MIL-M-8609B

26 JULY 1965
Superseding
MIL-M-8609A(ASG)
19 July 1957

MILITARY SPECIFICATION

MOTORS, DIRECT-CURRENT, 28-VOLT SYSTEM, AIRCRAFT,
GENERAL SPECIFICATION FOR

This specification is mandatory for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope.- This specification covers the general requirements for two classes of aircraft electric motors and, together with a detail specification or standard containing equivalent information as described in 3.4.2, forms the complete specification for procurement of aircraft electric motors operable from 28V dc systems.

1.2 Classification.- Motors shall be of the following classes, as specified (see 6.2):

Class A - Motors that are operable under temperature-altitude conditions of curve II of MS33543.

Class B - Motors that are operable under temperature-altitude conditions of curve I of MS33543.

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:

SPECIFICATIONS

Federal

| | |
|---|---|
| QQ-P-416 | Plating, Cadmium (Electrodeposited) |

Military

| | |
|---|---|
| MIL-P-116 | Preservation, Methods of |
| MIL-M-3171 | Magnesium Alloy, Processes for Corrosion Protection of |

| | |
|---|---|
| MIL-E-5272 | Environmental Testing, Aeronautical and Associated Equipment, General Specification for |
| MIL-C-5541 | Chemical Films and Chemical Film Materials for Aluminum and Aluminum Alloys |
| MIL-I-6181 | Interference Control Requirements, Aircraft Equipment |
| MIL-L-6880 | Lubrication of Aircraft, General Specification for |
| MIL-S-7742 | Screw Threads, Standard, Optimum Selective Series: General Specification for |
| MIL-A-8625 | Anodic Coatings, for Aluminum and Aluminum Alloys |
| MIL-E-16298 | Electric Machines Having Rotating Parts and Associated Repair Parts: Packaging of |
| MIL-D-70327 | Drawings, Engineering and Associated Lists |

STANDARDS

Military

| | |
|---|---|
| MIL-STD-130 | Identification Marking of US Military Property |
| MIL-STD-143 | Specifications and Standards, Order of Precedence for the Selection of |
| MIL-STD-195 | Marking of Connections for Electric Assemblies |
| MIL-STD-202 | Test Methods for Electronic and Electrical Component Parts |
| MIL-STD-704 | Electric Power, Aircraft, Characteristics and Utilization of |
| MS33543 | Criteria-Temperature and Altitude Range Self Cooled Electric Equipment |
| MS33568 | Drive, Square Mounting Flange With Involute Spline-Pinion |
| MS33569 | Drive, Round Mounting Flange With Involute Spline-Pinion |
| MS33570 | Drive, Square Mounting Flange With Round Shaft and Key |
| MS33571 | Drive, Round Mounting Flange With Round Shaft and Key |
| MS33586 | Metals, Definition of Dissimilar |

(Copies of specifications, standards, drawings, and publications required by suppliers 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 document forms a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply:

Uniform Classification Committee

Uniform Freight Classification Rules

(Application for copies should be addressed to the Uniform Classification Committee, 202 Chicago Union Station, Chicago, Ill. 60606.)

3. REQUIREMENTS

3.1 General.- The requirements specified in the detail specification or standard are applicable as detail requirements of this specification.

3.2 Preproduction sample.- When specified in the invitation for bid, contract, or order, prior to starting production, the supplier shall make ready the required samples of the finished product for examination and testing (see 4.3.1). The approval of the preproduction samples authorizes the start of production but does not relieve the supplier of responsibility for compliance with all applicable provisions of this specification.

3.3 Materials.- Materials used in the manufacture of motors shall be of high quality, suitable for the purpose intended, and shall conform to applicable Government specifications wherever practicable. The requirements of this paragraph will be considered as having been met if the preproduction tests have been passed.

3.3.1 Selection of materials.- Specifications and standards for all materials, parts, and Government certification and approval of processes and equipment, which are not specifically designated herein and which are necessary for the execution of this specification, shall be selected in accordance with MIL-STD-143, except as provided in the following paragraph.

3.3.1.1 Standard parts.- Military Standard (MS) parts shall be used wherever they are suitable for the purpose, and shall be identified on the drawing by their part numbers. Commercial utility parts such as screws, bolts, nuts, and cotter pins may be used, provided they possess suitable properties and are replaceable by the MS parts without alteration, and provided the corresponding standard part numbers are referenced in the parts list and, if practicable, on the contractor's drawings. In the event there is no suitable corresponding standard part in effect on date of invitation for bids, commercial parts may be used provided they conform to all requirements of this specification.

3.3.2 Corrosion resistance.- Materials shall be corrosion resistant or suitably processed to resist corrosion.

3.3.3 Dissimilar metals.- Unless suitably protected, metals such as brass, copper, or steel shall not be used in intimate contact with magnesium, aluminum, or their alloys. When protection is used it shall be such type that a low impedance path is offered to radio-frequency currents. Dissimilar metals are defined in MS33586.

3.4 Design and construction.-

3.4.1 Duty cycle.- The duty cycle shall be specified in the detail specification.

3.4.2 Detail requirements.- The detail requirements shall be specified in the detail specification or standard and shall include all the applicable data shown in 6.5.

3.4.3 Simplification.- Simplicity of design, resulting from use of the same part for as many applications as possible in a given motor and in motors of different ratings, is highly desirable.

3.4.4 Mounting flange.- The mounting flange, when required, and clearance for mounting studs shall be in accordance with the applicable motor standard or detail specification. Flanges in accordance with MS33568, MS33569, MS33570, or MS33571 are preferred in the applicable motor sizes.

3.4.5 Coupling spline.- The coupling spline, or drive shaft, shall be in accordance with the applicable motor standard or detail specification. Splines or drive shafts in accordance with MS33568, MS33569, MS33570, or MS33571 are preferred in the applicable motor sizes.

3.4.6 Lubrication.- Normally, lubrication shall not be allowed during the service life of the motor. When lubrication is allowed during the service life by the standard or detail specification, it shall be in accordance with MIL-L-6880.

3.4.7 Electrical connections.- External termination of the motor wiring shall be in accordance with MIL-STD-195, unless otherwise shown on the applicable standard or detail specification. The motor mounting provisions shall provide a low-impedance path for radio interference currents, but shall not be used to complete motor electrical circuits in lieu of a lead. Wherever practicable, positive connections which do not depend upon insulation in compression shall be used. Suitable shielding shall be provided for remote filtering if specified in the detail specification.

