 Lubrication fittings. Pressure lubrication fittings may be used on motor bearings where provision is made for pressure relief. The design of the lubricating system shall assure successful operation. Pressure lubrication fittings shall not be used where normal lubricating pressure may damage grease seals or other parts. Hydraulic lubrication fittings shall be in accordance with specification SAE J534.

3.15.2 Oil reservoir. Each oil reservoir shall be liberal in size and provided with an opening at the proper height to prevent overfilling (except where wool-packed bearings or equivalent) are used, and an opening shall be provided for use in filling the bearing with oil. A drain plug (except for wool-packed bearings or equivalent) shall be provided at the lowest point of the oil reservoir.

3.15.3 Oil leakage. A suitable method shall be provided to prevent lubricating oil or grease from escaping from motor bearings.

3.16 Vertical motors. The following requirements are based on design of equipment using vertical motors mounted above the driven units.

3.16.1 Bearing. Unless otherwise specified (see 6.2), the thrust bearing of vertical motors shall be a ball, roller, or plate bearing of suitable design to take the thrust and, where necessary, shall be designed to take thrust in both directions. This bearing may be located in either the upper or lower end shield. If it is intended to take radial load, an additional bearing of the sleeve or ball type may be used. The bearing in the end shield that does not take the thrust may be of either the ball-, roller-, or sleeve-bearing type. Where the motor shaft is solidly coupled to the driven apparatus, the thrust capacity of the thrust bearing shall be sufficient to carry the weight of the rotating element of the motor and, when specified, the weight of the rotating element of the driven auxiliary in addition.

3.16.2 Bearing lubrication. For the lubrication of the bearing of vertical motors, the requirements of 3.15.2 and 3.15.3 shall apply. The sleeve bearings shall be assured of sufficient lubrication by extension sleeves running in the oil reservoir and circulating the oil by centrifugal force or by other positive lubrication methods. Ball-thrust bearings shall be lubricated by oil or grease at all times. In the case of vertical motors, the requirements of 3.15.3 shall apply with special emphasis when properly lubricated and the design shall insure that oil or grease from the bearings above the motor cannot spill or run down over the motor windings under operating conditions, including inclined position where inclined position is necessary, and the maximum angle as specified (see 6.2).

3.17 Gear motors. When specified (see 6.2), motors shall be equipped with gears of the manufacturer's latest proven design that shall drive the power take-off shaft at the specified speed (see 6.2).

3.18 Thermal protection. When specified (see 6.2), type I motors shall have a thermal protector device that senses winding overheating and shuts off the motors.

3.19 Breather and drain plugs. When specified (see 6.2), totally enclosed motors shall have breather and drain plugs that prevent condensation build-up within the motor enclosure.

3.20 Interchangeability. All units of the same classification, furnished with similar options under a specific contract, shall be identical to the extent necessary to insure interchangeability of component parts, assemblies, accessories, and spare parts.

3.21 Dissimilar metals. Dissimilar metals as defined in MIL-STD-889 shall not be used in intimate contact without suitable protection to preclude or minimize galvanic corrosion.

3.22 Fungus resistance. When specified (see 6.2), electrical components and circuit elements, including terminal and circuit connections, shall be coated with varnish conforming to MIL-V-173, except that:

- a. Components and elements inherently inert to fungi or in hermetically sealed enclosures need not be coated.
- b. Current-carrying contact surfaces, such as relay contact points, shall not be coated.

3.23 Electromagnetic interference suppressors. When specified (see 6.2), motors shall conform to MIL-STD-461, class C3 requirements.

3.24 Identification marking. Identification marking shall be in accordance with NEMA MG1, as applicable.

3.25 Workmanship.

3.25.1 Riveted connections. Rivet holes shall be accurately punched or drilled and shall have the burrs removed. Rivets shall be driven with pressure tools and shall completely fill the holes. Rivet heads, when not countersunk or flattened, shall be of approved shape and of uniform size for the same diameter of rivet. Rivet heads shall be full, neatly made, concentric with the rivet holes, and in full contact with the surface of the member.

