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MILITARY SPECIFICATION

MOTORS, AIRCRAFT HYDRAULIC, CONSTANT DISPLACEMENT GENERAL SPECIFICATION FOR

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

1. SCOPE

1.1 Scope. This Specification covers constant displacement hydraulic motors, generally remotely mounted, using hydraulic fluid under pressure as the energy transfer medium for driving various accessories. Hydraulic motors shall be suitable for use in aircraft hydraulic systems conforming to and as defined in MIL-H-5440 and MIL-H-8891 as applicable.

1.2 Classification. Aircraft constant displacement hydraulic motors shall be of the following types and classes, as specified (see 6.2):

	Range	Rated
Type I.	-65°F (-54°C) to +160°F (71°C)	110°F (43°C)
Type II.	-65°F (-54°C) to +275°F (135°C)	225°F (107°C)
Type III.	-65°F (-54°C) to +390°F (200°C)	350°F (178°C)

Class 1500. 1500 psi (103 Bar) rated inlet pressure
Class 3000. 3000 psi (207 Bar) rated inlet pressure
Class 4000. 4000 psi (276 Bar) rated inlet pressure

Category A. Secondary. Secondary flight controls, winches, gun drives, constant speed drives, transfer packages, etc.

Category B. Primary. Primary flight controls, modulating slats, etc. See Para 4.6.15 for utility and primary motor endurance test requirements.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Naval Air Engineering Center, Engineering Specifications and Standards Department (Code 93), Lakehurst, NJ 08733, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FSC 1650

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. Unless otherwise specified, the following specifications, standards, and handbooks of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

NN-P-530	Plywood - Flat Panel
QQ-C-320	Chromium Plating (Electrodeposited)
QQ-N-290	Nickel Plating (Electrodeposited)
QQ-P-416	Plating, Cadmium (Electrodeposited)
QQ-S-365	Silver Plating (Electrodeposited)
QQ-Z-325	Zinc Coating, Electrodeposited, Requirements for
PPP-B-566	Boxes, Folding, Paperboard
PPP-B-585	Boxes, Wood, Wirebound
PPP-B-591	Boxes, Fiberboard, Wood-Cleated
PPP-B-601	Boxes, Wood, Cleated-Plywood
PPP-B-621	Boxes, Wood, Nailed and Lock-Corner
PPP-B-636	Box, Fiberboard
PPP-B-676	Boxes, Set-Up
PPP-T-60	Tape: Pressure-Sensitive Adhesive, Waterproof, for Packaging

MILITARY

MIL-P-116	Preservation, Methods of
MIL-B-121	Barrier Material, Greaseproofed, Waterproofed, Flexible

MIL-C-5501	Caps and Plugs, Protective, Dust and Moisture Seal
MIL-C-5541	Chemical Films and Chemical Film for Aluminum and Aluminum Alloys
MIL-H-5606	Hydraulic Fluid, Petroleum Base, Aircraft, Missile, and Ordnance
MIL-H-6083	Hydraulic Fluid, Petroleum Base, Preservation and Testing
MIL-A-8625	Anodic Coatings, for Aluminum and Aluminum Alloys
MIL-H-8775	Hydraulic System Components, Aircraft and Missiles, General Specification for
MIL-F-8815	Filter and Filter Elements, Fluid Pressure, Hydraulic Line, 15 Micron Absolute and 5 Micron Absolute Type II Systems
MIL-S-8879	Screw Threads, Controlled Radius Root With Increased Minor Diameter; General Specification for
MIL-H-8890	Hydraulic Components, Type III (-65° to 450°F), General Specification for
MIL-L-10547	Liners, Case, and Sheet, Overwrap, Water-Vaporproof or Waterproof, Flexible
MIL-T-10727	Tin Plating; Electrodeposited or Hot Dipped, for Ferrous and Nonferrous Metals
MIL-C-11796	Corrosion Preventive Compound, Petrolatum, Hot Application
MIL-P-15024	Plate, Identification - Information and Markings
MIL-C-16173	Corrosion Preventive Compound, Solvent Cutback, Cold Application
MIL-F-25682	Filter and Filter Element, Fluid Pressure, Hydraulic, absolute, 25 Micron, -65° to +450° and +600°F
MIL-C-26074	Coating, Nickel-Phosphorus, Electroless Nickel, Requirements for

MIL-H-83282	Hydraulic Fluid, Fire Resistant Synthetic Hydrocarbon Base, Aircraft
MIL-P-83461	Packings, Preformed-Petroleum Hydraulic Fluid Resistant Improved Performance @ 275°F (135°C)