3.4.8 Armature.- Motors shall be so constructed that the armature is readily removed without the use of special tools.

3.4.9 Brushes.-

3.4.9.1 Brush life.- The useful life of brushes at specified altitudes shall be as follows:

| | |
|---|---|
| Class A motor: | |
| 1,000 hours | Sea level to 35,000 feet |
| 500 hours | 35,000 to 50,000 feet |
| Class B motors: | |
| (a) Intermittent duty motor: | |
| 1,000 hours | Sea level to 35,000 feet |
| 500 hours | 35,000 to 65,000 feet |
| (b) Continuous duty motor: | |
| 500 hours | Sea level to 65,000 feet |

3.4.9.2 Brush accessibility.- Brushes shall be accessible for replacement when brush access covers are removed. It shall be possible to change the brushes without the aid of special tools.

3.4.9.3 Brush fit.- The face of each commutator brush shall appear to contact its commutator for at least 75 percent in the direction of rotation and have a contact area of at least 50 percent.

3.4.9.4 Cartridge-type brushes.- When cartridge-type brush assemblies are used, there must be an integral assembly of the brush, shunt, spring, and terminal, which shall not rotate during installation or when mounted.

3.4.9.5 Brush position.- The brush rigging shall be of such design that assembly and disassembly can be accomplished without loss of brush-setting indication.

3.4.9.6 Brush wear indicator.- Each brush shall be marked to indicate allowable wear by a readily discernible groove on its edge or side. This groove shall extend from the end of the brush opposite the wearing face to the point reached when 75 percent of the wearing depth has been exhausted. Other methods of wear indication may be used upon approval of the procuring activity.

3.4.9.7 Spare brushes.- All spare brushes shall be formed to a radius approximately equal to the radius of the new commutator.

3.4.10 Protection.- When used, all ventilating openings in the housing shall be of such size as not to permit passage of a 5/16-inch diameter rod.

3.4.11 Life of motor.- The motor shall be so designed that when operating under any of the temperature or altitude conditions specified in 3.4.18, the useful life of the motor shall be not less than 1,000 hours. Brush life shall be in accordance with 3.4.9.1.

3.4.12 Rotation.- The direction of rotation of the motor output shaft shall be as specified by the applicable standard or detail specification (see 3.10.2).

3.4.13 Thermal protection.- When specified by the applicable motor standard or detail specification, a protective means shall be supplied. One of the following methods and types of protection is to be specified.

3.4.13.1 Thermal protection method.-

3.4.13.1.1 Method I.- Protection shall be provided by a nonautomatic reset means to prevent smoke or toxic fumes from being generated by a motor under locked rotor or operating conditions. The protective device must be manually resettable or replaceable after partial disassembly of the motor.

3.4.13.1.2 Method II.- Protection shall be provided to permit a motor to develop maximum output or locked-rotor torque to the point of failure without being a fire hazard. The protective system must not be automatically reset and both motor and protector system are considered expended after one operation.

3.4.13.1.3 Method III.- Protection shall be provided to permit average rated torque capability under all operable environmental power and load conditions and attain a substantial portion of the rated life of the motor under overload conditions which cause cycling of the thermal protective device. The motor and protector shall provide a minimum of 25 hours of intermittent or continuous locked rotor protection at rated voltage.~~and frequency~~.

3.4.13.2 Thermal protection type.-

3.4.13.2.1 Direct acting.- A protector within or on the motor enclosure shall interrupt the motor power supply and shall be of sufficient rating to interrupt the maximum locked-rotor current and perform in accordance with the appropriate thermal protection method specified herein (see 3.4.13.1). The protector must be rated to provide a minimum of 5,000 interruptions of the maximum current, or 25 hours of intermittent ~~or 25 hours of intermittent~~ or continuous locked rotor protection at rated voltage.~~and frequency~~.

3.4.13.2.2 Indirect acting.- A protector shall be provided with a minimum inductive contact rating of 2 amperes at 28 volts dc to operate relays and signal devices. The protector shall perform in accordance with the appropriate thermal protection method specified herein (see 3.4.13.1) and shall have a minimum life of 5,000 operations.

3.4.14 Fluid resistance.- When specified by the applicable motor standard or detail specification, the motor shall be designed and constructed to operate under conditions of fluid leakage upon the motor as defined in 4.6.20.

3.4.15 Explosion-proof (aeronautical).- Unless otherwise specified by the applicable motor standard or detail specification, the motor and thermal protector (if specified) shall be explosion-proof as defined in 4.6.21.

3.4.16 Brakes.- When required by the standard or detail specification, the motor shall be equipped with a brake. Stopping revolutions and inertia load shall be as specified by the standard or detail specification.

3.4.17 Radio interference.- The motor shall be designed to minimize the generation of radio interference, and when required by the detail specification or standard, the motor shall be equipped with a radio interference filter and shall meet the requirements of MIL-I-6181.

3.4.18 Operating conditions.- The motor shall provide mechanical energy in aircraft under any of the following operating conditions or natural combination of conditions:

(a) Altitude-temperature: Altitude-temperature range in accordance with MS33543, curve I (class B) or curve II (class A), as specified on the applicable standard or detail specification. The pressure may remain constant, or may vary at a rate as high as 1.5 in. Hg per sec.
(b) Humidity: Relative humidity ranging up to 100 percent, including conditions wherein condensation will take place in or on the equipment.
(c) Sand-dust resistance: Under conditions of airborne sand and dust particles.
(d) Resistance to salt spray: Atmosphere containing salt-laden moisture.
(e) Fungus: When exposed to fungus growth as encountered in tropical climates.
(f) Operating position: When installed in any position.
(g) Input power: The input power shall be in accordance with MIL-STD-704.

3.5 Interchangeability.- All parts having the same manufacturers part number shall be directly and completely interchangeable with respect to installation and performance. Changes in manufacturer's part numbers shall be governed by the drawing number requirements of MIL-D-70327.

3.6 Finish.-

3.6.1 Anodizing.- When used, anodic treatment of aluminum alloy parts shall be in accordance with MIL-A-8625. The aluminum oxide film deposited by this treatment shall be removed from the actual contact area of all surfaces required to act as a path for electrical current and from the local area under screws, nuts, or the like used for assembly or mounting purposes to provide an adequate bonding connection.

3.6.2 Chemical films.- Chemical films in accordance with MIL-C-5541, or approved equivalent, may be used when the motor component parts are not subject to abrasion.

3.6.3 Magnesium alloy parts.- Wherever practicable, magnesium alloy parts shall be surface treated in accordance with MIL-M-3171 to provide protection against corrosion.

3.6.4 Electrical sheet steel assemblies.- Electrical sheet steel assemblies such as armatures, field poles, etc., shall be processed by acceptable commercial methods, to provide protection against corrosion.

3.6.5 Plating. When used as a sole protective coating, cadmium plating shall be in accordance with QQ-P-416, type I or II, as applicable, and of a class that is adequate to achieve the degree of protection required.