3.25.2 Bolted connections. Bolt holes shall be accurately punched or drilled and shall have the burrs removed. Washers or lockwashers shall be provided in accordance with good commercial practice and all bolts, nuts, and screws shall be tight.

3.25.3 Steel fabrication. The steel used in fabrication shall be free from kinks, sharp bends, and other conditions that would be deleterious to the finished product. Manufacturing processes shall not reduce the strength of the steel to a value less than intended by the design. Manufacturing processes shall be done neatly and accurately. All bends shall be made by controlled means to insure uniformity of size and shape.

3.25.4 Welding. Welding procedures shall be in accordance with a nationally recognized welding code. The surface of parts to be welded shall be free from rust, scale, paint, grease, or other foreign matter. Welds shall be of sufficient size and shape to develop the full strength of the parts connected by the welds. Welds shall transmit stress without permanent deformation or failure when the parts connected by the weld are subjected to proof and service loadings.

3.25.5 Castings. All castings shall be sound and free from patching, misplaced coring, warping, or any other defect that reduces the casting ability to perform its intended functions.

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4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Component and material inspection. Components and materials shall be inspected in accordance with all the requirements specified herein and in applicable referenced documents.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.2.1).
- b. Quality conformance inspection (see 4.2.2).

4.2.1 First article inspection. First article inspection shall be performed on one motor when a first article sample is required (see 3.2, 4.2.1, and 6.2). This inspection shall include the examination of 4.5 and the tests of 4.6. The first article may be either a first production item or a standard production item from the supplier's current inventory provided the motor meets the requirements of the specification and is representative of the design, construction, and manufacturing technique applicable to the remaining motors to be furnished under the contract.

4.2.2 Quality conformance inspection. The quality conformance inspection shall include the examination of 4.5, the tests of 4.6, and the packaging inspection of 4.7. This inspection shall be performed on the samples selected in accordance with 4.4.

4.3 Inspection lot. All motors of the same type, class, style, kind, group, and enclosure design offered for delivery at one time shall be considered a lot for purposes of inspection.

4.4 Sampling. Sampling shall be in accordance with MIL-STD-105.

4.4.1 Sampling for examination. Examination shall be based on inspection level II and an Acceptable Quality Level (AQL) of 4.0 percent defective.

4.4.2 Sampling for test. Sampling for motors shall be in accordance with NEMA MG1. When sampling is not specified in NEMA MG1, sampling shall be in accordance with MIL-STD-105, inspection level S-2 and AQL of 2.5 percent defective.

4.5 Examination. Each sample shall be examined for compliance with the requirements specified in section 3 of this specification. This element of inspection shall encompass all visual examinations and dimensional measurements.

4.6 Tests. Each motor selected shall be tested in accordance with NEMA MG1. Any motor failing to pass any test shall be rejected.

4.6.1 Measurement of electromagnetic interference. To determine conformance with 3.23, electromagnetic interference shall be determined in accordance with MIL-STD-461. The manufacturer may, upon approval of the contracting officer, furnish a certification in lieu of test that the motors meet the requirements, together with a list of any suppression devices required. The list shall be sufficiently detailed to allow visual determination that the devices are installed.

4.7 Preparation for delivery inspection. The inspection of the preservation, packing, and marking shall be in accordance with the requirements of section 4 of MIL-E-16298. The inspection shall consist of the quality conformance inspection; and, when specified (see 6.2), a preproduction pack shall be furnished for examination and test within the time frame required (see 6.2).

5. PREPARATION FOR DELIVERY

5.1 Preservation, packing, and marking. Preservation, packing, and marking shall be in accordance with the requirements of MIL-E-16298 with the level of preservation and the level of packing as specified (see 6.2).

5.2 Marking.

5.2.1 Military agencies. Shipments to military agencies shall be marked in accordance with MIL-STD-129.

5.2.2 Civil agencies. Shipments to civil agencies shall be marked in accordance with FED-STD-123.

6. NOTES

6.1 Intended use. The electric motors covered by this specification are intended for use in applications that require electrical energy to be transformed into rotating mechanical energy.