STANDARDS

MILITARY

DOD-STD-100	Engineering Drawing Practices
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-130	Identification Marking of U.S. Military Property
MIL-STD-143	Specifications and Standards, Order of Precedence for the Selection of
MIL-STD-276	Impregnation of Porous Nonferrous Metal Castings
MIL-STD-280	Definitions of Item Levels, Item Exchangeability Models, and Related Terms
MIL-STD-781	Reliability Tests: Exponential Distribution
MIL-STD-810	Environmental Test Methods
MIL-STD-889	Dissimilar Metals
MS3332	Flange - Accessory, 5,000 B.C. Round, Design Standard for
MS3335	Spline Details, Accessory Drives and Flanges
MS21344	Fitting, Installation of Flared Tube, Straight Threaded Connectors Design Standard for
MS28773	Retainer, Packing Backup, Tetrafluoroethylene, Thread Tube Fitting Boss
MS28774	Retainer, Packing Backup, Single Turn, Tetrafluoroethylene
MS28775	Packing, Preformed, Hydraulic Plus 275 Deg. F (O-Ring)
MS28782	Retainer, Packing, Backup, Teflon
MS28783	Ring, Gasket, Backup, Teflon
MS33649	Boss, Fluid Connection, Internal Straight Thread

AIR FORCE-NAVY AERONAUTICAL

AND10260	Flange, Type X Accessory Mounting
AND10261	Flange, Type XI Accessory Mounting
AND10262	Flange, Type XII Accessory Mounting

(Copies of specifications, standards, handbooks, drawings, and publications required by manufacturers in connection with specific acquisition functions should be obtained from the contracting 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. The issues of the documents which are indicated as DoD adopted shall be the issue listed in the current DoDISS and the supplement thereto, if applicable.

SOCIETY OF AUTOMOTIVE ENGINEERS

AIR-1362	Physical Properties of Fluids

(Application for copies of SAE publications 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 First article/qualification. The motors furnished under this specification shall be a product which has been tested and passed the first article or qualification as specified in the detail specification.

3.2 Precedence. The requirements of MIL-H-8775 or MIL-H-8890, as applicable apply as requirements of this specification with the exceptions and additions specified herein. In case of conflict between the requirements of this specification and the detail specification the requirements of the detail specification shall take precedence.

3.3 Selection of specifications and standards. Specifications and standards for necessary commodities and services not specified herein shall be selected in accordance with MIL-STD-143.

3.4 Materials. Materials used in the manufacture of hydraulic motors shall be of high quality, suitable for the purpose, and shall conform to the applicable Government specifications. Materials conforming to the motor manufacturer's specifications may be used provided the specifications are acceptable to the procuring activity and contain provisions for adequate tests. The use of motor manufacturer's specifications shall not constitute waiver of other applicable specifications.

3.4.1 Metals. All metals used in the construction of hydraulic motors, except those which are in constant contact with the hydraulic fluid, shall be of a corrosion-resistant type or shall be suitably protected to resist corrosion. The use of dissimilar metals, especially brass, copper, or steel in intimate metal-to-metal contact with aluminum alloy, shall be avoided wherever practicable. Dissimilar metals are defined in MIL-STD-889.

3.4.1.1 Type I system motors. Except for internal surfaces in constant contact with hydraulic fluid, ferrous alloys shall have a chromium content of not less than 12 percent or shall be suitably protected against corrosion as specified in 3.4.2.1. In addition, tin, cadmium and zinc platings shall not be used for internal parts or on internal surfaces in contact with hydraulic fluid or exposed to its vapors. O-ring grooves for external seals shall not be considered as internal surfaces in constant contact with hydraulic fluid. Magnesium shall not be used.

3.4.1.2 Type II and type III system motors. Ferrous alloys shall have a chromium content of not less than 12 percent or shall be suitably protected against corrosion as specified in 3.4.2.1. In addition, tin, cadmium and zinc platings shall not be used for internal parts or on internal surfaces in contact with hydraulic fluid or exposed to its vapors. Magnesium shall not be used. Where performance or reliability of the motor will be jeopardized by the use of materials and processes as specified in 3.4.1 and 3.4.2, alternate materials or processes may be used, subject to the approval of the procuring activity. Such materials or processes shall be selected so as to provide the maximum degree of corrosion resistance consistent with the performance requirements.

3.4.2 Corrosion protection. Metals which do not inherently possess adequate corrosion-resisting characteristics shall be suitably protected, in accordance with the following subparagraphs, to resist corrosion which may result from such conditions as dissimilar metal combinations, moisture, salt spray, and high temperature deterioration as applicable.