3.7 Screw threads.- Screw threads shall conform to MIL-S-7742.

3.8 Safety wiring and staking.- Accidental loosening of screws, screw parts, and other connections shall be prevented by safety wiring (0.032-inch min. OD where practicable), staking, or other approved methods. Washers and cotter pins, where used, shall be assembled in a manner which prevents rotation of washers and movement of cotter pins under conditions of vibration.

3.9 Performance.- The motor shall satisfy any natural combination of the tests specified in section 4.

3.10 Markings.-

3.10.1 Terminals.- Markings of terminals shall be in accordance with MIL-STD-195 unless otherwise shown by the applicable motor standard or detail specification. When deviations from MIL-STD-195 exist, a diagram or chart of the terminals shall be affixed to the motor.

3.10.2 Rotation marking.- The direction of rotation of the output shaft shall be plainly and permanently indicated by an arrow for both unidirectional and reversible motors.

3.10.3 Internal capacitors.- The presence of internal capacitors which may be damaged by dielectric strength test of the motor shall be plainly and permanently indicated on the surface of the motor near the nameplate.

3.11 Identification of product.- Equipment, assemblies, and parts shall be marked in accordance with MIL-STD-130. The identification data applied to the motor shall be as follows:

Nomenclature (as shown on applicable standard)
HP_____, RPM_____, Volts _____, Amp._____
For use on 28V dc system
Duty_____(continuous or intermittent, and if intermittent, state duty cycle as "_____minutes at full load, followed by _____ minutes at _____load, followed by_____minutes rest.")

MS Part No.
Federal Stock No.
Manufacturer's part No.
Manufacturer's serial No.
Contract or order No.
Manufacturer's name or trademark
Inspector's stamp
US

Any additional nameplates with proprietary data shall be attached to the motor by means of easily removable screws.

3.12 Workmanship.- All machined surfaces shall have a finish suitable for the purpose intended, and all details of manufacture, including the preparation of parts and accessories, shall be in accordance with the best practice for high-quality electrical equipment. Particular attention shall be given to neatness and thoroughness of soldering, wiring, impregnation of coils, marking of parts, plating, lacquering, riveting, clearance between soldered connections, removal of burrs and sharp edges, and ruggedness.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection.- Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any other commercial laboratory acceptable to 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.

4.2 Classification of inspections.- The examination and testing of motors shall be classified as:

(a) Preproduction inspection (4.3)
(b) Quality conformance inspection (4.4)

4.3 Preproduction inspection.-

4.3.1 Sampling instructions.- The preproduction samples shall consist of four motors representative of production motors. Each motor shall be accompanied by a set of spare brushes.

4.3.2 Tests.- The preproduction tests shall consist of all the tests specified under 4.6, with the exception of the load test specified in 4.6.3. On each of the four motors, tests shall be conducted essentially in the order listed for each motor.

Motor No. 1

| | | |
|---|---|---|
| (a) | Examination of product | (4.6.1) |
| (b) | Dielectric strength | (4.6.4) |
| (c) | Performance | (4.6.2) |
| (d) | Overspeed | (4.6.5) |
| (e) | High ambient temperature | (4.6.6.1) |
| (f) | Low ambient temperature | (4.6.6.2(a)) |
| (g) | Starting | (4.6.9) |
| (h) | Commutator and brush wear | (4.6.13) |
| (i) | Fungus | (4.6.18) |

Motor No. 2

| | | |
|---|---|---|
| (a) | Examination of product | (4.6.1) |
| (b) | Dielectric strength | (4.6.4) |
| (c) | Performance | (4.6.2) |
| (d) | Overspeed | (4.6.5) |
| (e) | Ripple voltage (when specified) | (4.6.22) |
| (f) | Radio interference | (4.6.7) |
| (g) | Acceleration | (4.6.10) |
| (h) | Operating position | (4.6.8) |
| (i) | Commutator and brush wear | (4.6.13) |
| (j) | Humidity | (4.6.15) |
| (k) | Explosion-proof (when specified) | (4.6.21) |
| (l) | Thermal protection Methods 2 and 3 (when specified) | (4.6.19.1.2 and 4.6.19.1.3) |

Motor No. 3

| | | |
|---|---|---|
| (a) | Examination of product | (4.6.1) |
| (b) | Dielectric strength | (4.6.4) |
| (c) | Performance | (4.6.2) |
| (d) | Overspeed | (4.6.5) |
| (e) | Low ambient temperature | (4.6.6.2(b)) |
| (f) | Shock | (4.6.11) |
| (g) | Brake performance (motors with stopping devices only) | (4.6.23) |
| (h) | Vibration | (4.6.12) |
| (i) | Salt spray | (4.6.16) |
| (j) | Thermal protection Methods 1 and 2 (when specified) | (4.6.19.1.1 and 4.6.19.1.2) |

Motor No 4

| | | |
|---|---|---|
| (a) | Examination of product | (4.6.1) |
| (b) | Dielectric strength | (4.6.4) |
| (c) | Performance | (4.6.2) |
| (d) | Overspeed | (4.6.5) |
| (e) | Fluid resistance (when specified) | (4.6.20) |
| (f) | Life (1000 hours only) | (4.6.14) |
| (g) | Sand and dust resistance | (4.6.17) |

4.3.2.1 Disassembly and inspection.- At the conclusion of the preproduction tests, the motors shall be disassembled and inspected for excessive wear and defects.

4.4 Quality conformance tests.- Quality conformance tests shall consist of individual tests.

4.4.1 Individual tests.- Each motor shall be subjected to the following tests:

| | | |
|---|---|---|
| (a) | Examination of product | (4.6.1) |
| (b) | Load test | (4.6.3) |
| (c) | Dielectric strength | (4.6.4) |
| (d) | Thermal protection - Short time test only when motor is thermally protected | (4.6.19.3) |
| (e) | Brake performance - stopping revolutions | (4.6.23.1) |

4.5 Test conditions.- Unless otherwise specified herein, each test in this section shall be made under the following conditions.

4.5.1 Loading.- The motor shall be coupled to a suitable loading device capable of loading the motor throughout the rated load and speed range. The rotational axis of the motor shall be horizontal. Rated torque shall be computed from rated horsepower and rated speed and used as the index of loading. Reversible motors shall be tested in each direction of rotation.

4.5.2 Ambient.- The ambient temperature shall be 25° ±15° C unless higher or lower ambients are otherwise specified in the applicable motor standard or detail specification.

4.5.3 Altitude.- The tests shall be run at approximately sea level altitude.

4.5.4 Location of load.- The load for the motor shall be so located that it will not appreciably affect the ambient temperature.

4.5.5 Warmup.- Prior to each test, continuous-duty motors shall be operated at rated load for sufficient time to reach a substantially constant temperature, as specified in 4.6.2. Intermittent-duty motors are rated at 25° C with no temperature rise and no warmup is required.