6.2 Ordering data. Purchasers should select the preferred options permitted herein and include the following information in procurement documents:

- a. Title, number, and date of this specification.
- b. Type, class, style, kind, and group of motor (see 1.2.1).
- c. Enclosure design of motor (see 1.2.2).
- d. When a motor and/or enclosure other than one of the types, classes, styles, kinds, groups, or designs defined by 1.2.1 and 1.2.2 is desired (i.e., such as motors of the synchronous reluctance/hysteresis/permanent magnet types or of relatively uncommon voltage/frequency ratings such as 50 Hz/415V) (see 3.1 and 3.7).
- e. When a first article is required for inspection and approval (see 3.2, 4.2.1, and 6.4).
- f. Voltage and frequency rating (see 3.7).
- g. Hp and speed ratings (see 3.8).
- h. Time rating if other than continuous (see 3.9).
- i. Insulation system class required (see 3.10).
- j. Performance requirements if other than according to NEMA MG1 (see 3.11).

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- k. Frame size, shaft size, and dimensions, if other than NEMA MG1 (see 3.12).
- l. Code letter of locked rotor kVA/hp (see 3.13).
- m. Type of bearing required (see 3.14).
- n. Type of thrust bearing of vertical motors (3.16.1).
- o. Maximum operation angle (see 3.16.2).
- p. When updated, gears are required (see 3.17).
- q. When thermal protective device for type I motors is required (see 3.18).
- r. When breather and drain plugs are required (see 3.19).
- s. When fungus resistance treatment is required (see 3.22).
- t. When electromagnetic interference tests are required (see 3.23).
- u. When a preproduction pack is required and the time frame required for submission (see 4.7).
- v. Level of preservation and level of packing required (see 5.1).

6.3 Proper selection of the motor. Extreme care should be used in the proper selection of the motor in order that successful operation and good service will result. When in doubt, the exact type of service should be specified. Where the apparatus is subjected to unusual risk, manufacturers should be consulted, especially where the motor is used under the following conditions.

6.3.1 Exposure to:

- a. Combustible, explosive, abrasive, or conducting dusts.
- b. Lint or very dirty operating conditions where the accumulation of dirt will interfere with normal ventilation.
- c. Chemical fumes, flammable or explosive gases or vapors.
- d. Nuclear radiation.
- e. Steam, salt-laden air, oil vapor, or liquid sprays.
- f. Damp or very dry locations, radiant heat, vermin infestation, or atmospheres conducive to the abnormal growth of fungus.
- g. Abnormal shock, vibration, or mechanical loading from external sources.
- h. Abnormal axial or side thrust imposed on the motor shaft.
- i. Temperatures below 0° centigrade (C) or when water cooling is used temperatures below 10°C.
- j. Temperatures above 40°C.
- k. Altitude above 3,300 feet (1,000 meters).

6.3.2 Operation where:

- a. There is excessive departure from rated voltage and/or frequency.
- b. The deviation factor of the alternating current supply voltage exceeds 10 percent.
- c. The ac supply voltage is unbalanced by more than 1 percent.
- d. Low noise levels are required.
- e. The motor may be momentarily submerged in water.
- f. Speeds are above the highest rated speed.
- g. The motor is in a poorly ventilated room, in a pit, entirely enclosed in a box, or in an inclined position.

6.3.3 Operation where subjected to:

- a. Torsional impact loads.
- b. Repetitive abnormal overloads.
- c. Reversing or electric braking.

6.3.4 Operation of the motor at standstill with any winding continuously energized or of a short-time rated motor with any winding continuously energized.

6.4 First article. When a first article inspection is required, the item will be tested and should be a first production item consisting of one complete motor or it may be a standard production item from the contractor's current inventory as specified in 4.2.1. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examination, test, and approval of the first article.

6.5 Definitions.

6.5.1 Fractional-hp motor. A fractional-hp motor is either (1) a motor built in a frame that has a 2-digit frame number in accordance with paragraph A of MG1-11.01 or (2) a motor built in a frame smaller than that frame of an integral-hp motor (see MG1-1.02) that has a continuous rating of 1 hp, open construction, at 1,700 to 1,800 revolutions per minute (rpm).