3.4.2.1 Ferrous and copper alloys. Ferrous alloys requiring corrosion preventive treatment, and all copper alloys, except for parts having bearing surfaces, shall have a suitable electrodeposited metallic coating selected from Table I. Cadmium and zinc plating shall not be used for internal parts or on internal surfaces in contact with hydraulic fluid or exposed to its vapors and not where subject to abrasion. Where not indicated, class and type are at the option of the manufacturer.

TABLE I. Metallic coatings.

Cadmium Plating	QQ-P-416, Type II, Class 2
Zinc Plating	QQ-Z-325, Type II, Class 2
Chromium Plating	QQ-C-320
Nickel Plating	QQ-N-290
Silver Plating	QQ-S-365
Tin Plating	MIL-T-10727, Type I
Electroless Nickel	MIL-C-26074

Other metallic coatings, the use of which has been demonstrated to be satisfactory to the purchaser, such as electrodeposited 85 percent tin, 15 percent cadmium alloy may be used.

3.4.3 Anodizing. Unless otherwise authorized, all aluminum alloys shall be anodized in accordance with MIL-A-8625, except that in the absence of abrasive conditions they may be coated with chemical film in accordance with MIL-C-5541. The exceptions noted will be subject to the approval of the procuring activity.

3.4.4 Castings. Castings shall be of high quality, clean, sound, and free from cracks, blow holes, and excessive porosity and other defects. Defects not materially affecting the suitability of the castings may be repaired at the foundry or during machining by peening, impregnation, welding, or other methods acceptable to the procuring activity. Inspection and repair of castings shall be governed by quality control techniques and standards satisfactory to the procuring activity. When impregnation castings are used, they shall be in accordance with impregnation procedures and inspections requirements of MIL-STD-276.

3.4.5 Seals. For Type I system motors, static and dynamic seals where practicable, shall be in accordance with MS28775. For Type II system motors, static and dynamic seals, where practicable, shall be in accordance with MIL-P-83461 (improved performance at +275°F). Back up seals shall be in accordance with MS28773, MS28774, MS28782, or MS28783. Nonstandard seals necessary to demonstrate compliance with the requirements of this specification, may be used subject to the approval of the procuring activity. For Type III system motors, seals and back-up rings used shall be subject to approval of the procuring activity.

3.5 Design and construction.

3.5.1 Direction of rotation. Unless otherwise specified in the detail specification, the hydraulic motors shall operate satisfactorily in either direction of rotation. It shall not be necessary to alter the motor to effect a change in the direction of rotation, but merely to reverse the direction of flow.

3.5.2 Rated speed. The rated speed of a motor shall be the maximum speed at which the motor is designed to operate continuously at rated temperature and rated differential pressure. The rated speed shall be measured and stated as RPM of the motor output shaft and shall be specified in the detail specification.

3.5.2.1 Overspeed. Motor performance and integrity shall not be impaired after driven at intermittent speeds up to 125 percent of rated RPM, for 30 minutes.

3.5.3 Shaft seal. The hydraulic motor shall be provided with a suitable seal for the motor shaft. No changes of the shaft seal shall be required for operation in either direction of rotation. The shaft seal shall be capable of meeting the tests and environments specified in Section 4.

3.5.4 Drains. The motor body shall be provided with case drain and seepage drain connections and plugs as specified in the detail specification.

3.5.5 Lubrication. The hydraulic motor shall be self-lubricating with no provision other than the circulating fluid.

3.5.6 Balance. The moving parts of the hydraulic motor shall be inherently balanced, and the motor shall not emit abnormal vibrations under conditions of operation at all speeds up to, and including the maximum speed. The self induced vibration limitations at the operating conditions shall be as specified in the detail specification.

3.5.7 Torque pulsations. The motor shall be designed to deliver continuous torque without excessive amplitude ripple (over ± 10%) when the motor is operated within the rated speed range under any of the conditions specified in Section 4 or as detailed in the detail specification.

3.5.8 Dimensions. The external envelope dimensions of the hydraulic motors shall conform to applicable drawings as specified in the detail specification.

3.5.9 Weight. The dry weight of the completely assembled motor shall not exceed the value specified in the detail specification and shall be specified on the installation drawing. When required by the detail specification, the wet weight shall also be specified on the installation drawing.

3.5.10 Ports. Unless otherwise specified in the detail specification, the port bosses shall conform to MS33649.

3.5.10.1 Port structural strength. The structural design of the ports and of the affected sections of the motor housing shall be such as to withstand the application of a torque 2.5 times the maximum steel tubing value specified in MS21344, resulting from the attachment or removal of fittings and hoses when installing or removing motors during field maintenance without permanent distortion or impairment of function.