4.5.6 Voltage measurement - The input voltage shall be measured at the terminals of the motor.

4.5.7 Input voltage.- Rated input voltage as shown on the applicable standard or specification, or both, shall be used. Unless otherwise specified, the voltage shall be 27V for continuous-duty motors and 26V for intermittent-duty motors.

4.6 Test methods.-

4.6.1 Examination of product.- Each motor shall be examined to determine compliance with all requirements of this specification not covered by tests.

4.6.2 Performance.-

4.6.2.1 Heating.- Provision shall be made for determining speed, input voltage and current, field voltage and field current (where practicable), and the output torque. While the motor is cold, the resistance and temperature of the field shall be determined in order to calculate the field temperature rise (average) during operation at rated load. Where the resistance method is not practicable, measurement may be made by a thermocouple on the frame or field structure. Continuous-duty motors shall have reached the continuous operating condition when the rate of rise of field temperature above the then existing ambient is no more than 1° C for 5 minutes; and for intermittent-duty motors, when the difference between the maximum rise at the end of succesive duty cycles is no more than 1° C.

The ability of the motor to deliver rated torque at rated input voltage for continuous- or rated duty cycle operation shall be demonstrated. Immediately following the above run, the ability of the motor to deliver the rated torque for both minimum and maximum continuous input voltage shall be demonstrated. When specified by the detail specification or standard, motor operation at reduced horsepower output for emergency or ground start low-voltage limits of MIL-STD-704 shall be demonstrated. The final temperature attained by the motor shall not be cause for rejection, provided the motor meets all other requirements of the specification. When specified, the temperature of exposed parts shall be limited to a maximum of 199° C, and shall not be exceeded for any temperature-altitude condition within the requirements of this specification.

4.6.2.2 Speed.- At rated voltage and rated torque, the speed of the motor shall be determined. The speed of continuous-duty motors shall be within 10 percent of rated speed with the internal temperature of the motor as near as practicable to the temperature recorded during heating test (4.6.2.1). The speed of intermittent-duty motors shall be within 10 percent of rated speed with the internal temperature of the motor as near 25° C as practicable. When this test is conducted following environmental tests, the speed shall be within 15 percent of rated speed.

4.6.2.3 Commutation.- Where observable, commutation of the motor shall be evaluated over the input voltage range for no load, half load, and rated load immediately following the above heat runs with the motor hot. Where commutation is observable, there shall be no more than fine pinpoint sparking at the brushes during the test.

4.6.2.4 Calibration.- The motor, with rated voltage applied, shall be subjected to tests to determine conformance to the range of speed-torque requirements shown on the applicable standard or detail specification. Current, speed, horsepower, and efficiency shall be shown graphically using values of torque as the abscissa.

4.6.2.5 Efficiency.- At rated voltage and rated output torque, the speed and input current shall be determined. The efficiency shall be not less than that shown by the applicable standard or detail specification when a minimum is specified.

4.6.3 Load test.-

4.6.3.1 Continuous-duty motors.- Continuous-duty motors shall be tested at rated voltage and torque for input current and speed after running for a sufficient time to attain at least 80 percent of normal temperature rise obtained under the test conditions of 4.5. Unless otherwise specified by the detail standard or specification, the motor speed shall not differ from the rated speed by more than 10 percent of the rated speed. The input current shall be of such value that the motor meets the efficiency requirements of the detail standard or specification, or both. Tests may be run at room temperature if correlated with the 80 percent normal temperature rise test. Where commutation is observable, there shall be no more than fine pinpoint sparking at the brushes.

4.6.3.2 Intermittent-duty motors.- Intermittent-duty motors shall be tested at rated voltage and torque for input current and speed with the temperature of the motor as near 25° C as practicable. Unless otherwise specified in the detail standard or specification, the motor speed shall not differ from the rated speed by more than 10 percent of the rated speed. The input current shall be of such value that the motor meets the efficiency requirements of the detail standard or specification, or both. Where commutation is observable, there shall be no more than fine pinpoint sparking at the brushes.

4.6.4 Dielectric strength.- While the motor is not as the result of testing, it shall be subjected to and withstand the following test voltage at a frequency of approximately 60 cps, applied between windings, and between each winding and frame, for the specified time. For this test, all windings permanently connected together are are to be considered one winding. During this test, all capacitors shall be disconnected. Permanently grounded windings need not be tested; however, windings which can be isolated from ground by removal of a brush shall be tested.

500V (rms) for 1 minute or
600V (rms) for 1 second

No voltage breakdown shall occur as a result of this test.

4.6.4.1 Capacitors.- Capacitors shall be subjected to and shall withstand a test of 150V dc for 1 second.

4.6.5 Overspeed.- This test shall be made while the motor is hot as the result of testing and shall be made at no load and at a speed 25 percent above the maximum speed under minimum specified operating load. The motor shall demonstrate its ability to operate at overspeed conditions for 5 minutes or 1 duty cycle without mechanical failure or impaired electrical performance.

4.6.6 Extreme temperature operation.-

4.6.6.1 High ambient temperature.- While inoperative, the motor shall be soaked for 24 hours at the maximum ambient temperature indicated for sea level operation by the curve on MS33543 applicable to the class of motor being tested. Soaking temperatures are 71° C for class A and 120° C for class B motors. While at this temperature, the motor shall be operated with output torque as follows:

1.

(a) Continuous-duty motors without thermal protection shall operate satisfactorily at rated torque for 1/2 hour.
(b) Intermittent-duty motors without thermal protection shall operate satisfactorily at rated torque for 6 duty cycles or an accumulation of 1/2 hour of cycles, whichever is longer.
(c) Continuous-duty motors with thermal protection shall operate satisfactorily at 115 percent of rated torque for 1/2 hour without tripping the thermal device.
(d) Intermittent-duty motors with thermal protection shall operate satisfactorily at 115 percent of rated torque for 6 duty cycles or the accumulation of 1/2 hour of cycles, whichever is longer, without tripping the thermal device.

At the completion of these tests, the speed for class B motors at rated torque shall be within the requirements of the detail specification or standard.

4.6.6.2 Low ambient temperature.- The motor shall be subjected to an ambient temperature of -55° C for at least 72 hours nonoperating, following which and while at this temperature, 25V dc or lower, if specified in the detail specification, shall be applied for the following tests:

(a) Motor No. 1 shall be operated at no load and will be considered satisfactory if, within 2 seconds after application of voltage, the speed is at least 70 percent of rated speed and the motor shows no evidence of damage on completion of the test.
(b) Motor No. 2 shall be fitted with a suitable torque measuring device before being placed in the cold chamber. This motor shall start with 200 percent of rated torque within 1 second (higher or lower starting torque may be specified by the detail specification or standard). After starting, the torque shall be immediately reduced to full-load value. Continuous-duty motors shall operate satisfactorily for 1/2 hour and intermittent-duty motors shall operate satisfactorily for 6 duty cycles.