6.5.2 Integral-hp motor. An ac integral-hp motor is a motor (1) built in a frame that has a 3-digit frame number in the 680 and smaller series in accordance with paragraph B of MG1-11.01 and (2) built in a frame having an open continuous rating of 1 hp at 1,700 to 1,800 rpm or in a larger frame, but no larger than the frame required for the ratings given in paragraph D of MG1-10.32 for induction motors.

6.6 Tables. Tables III, IV, and V have been reproduced from NEMA MG1.

MILITARY INTERESTS:

Custodians

Navy - YD
Air Force - 11

Review Activities

Army - ER
Navy - AS

User Activities

Army - AR, ME

CIVIL AGENCY COORDINATING ACTIVITIES:

GSA - FSS

PREPARING ACTIVITY:

Navy - YD

Project No. 6105-0119

Orders for this publication are to be placed with General Services Administration, acting as an agent for the Superintendent of Documents. See section 2 of this specification to obtain extra copies and other documents referenced herein.

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TABLE I. Fractional-horsepower and speed ratings for type I, class 1 and type II class 3 motors.

Horsepower	60-Hz Synchronous Ppm	Approximate Full-Load Rpm		50-Hz Synchronous Ppm	Approximate Full-Load Rpm	
		All Motors Except Shaded Pole & Permanent-Split Capacitor	Shaded Pole Motors		All Motors Except Shaded Pole & Permanent-Split Capacitor	Permanent-Split Capacitor Motors
1, 1.5, 2, 3, 5, 7.5, 10, 15, 25, and 35 millihorsepower	3600 1800 1200 900	3405 1725 1140 ..		3000 1500 1000		2850 1425 950
1, 1.25, 1.5, 2, 2.5, 3, 4, 5, 6, 8, 10, 12.5, 16, 20, 25, 30, and 40 millihorsepower	1800 1200 900		1550 1050 800	1500 1000	1300 875	
1, 1.25, 1.5, 2, 2.5, 3, 4, 5, 6, 8, 10, 12.5, 16, 20, 25, 30, and 40 millihorsepower	3600 1800 1200 900			3000 1500 1000		2500 1300 875
1/20, 1/12, and 1/8 Hp	3600 1800 1200 900	3450 1725 1140 850		3000 1500 1000		2850 1425 950

TABLE I. Fractional-horsepower and speed ratings for type I, class I and type II class 2 motors (continued).

Horsepower	60-Hz Synchronous Rpm	Approximate full-load Rpm			50-Hz Synchronous Rpm	Approximate full-load Rpm		
		All Motors Except Shaded Pole & Permanent-Split Capacitor	Shaded Pole Motors	Permanent-Split Capacitor Motors		All Motors Except Shaded Pole & Permanent-Split Capacitor	Shaded Pole Motors	Permanent-Split Capacitor Motors
1/20, 1/15, 1/12, 1/10, 1/8, and 1/6 Hp	1800		1550		1500		1300	
	1200		1050		1000		875	
	900		800					
1/20, 1/15, 1/12, 1/10, 1/8, 1/6, 1/5, 1/4, and 1/3 Hp	3600				3000			2700
	1800			3250	1500			1350
	1200			1625	1000			900
	900			1075				
1/6, 1/4 and 1/3 Hp	3600				3000			
	1800	3450			1500			
	1200	1725			1000			
	900	1140						
1/2 Hp	3600				3000			2700
	1800	3450		3250	1500			1350
	1200	1725		1625	1000			900
3/4 Hp	3600				3000			2700
	1800	3450		3250	1500			1350
1 Hp	3600				3000			2700
	1800	3450		3250	1500			1350
1 Hp	3600	3450		3250	3000		2850	2700

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TABLE II. Fractional horsepower and speed ratings for type I, class 2 motors.

Horsepower	Speed (Rpm)
10, 15, 25, and 35 millihorsepower	5,000 or higher
1/20, 1/12, 1/8, 1/6, 1/4, 1/3, 1/2, 3/4, and 1 Hp	5,000 or higher

TABLE III. Integral horsepower and synchronous speed ratings for type I, class 1, style A, kind 2 and style B motors.