3.5.10.2 Port marking. Inlet, outlet, and case drain ports shall be identified on each motor by clear and permanent markings.

3.5.11 Motor mounting. The motor shall incorporate a standard mounting flange, which shall be in accordance with either AND10260, AND10261, AND10262, or MS3332, or as specified in the detail specification. Motor operation shall not be impaired by mounting the motor in any possible orientation.

3.5.11.1 Mounting interface. The oil holes and oil flow specified on AND10260, AND10261, and AND10262 shall not be applicable.

3.5.11.2 Drive shaft loading. Motors shall be designed to absorb all self generated thrust and radial loads. If any additional thrust or radial loads are imposed on the external drive shaft such as fan drive applications, they shall be reflected in the detail specification.

3.5.11.3 Wet splines. When specified in the detail specification oil lubricated (spray) splines shall be designed in accordance with MS3335 unless otherwise specified.

3.5.12 Shear section. The motor shaft shall not shear when subjected to a minimum torque of 3.0 times rated. When requested by the procuring activity, a minimum and maximum shear value will be referenced on the applicable drawing.

3.5.13 Self-contained failure. The motor shall be designed to completely contain all internal parts in the event of a failure due to an overspeed condition. Maximum overspeed conditions shall be included in the detail specification. No loss of fluid from the motor shall occur as a result of the failure, other than the external and shaft seal leakages specified in the detail specification.

3.6 Part numbering of interchangeable parts. All parts having the same design activity FSCM (Federal Supply Code for Manufacturers) and part number shall be interchangeable as defined in MIL-STD-280. The item identification and part number requirements of DOD-STD-100 shall govern the design activity part numbers and changes thereto.

3.7 Screw threads. All screw threads shall be in accordance with MIL-S-8879.

3.8 Threaded parts. All internal or external threaded parts shall be positively locked by a method approved by the procuring activity.

3.9 Performance. The motor shall satisfy the performance requirements specified herein.

3.9.1 Hydraulic fluid. The detail specification shall specify the hydraulic fluid required for that particular application. If not specified, MIL-H-5606 shall be used as a fluid for design and testing.

3.9.1.1 Hydraulic fluid properties. The value of the following physical properties, bulk modulus, viscosity, density, specific heat thermal conductivity, and thermal expansion for the hydraulic fluids is defined in AIR-1362. These are required for detail design and analysis and are considered to be nominal values.

3.9.2 Rated inlet pressure. The rated inlet pressure of the hydraulic motor shall be specified in the detail specification. This pressure is defined as the maximum system pressure for which the motor is designed to operate continuously at rated temperature and rated speed. It shall conform to one of the motor classes specified in paragraph 1.2.

3.9.3 Operating pressures. The operating pressure limits and peak impulse pressure for the inlet and outlet shall be specified in the detail specification.

3.9.4 Rated temperature. The rated temperature of the hydraulic motor shall be specified in the detail specification. This temperature is defined as the maximum continuous fluid temperature at the inlet port of the motor. It shall be expressed in degrees Fahrenheit (^{o}F) or degrees Celsius (^{o}C) and shall conform to one of the motor types specified in paragraph 1.2.

3.9.5 Rated differential pressure. The rated differential pressure shall be defined as the measured differential pressure between the inlet and outlet ports of the motor. The rated differential pressure shall be specified in the detail specification.

3.9.6 Rated torque. The rated torque shall be defined as the output torque of the motor at rated differential pressure, rated temperature and rated speed. The rated torque shall be as specified in the detail specification.

3.9.7 Vibration. Motors shall be capable of withstanding vibrations generated by the driven accessory. Unless otherwise specified in the detail specification, motors shall be vibration tested per paragraph 4.6.11.

3.10 Life. The life of hydraulic motors may be stated in the following ways:

3.10.1 Calendar life. The total calendar time during which no maintenance is required for age related reasons.

3.10.2 Storage life. Time of storage condition (conditions of environment should be specified) may be given as a percentage of calendar life.

3.10.3 Standby life. Life of a unit installed in a secondary or standby system which is operating on an intermittent basis.

3.10.4 Service life. The accumulation of operating time under service conditions, without overhaul.

3.10.5 Rated endurance. The rated endurance of a motor is defined as the total number of hours of operation to be included in the endurance phase of the first article/qualification tests. Unless otherwise stated in the detail specification, the value of the rated endurance shall be 750 hours for Type I and Type II models and 250 hours for Type III models. A cyclic endurance test is specified in Table IV for Category B motors.