4.6.7 Radio interference.- The radio interference measurements shall be made using the setup and procedures of MIL-I-6181.

4.6.7.1 Conducted radio interference (for motors without filter).- The indicated quasi-peak conducted radio interference voltage produced by operation of the motor at both rated torque and minimum specified operating load shall not exceed 5,000 microvolts over the 0.15 to 20 megacycle range with no filtering. Measurement shall not be made between an open circuit and any other point, e.g., the unused field in a split-field series motor.

4.6.7.2 Conducted radio interference (with filter).- When required by the procuring activity, the motor manufacturer shall provide a filter properly connected and arranged for mounting on or near the motor, as approved by the procuring activity. The conducted radio interference voltage produced by operation of the motor and filter as above shall not exceed the requirements of MIL-I-6181. Measurement shall not be made between an open circuit and any other points, e.g., the unused field in a split-field series motor.

4.6.7.3 Radiated interference (with filter).- Radiated interference produced by operation of the motor at both rated torque and minimum specified operating load shall not exceed the requirements of MIL-I-6181.

4.6.8 Operating position.- During the course of other tests, it shall be ascertained that the operation of the motor in any position does not adversely affect power output, heating, lubrication, or other operating characteristics.

4.6.9 Starting.-

4.6.9.1 Starting current - At 25° C ambient temperature, no load, and with rated voltage applied at the motor terminals, the maximum starting current shall not exceed 1,000 percent of rated full-load current, and the motor shall accelerate in such manner that within 0.3 second after the motor is energized, the current shall not exceed 150 percent of full-load current. Starting current shall be measured with an oscillograph, or other suitable instrument. The measured starting current shall be corrected to rated voltage in direct proportion to the reduction of voltage.

4.6.9.2 Consecutive starts.- For this test, the equivalent resistance of the line shall be such that a drop of not more than 0.5V for continuous-duty motors or 1.0V for intermittent-duty motors will occur when full-load current is drawn. The motor shall be subjected to 50 consecutive 5-minute cycles of starting, with a running time of 1 minute at full load or rated running time if less than 1 minute, and stationary for 4 minutes or rated idle time if more than 4 minutes. Upon the completion of this test, the brushes and commutator shall not show signs of excessive burning or wear.

4.6.10 Acceleration.- The motor shall be mounted on a centrifuge. The centrifuge shall then be operated at a speed that will produce an acceleration of 10 gravitational units; the motor shall start at no load and run satisfactorily during the test. The motor shall then be rotated 180 degrees about an axis perpendicular to the axis of the centrifuge arm and the test repeated. The motor shall be mounted on the centrifuge in four additional positions such that the accelerating force is applied in both directions through each of the remaining axes of the motor. For each position of the motor, the centrifuge shall be operated at a speed that will produce an acceleration of 10 gravitational units. The acceleration of 10 gravitational units in each test shall be stabilized and maintained for a period of not less than 1 minute. If the motor cannot be operated at "no load," loading or running the motor at reduced voltage is permissible during this test.

4.6.11 Shock.- The motor shall be mounted using its own mounting provisions and subjected to shock tests Procedure V of MIL-E-5272, except the test specified for "Equipment crash-safety" shall not be required. The shock testing machine shall be in accordance with MIL-STD-202, or other approved equipment. Following this test, the motor shall pass the speed and commutation tests (4.6.2.2 and 4.6.2.3).

4.6.12 Vibration.- The motor shall be subjected to vibration tests Procedure XII of MIL-E-5272. During the entire test, the motor shall be operated at no load with voltage adjusted to give rated speed. The "on time" for intermittent-duty motors shall be in accordance with rated duty cycle. Following this test, the motor shall pass the speed and commutation tests (4.6.2.2 and 4.6.2.3).



ce of ... round can be ... shall be of such accuracy that a differe

4.6.13 Commutator and brush wear.- The motor shall be operated at rated load and duty cycle. New brushes may be installed for this test. Different altitude conditions or brush life may be specified by the applicable motor standard or detail specification, in which case the test altitude and allowable percentage wear may be changed accordingly. Brush and commutator wear during operation (a), (b), and (c) below, shall not exceed 10 percent, 5 percent, and 5 percent, respectively, of the allowable wear. For continuous-duty class B motors, the brush wear shall not exceed 20 percent, 10 percent, and 5 percent during operation (a), (b), and (c), respectively under 4.6.13.1. Allowable wear shall be as specified by the manufacturer and approved by the activity responsible for qualification. During altitude portions of test, the rate of change in altitude need not be controlled. The maximum dew point for all altitude tests shall be -60° C.

4.6.13.1 Class B motors shall be operated as follows:

| | Hours | Altitude | Temperature ±5° C |
|---|---|---|---|
| (a) | 75 | Sea level | +25 |
| | 25 | Sea level | +120 |
| (b) | 9 | 35,000 ft. | -55 |
| | 1 to 2 | Sea level | +25 |
| | 9 | 35,000 ft. | -55 |
| | 1 to 2 | Sea level | +25 |
| | 9 | 35,000 ft. | +50 |
| | 1 to 2 | Sea level | +25 |
| | 9 | 35,000 ft. | +50 |
| | 1 to 2 | Sea level | +25 |
| (c) | 9 | 65,000 ft. | -55 |
| | 1 to 2 | Sea level | +25 |
| | 9 | 65,000 ft. | +20 |
| | 1 to 2 | Sea level | +25 |

4.6.13.2 Class A motors shall be operated as follows:

| | | | |
|---|---|---|---|
| (a) | 100 | Sea level | +25 |
| (b) | 9 | 35,000 ft. | -55 |
| | 1 to 2 | Sea level | +25 |
| | 9 | 35,000 ft. | -55 |
| | 1 to 2 | Sea level | +25 |
| | 9 | 35,000 ft. | -10 |
| | 1 to 2 | Sea level | +25 |
| | 9 | 35,000 ft. | -10 |
| | 1 to 2 | Sea level | +25 |
| (c) | 9 | 50,000 ft. | -55 |
| | 1 to 2 | Sea level | +25 |
| | 9 | 50,000 ft. | -10 |
| | 1 to 2 | Sea level | +25 |

4.6.14 Life.- The motor shall be operated at rated voltage and output torque under the following conditions. Unidirectional continuous-duty motors shall be stopped and started every 24 hours. Reversible continuous-duty motors shall be reversed every 24 hours. Reversible intermittent-duty motors shall be alternately operated in each direction at the rated duty cycle. Maintenance of any kind, including dressing of commutator, shall not be allowed during this test. Following this test, the motor shall meet the speed test (4.6.2.2).