Horsepower	Speed (Rpm)							
	60 Hz				50 Hz			
1/2	----	----	----	900	----	----	1000	750
3/4	----	----	1200	900	----	1500	1000	750
1	----	1800	1200	900	3000	1500	1000	750
1-1/2	3600	1800	1200	900	3000	1500	1000	750
2	3600	1800	1200	900	3000	1500	1000	750
3	3600	1800	1200	900	3000	1500	1000	750
5	3600	1800	1200	900	3000	1500	1000	750
7-1/2	3600	1800	1200	900	3000	1500	1000	750
10	3600	1800	1200	900	3000	1500	1000	750
15	3600	1800	1200	900	3000	1500	1000	750
20	3600	1800	1200	900	3000	1500	1000	750
25	3600	1800	1200	900	----	----	----	----

TABLE IV. Integral-horsepower and synchronous speed ratings for type II, class 3 motors.

Horsepower	Speed (Rpm)											
	60 Hz								50 Hz			
1/2	----	----	----	900	720	600	514	----	----	----	750	
3/4	----	----	1200	900	720	600	514	----	----	1000	750	
1	----	1800	1200	900	720	600	514	----	1500	1000	750	
1-1/2	3600*	1800	1200	900	720	600	514	3000*	1500	1000	750	
2	3600*	1800	1200	900	720	600	514	3000*	1500	1000	750	
3	3600*	1800	1200	900	720	600	514	3000*	1500	1000	750	
5	3600*	1800	1200	900	720	600	514	3000*	1500	1000	750	
7-1/2	3600*	1800	1200	900	720	600	514	3000*	1500	1000	750	
10	3600*	1800	1200	900	720	600	514	3000*	1500	1000	750	
15	3600*	1800	1200	900	720	600	514	3000*	1500	1000	750	
20	3600*	1800	1200	900	720	600	514	3000*	1500	1000	750	
25	3600*	1800	1200	900	720	600	514	3000*	1500	1000	750	
30	3600*	1800	1200	900	720	600	514	3000*	1500	1000	750	
40	3600*	1800	1200	900	720	600	514	3000*	1500	1000	750	
50	3600*	1800	1200	900	720	600	514	3000*	1500	1000	750	
60	3600*	1800	1200	900	720	600	514	3000*	1500	1000	750	
75	3600*	1800	1200	900	720	600	514	3000*	1500	1000	750	
100	3600*	1800	1200	900	720	600	514	3000*	1500	1000	750	
125	3600*	1800	1200	900	720	600	514	3000*	1500	1000	750	
150	3600*	1800	1200	900	720	600	---	3000*	1500	1000	750	
200	3600*	1800	1200	900	720	---	---	3000*	1500	1000	750	
250	3600*	1800	1200	900	---	---	---	3000*	1500	1000	750	
300	3600*	1800	1200	---	---	---	---	3000*	1500	1000	---	
350	3600*	1800	1200	---	---	---	---	3000*	1500	1000	---	
400	3600*	1800	----	---	---	---	---	3000*	1500	----	---	
450	3600*	1800	----	---	---	---	---	3000*	1500	----	---	
500	3600*	1800	----	---	---	---	---	3000*	1500	----	---	

*Applies to squirrel-cage motors only.

CC-M-1807A

TABLE V. Code letters for locked rotor (Kva).

Letter Designation	Kva per Horsepower*	Letter Designation	Kva per Horsepower*
A	0-3.15	K	8.0-9.0
B	3.15-3.55	L	9.0-10.0
C	3.55-4.0	M	10.0-11.2
D	4.0-4.5	N	11.2-12.5
E	4.5-5.0	P	12.5-14.0
F	5.0-5.6	R	14.0-16.0
G	5.6-6.3	S	16.0-18.0
H	6.3-7.1	T	18.0-20.0
J	7.1-8.0	U	20.0-22.4
		V	22.4-and up

*Locked Kva per horsepower (Kva/Hp) range includes the lower figure up to, but not including the higher figure. For example, 3.14 Kva/Hp is designated by letter A and 3.15 Kva/Hp by letter B.

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