(a) Class A motors shall be operated for 1,000 hours at standard test conditions.
(b) Class B intermittent-duty motors shall be operated for 24 hours at 120° +5° -0° C followed by 976 hours at standard test conditions (4.5).
(c) Class B continuous-duty motors shall be operated for 24 hours at 120° +5° -0° followed by 476 hours at standard test conditions (4.5).

4.6.15 Humidity.- The motor shall be subjected to humidity test Procedure I, of MIL-E-5272. Immediately following this test, the motor shall pass the speed and commutation tests (4.6.2.2 and 4.6.2.3) at room temperature.

4.6.16 Salt spray.- The motor shall be subjected to the 50-hour salt spray test Procedure I of MIL-E-5272. During this test, the motor shall be operated as follows:

(a) Continuous-duty motors shall be operated at "no load" with voltage adjusted to give approximately rated speed for 10 periods of 15 minutes duration with a minimum nonoperating period of 45 minutes between running periods.
(b) Intermittent-duty motors shall be operated at "no load" with voltage adjusted to give approximately rated speed for 10 duty cycles (a maximum of 15 minutes running time per cycle) with a minimum nonoperating period of 45 minutes between running periods.

Following the test, the motor shall be washed, dried for 15 to 20 hours, and shall then pass the speed and commutation tests (4.6.2.2 and 4.6.2.3) at room ambient temperature.

4.6.17 Sand and dust resistance - The motor shall be subjected to sand and dust test Procedure I, Part I of MIL-E-5272. The motor shall be located in the test chamber in any position. The test cycle shall be composed of 30-minute operative (no load) and 90-minute inoperative periods. Following this test, the motor shall pass the speed and commutation tests (4.6.2.2 and 4.6.2.3) at room ambient temperature. If the motor cannot be operated at "no load," loading or running the motor at reduced voltage is permissible during this test.

4.6.18 Fungus.- The motor shall be subjected to fungus resistance tests Procedure I of MIL-E-5272. Service covers and inspection plates shall be removed prior to the treatment with the spore suspension and then reinstalled after the spores have been introduced within the motor proper. Immediately following the test, the motor shall pass the speed and commutation tests (4.6.2.2 and 4.6.2.3) at room ambient temperature.

4.6.19 Thermal protection -

4.6.19.1 Direct acting thermal protection tests.-

4.6.19.1.1 Tests for Method 1, thermal protection motor No. 4.-

4.6.19.1.1.1 Mounting.- Unless otherwise specified in the detail specification or standard, the motor mounting method shall thermally isolate the motor to prevent conduction to or from adjacent metallic structures.

4.6.19.1.1.2 Running overload test.- The motor and thermal protector combination shall provide 115 percent of rated torque for 1 hour at maximum ambient, rated voltage [redacted] without a nuisance trip, for continuous-duty motors. The motor is then to be overloaded until the protector trips and no smoke or toxic fumes shall occur. Intermittent-duty motors shall be operated at room ambient and rated load until the protector trips. No smoke or toxic fumes shall occur. If no protector trip occurs prior to stabilization of frame temperature, the test shall be repeated in the maximum specified ambient.

4.6.19.1.1.3 Locked rotor test.- With rotor locked at room ambient and rated voltage [redacted] applied to the motor terminals, motor and thermal protector combination shall withstand one locked rotor protector interruption without the occurrence of smoke or toxic fumes.

4.6.19.1.2 Tests for Method 2 thermal protectors - motors No. 2 and No. 4.-

4.6.19.1.2.1 Mounting.- Unless otherwise specified by the detail specification or standard, the motor mounting method shall [redacted] thermally isolate the motor to prevent conduction to or from adjacent metallic structures.

4.6.19.1.2.2 Running overload test - motor No. 4.- The motor shall be operated at 150 percent of rated torque in the maximum specified ambient at rated voltage [redacted] until the input power has been completely interrupted by the protective system. During the test, no flame shall be visible and no external part of the motor, prior or subsequent to operation of the protective system, shall exceed 200° C, unless otherwise specified in the detail specification or standard. If power interruption does not occur at 150 percent of rated torque within 2 hours, a load torque greater than 150 percent of rated torque may be utilized.

If the motor input power was not interrupted by a protective device, the test shall be repeated on motor No. 1 after completion of all other tests on motor No. 1.

4.6.19.1.2.3 Locked rotor test - motor No. 2.- The motor rotor shall be locked while at room ambient and rated voltage [redacted] applied to the motor terminals until the input power is completely interrupted by the motor protective system. During the test, no flame shall be visible and no external part of the motor, prior or subsequent to operation of the protective system, shall exceed 200° C, unless otherwise specified in the detail specification or standard. When an explosion-proof test requirement is specified, the above test shall be conducted in the explosive atmosphere specified in the detail specification or standard. No explosion, external to the motor, shall occur. If the motor power was not interrupted by a protective device, the test shall be repeated on motor No. 3 after all other scheduled tests on motor No. 3.

4.6.19.1.3 Test for Method 3 of thermal protection - motor No. 2.-

4.6.19.1.3.1 Running overload test.- After conclusion of the explosion-proof test, if specified, the motor and thermal protector combination shall provide 115 percent of rated torque for 1 hour at maximum ambient without a nuisance trip for continuous-duty motors. The load shall then be increased to 150 percent of rated torque and the protector must trip within 5 minutes and not reset within a period equal to twice the time required to trip at 150 percent of rated torque. Cyclical tests, by means of the thermal protector, shall be continued for 25 hours with the load set at 150 percent

of rated torque.

Intermittent-duty motors shall be subjected to cyclical tests for 25 hours at maximum ambient, rated voltage and frequency, with the load set at rated torque.

4.6.19.1.3.2 Locked rotor test.- After conclusion of the running overload test, the motor shall be submitted to locked rotor operation at rated voltage [redacted] for 25 hours at room ambient. Following this test the motor shall pass the load test specified in 4.6.3 at room ambient temperature.

4.6.19.2 Indirect acting thermal protection tests.-

4.6.19.2.1 The motor and protector signal element shall be subjected to the tests of 4.6.19.1.1, 4.6.19.1.2, or 4.6.19.1.3, as appropriate, according to the method of protection specified and motor duty.

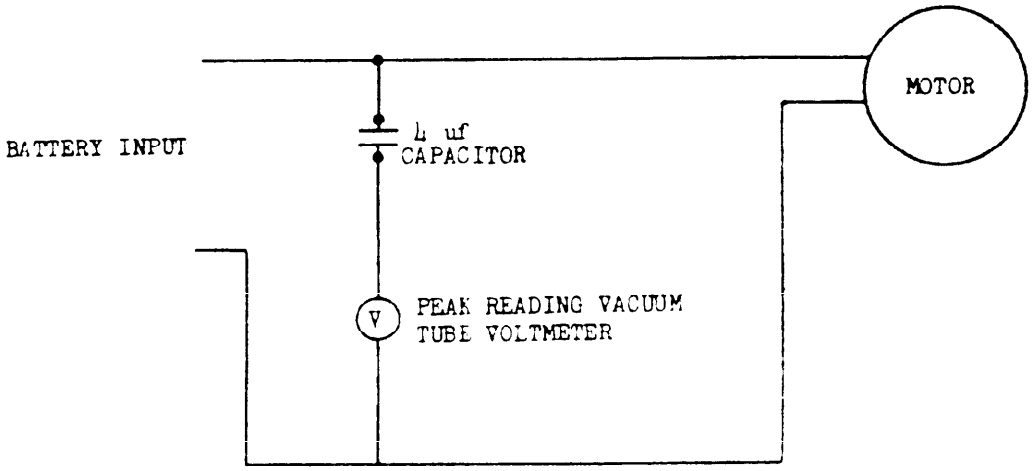
4.6.19.3 Short time.- For quality conformance tests, motors furnished with thermal protective means shall be given a functional test by a suitable method, after the device has been installed in the motor, to check proper installation and operation of the protector.

4.6.20 Fluid resistance.- Fluid-resistant motors shall be mounted in a manner simulating that in the actual application, and tested under the following conditions:

(a) The oil specified by the detail specification or standard shall be allowed to drip on and flow over the motor at the rate of 1/2 pint per hour.
(b) Unless otherwise specified by the detail specification or standard, the oil temperature shall be between 55° and 65° C.
(c) At no load with terminal voltage adjusted to give approximately rated speed, continuous-duty motors shall be operated for 48 hours, and intermittent-duty motors shall be operated for 6 duty cycles, following each 12 hours of exposure, for 4 periods of operation.
(d) After this test, the motor shall be cleaned and dried externally, and shall then withstand a voltage of 220V rms at commercial frequency of approximately 60 cps, for 1 minute, successively impressed between each circuit and all other circuits and metal parts grounded together. The motor shall then pass the speed test specified in 4.6.2.2, at room ambient temperature.

4.6.21 Explosion-proof (aeronautical).- Explosion-proof motors shall be subjected to explosion-proof tests Procedure IV of MIL-E-5272. These tests shall be made using two different explosive mixtures; one mixture resulting in maximum pressure and the other in maximum duration of flame. Tests shall be conducted at sea level only, and five explosions shall be accomplished for each mixture. The explosive mixture may be circulated within the chamber and motor at sea-level pressure in lieu of 10,000 feet as specified for tests under Procedure III, of MIL-E-5272. Motors below 2 inches diameter may be tested in accordance with Procedure III in lieu of Procedure IV.

4.6.22 Ripple voltage.- The circuit for the ripple voltage test shall be as specified on figure 1. The test shall be conducted with rated load on the motor. Reversible motors shall be tested for both directions of rotation. Peak voltage reading shall be taken with voltmeter successively connected for each polarity, and the higher of the two reading shall not exceed 1.5V.




THE LENGTH OF LEADS SHALL BE AS SHORT AS PRACTICABLE.

THE ACCURACY OF THE VACUUM TUBE VOLTMETER SHALL BE WITHIN ±2 PERCENT.

FIGURE 1. Circuit diagram to measure ripple voltage

4.6.23 Brake performance.-

4.6.23.1 Stopping revolutions.- Motors with stopping devices shall be instrumented to determine revolutions of coast after the motor is de-energized and shall be equipped with the inertia load specified by the applicable detail specification or standard. The motor shall be operated at rated speed with no load other than the inertia load specified by the applicable specification or standard. Voltage may be reduced to obtain the required speed. Upon removal of the voltage, the revolutions of coast shall be within the value specified by the applicable specification or standard. For production testing purposes, revolutions of coast may be determined by other means if correlated with results obtained by the inertia load, rated voltage method.

4.6.23.2 Static holding torque.- The output shaft of motors equipped with stopping devices shall be subjected to 200 percent of rated torque while the motor is de-energized. The motor shaft shall not creep. Other values of holding torque may be specified by the applicable specification or standard. When required by the detail specification or standard, the above test procedure shall be applicable while the motor is being subjected to vibration tests Procedure XII of MIL-E-5272 at room ambient temperatures. During this test, the torque-producing device shall be so connected that it will not add to the effective mass of the motor.

4.6.23.3 Brake life.- The life of the brake shall be determined by cycling at no load with the voltage adjusted to produce rated speed with connected inertia load as specified by the applicable detail specification or standard. Reversible motors shall be operated in alternate rotations. If the voltage required is such as to cause improper operation of the brake, the circuit may be modified to obtain normal operation of the brake. A cycling rate shall be used which will not result in exceeding the temperature of the windings obtained during the heating test (4.6.2.1). At the completion of the number of cycles specified by the detail specification or standard, the motor shall meet the requirements of 4.6.23.1 and 4.6.23.4.

4.6.23.4 Brake operating voltage.- At 18V, no load, the motor shaft shall start and operate without malfunction of the brake. The motor shall be operated at 18V no load and the circuit momentarily interrupted; the output shall resume rotation. A different operating voltage may be specified by the applicable MS.

4.7 Examination of preparation for delivery.- An examination shall be made to determine that preservation, packaging, packing and marking requirements of the applicable contract or order are complied with. Defects shall be scored in accordance with the list below. The lot size shall be the number of shipping containers fully prepared for delivery, with the exception that containers need not be sealed or closed, nor interior containers or case liners sealed (if applicable). Examination shall be made in two phases; first an interior examination in process of packaging, and second an examination of containers fully prepared for delivery. The sample unit for each of the two phases shall be one container prepared for delivery as set forth above. The inspection level shall be S-2 of MIL-STD-105, with an acceptable quality level (AQL) of 4.0 defects per 100 units.

| Examine | Defects |
|---|---|
| Marking (interior package or container and exterior container as applicable) | Omitted, incorrect, illegible, improper size, location, sequence or method of application. |
| Materials | Component missing, damaged, defective or not as specified. |
| Workmanship (as applicable) | Inadequate or improper packaging or packing, such as closure of interior packages or containers, closure of case liners or container flaps, taping of seams, corners, and manufacturer's joints, closure of alternate containers; loose strapping or tape banding; inadequate stapling, bulging, or distortion of containers. |
| Weight (exterior container) | Weight per container exceeds maximum specified. |
| Contents (interior and exterior container as applicable) | Number per container not as specified. |
| Preservation (as applicable) | Preservation missing, improperly applied or incorrect type. |

4.8 Material test specimens.- Test specimens shall be furnished when requested by the procuring activity for check tests at an acceptable testing laboratory to determine conformance with the applicable specification.

5. PREPARATION FOR DELIVERY

5.1 Preservation, packaging, packing, and marking.- Motors shall be preserved and packaged in accordance with level A or C of MIL-E-16298, as specified (see 6.2). They shall be packed in accordance with level A, B, or C, as specified (see 6.2), and marked in accordance with MIL-E-16298.

## 6. NOTES

6.1 Intended use.- This specification covers the requirements of dc motors for use in aircraft 28V systems to drive various aircraft accessories.

6.2 Ordering data.- Procurement documents should specify:

(a) MS part number, or title, number, and date of detail specification.
(b) Thermal protection method, when specified (see 3.4.13).
(c) Whether preproduction samples are required (see 3.2).
(d) Thermal protection type, when specified (see 3.4.13.2)
(e) Applicable levels of preservation, packaging, and packing (see 5.1).

6.4 Definitions.-

6.4.1 Ambient temperature.- Ambient temperature is the temperature of air surrounding the unit in normal free convection (velocity below 50 cfm).

6.4.2 Continuous duty.- Continuous duty is a requirement of service that demands operation at substantially constant load for an indefinite period.

6.4.3 Intermittent duty.- Intermittent duty is a requirement of service that demands operation for alternate intervals of (a) load and part or no load; or (b) load and rest; or (c) load, part or no load, and rest; such alternate intervals being definitely specified as the duty cycle.

6.4.4 Operating time.- When a definite operating time is specified in the specification, it shall be continuous in the case of continuous-duty rated motors, or be composed of no load or specified minimum load, and load and rest periods in the case of intermittent-duty rated motors. For example: If 1 hour of operation were required of a motor whose duty cycle was 1 minute under full load and 9 minutes of rest, then 6 cycles would be equivalent to 1 hour of operation.

6.4.5 Maximum temperature of exposed parts.- In order to assure that there will be no autogenous ignition of fuel vapors, 4.6.2.1 includes a maximum limiting temperature of exposed parts.

6.5 Sample detail requirements format.- The data indicated in 3.4.2 is contained in the following sample format:

Aircraft electric motor detail requirements
(For use on a 28V dc system)

A. Application (describe briefly)
Include whether class A or B

B. Design details:

(1) Output:_____Horsepower at_____RPM.

(2) Terminal voltage_____volts.

(3) Duty cycle: Continuous or intermittent (if intermittent specify cycle).

Aircraft electric motor detail requirements
(For use on a 28V dc system) (Continued)

(4) Maximum weight:_____.

(5) Minimum efficiency_____percent.

(6) Rotation of output shaft:_____CW, CCW, or reversible
(viewed from end opposite output shaft).

(7) Mounting flange and drive:_____MS33568 _____MS33570
_____MS33569 _____MS33571
_____Other: _____

(8) Maximum dimension: Length _____Diameter _____.

(9) Enclosure_____.

(10) Maximum allowable speed_____RPM at minimum operating load.

(11) Sketch: May replace all or part of (6), (7), or (9) above and must indicate method of marking electrical connections to motor.

(12) High temperature speed_____RPM ± _____percent.

C. Designations: All of the following design features have the indicated requirements incorporated in the general specification which are automatically effective unless exception is taken herein.

(1) Starting torque: 200 percent of full-load torque at lowest ambient temperature.
Option:_____percent full load torque.

(2) Starting current: 1,000 percent of full load current
Option:_____percent full load current.

(3) Operating location: Nonpressurized space and corresponding temperatures as dictated by class A or B
Option: Specify altitude-temperature combination.

(4) Minimum operating load: No load.

(5) Brush life:

Class A motor:

| | |
|---|---|
| 1,000 hours | Sea level to 35,000 feet |
| 500 hours | 35,000 to 50,000 feet |

Aircraft electric motor detail requirements
(For use on a 28V dc system) (continued)

Class F motors :

(a) Intermittent-duty motors

| | |
|---|---|
| 1,000 hours | Sea level to 35,000 feet |
| 500 hours | 35,000 to 65,000 feet |

(b) Continuous-duty motors

| | |
|---|---|
| 500 hours | Sea level to 65,000 feet |

Option:_____hours at sea level,_____hours at_____ft. alt.

(6) Useful life: 1,000 hours.
Option:_____hours.

(7) Radio noise filter: Not required.
Option:_____.

(8) Thermal protection: Not required.
Option: Type_____.

(9) Thermal marking: In accordance with MIL-STD-195.
Option:_____.

(10) Fluid resistance: Not required.
Option: Typed fluid_____.

(11) Explosion-proof: Yes
Option_____No.

(12) Reduced voltage operation: Not required.
Option_____hp output at_____volts.

(13) Brake: Not required.
Option:_____.
Specify stopping revolutions, inertia load, required life cycles, etc.

D. Additional requirements: (not specifically covered above)

NOTE: This format should be reproduced locally

Custodians:
Army - MO
Navy - WP
Air Force - (11)

Reviewer activities:
Army -
Navy - WP
Air Force - (11), (82)

User activities:
Army -EL, MC
Navy -MC
Air Force -

Preparing activity:
Navy - WP

Project No. 6105-0004

# STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

OMB Approval
No. 22-R255

INSTRUCTIONS: The purpose of this form is to solicit beneficial comments which will help achieve procurement of suitable products at reasonable cost and minimum delay, or will otherwise enhance use of the document. DoD contractors, government activities, or manufacturers' vendors who are prospective suppliers of the product are invited to submit comments to the government. Fold on lines on reverse side, staple in corner, and send to preparing activity. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements. Attach any pertinent data which may be of use in improving this document. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity.

DOCUMENT IDENTIFIER AND TITLE

NAME OF ORGANIZATION AND ADDRESS

CONTRACT NUMBER

MATERIAL PROCURED UNDER A

☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

1. HAS ANY PART OF THE DOCUMENT CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

A. GIVE PARAGRAPH NUMBER AND WORDING

B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

2. COMMENTS ON ANY DOCUMENT REQUIREMENT CONSIDERED TOO RIGID

3. IS THE DOCUMENT RESTRICTIVE?

☐ YES ☐ NO *(If "Yes", in what way?)*

4. REMARKS

SUBMITTED BY *(Printed or typed name and address - Optional)*

TELEPHONE NO.

DATE

**DD FORM 1 JAN 72 1426**

REPLACES EDITION OF 1 JAN 66 WHICH MAY BE USED

S/N 0102-014-1802

FOLD

POSTAGE AND FEES PAID


OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

Commanding Officer
Naval Air Engineering Center
Engineering Specifications and Standards
Department (ESSD) Code 93
Lakehurst, NJ 08733

FOLD