3.10.6 Reliability. Unless otherwise specified in the detail specification, the motor shall have a upper mean-time-between failure (MTBF) θ_o as defined in MIL-STD-781, of 2000 hours at a discrimination ratio of 3.0:1 and a decision risk of 10 percent.

3.11 Markings. All markings shall be durable to withstand effacing or obliteration resulting from service usage.

3.11.1 Direction of rotation. The corresponding inlet port for each direction of rotation shall be clearly and permanently marked on the motor housing as indicated on the applicable drawings.

3.12 Identification of product.

3.12.1 Nameplate. A nameplate conforming with MIL-P-15024 containing the following information legibly filled in shall be securely attached to the motor. The information marked in the spaces provided shall be in accordance with MIL-STD-130.

MOTOR, AIRCRAFT HYDRAULIC

Torque ___ at ____ rated differential pressure
Rated speed _____rpm
Type _____
Class _____
Displacement, cu. in. (cm^3) per revolution ____(cm^3)
Manufacturer's Part No. _____
Manufacturer's Serial No. _____
Contract or Order No. _____
Manufacturer's name or trade-mark
Fluid _____

3.13 Workmanship. All details of workmanship shall be in accordance with high-grade manufacturing practices for aircraft hydraulic motors.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, 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 that supplies and services conform to prescribed requirements.

4.2 Classification of inspections. The inspection of hydraulic motors shall be classified as follows:

a. First article/qualification inspection (see 4.3).

b. Quality conformance inspection (see 4.4).

4.3 First article/qualification inspection. The first article inspection shall consist of all the inspections of this specification (see 4.6).

4.3.1 Sampling for first article/qualification inspection. Unless otherwise specified, as soon as practicable after award of a contract or order, the contractor shall furnish 2 production representative hydraulic motors for inspection to determine conformance with this specification. The samples shall be identified with the manufacturer's part number and contract number and shall be inspected as specified herein and in accordance with the contract or order (see 6.2).

4.3.2 First article/qualification tests. The first article inspection shall be conducted as described under "Inspection Methods" (paragraph 4.6). The inspections shall be conducted in the order listed under 4.6 and in the following sequence: Individual tests and sampling tests. First article inspection may, at the option of the testing activity, be supplemented with tests under actual service conditions or may be partially or completely waived based on similarity to units previously subjected to first article tests.

4.4 Quality conformance inspection. The quality conformance inspection shall consist of individual tests and sampling tests (when applicable).

4.4.1 Quality conformance tests. Each hydraulic motor submitted for acceptance under contract shall be subjected to the following examination and tests in the order listed. In addition, each motor shall be subject to any other tests specified herein, which the Government Inspector considers necessary to determine conformance with the requirements of this specification.

a.	Examination of Product	(4.6.1)
b.	Break-In-Run	(4.6.2)
c.	Rated Speed Run	(4.6.3)
d.	Proof Pressure Run	(4.6.4)
e.	Shaft Seal and External Leakage	(4.6.5.1)
f.	Consumption	(4.6.7)
g.	Torque-Stalled	(4.6.6.2)
h.	Stalled Leakage (Individual Test)	(4.6.8.2)

4.4.2 Sampling tests. When requested by the procuring activity, one hydraulic motor from the first 50, and one from every 500 thereafter, which have passed the required individual tests, shall be selected at random by the Government Inspector and subjected to the following tests, as described under "Inspection Methods". The basis for motor sampling shall be the total continuous production run of any given model.

a.	Low Temperature Operation	(4.6.12)
b.	Shaft Seal Leakage (Sampling Test	(4.6.5.2)
c.	Stalled Leakage (Sampling Test)	(4.6.8.1)
d.	Torque (Sampling Test)	(4.6.6.1)

e.	Torque-Stalled (Sampling Test)	(4.6.6.3)
f.	Torque-Breakout (Sampling Test)	(4.6.6.4)
g.	Vibration Tests	(4.6.11)
h.	Oscillating Endurance Test Apparatus	(4.6.13)
i.	Endurance Test	(4.6.15)
j.	Recalibration	(4.6.15.6)

4.4.2.1 Rejection and retest. When sampling tests are specified on a number of motors that are selected from a production run and one or more of this number fails to meet the specified test(s), acceptance of all items still on hand and subsequent production will be withheld until the extent and cause of failure is determined. For operation reasons, individual tests may be continued pending investigation of a sampling test failure. However, final acceptance of the items on hand and subsequent production is contingent upon the procuring activities decision regarding acceptance of the corrective action on the product to conform to specification requirements. When corrective action has been accomplished, all necessary tests shall be repeated. If investigation indicates that the defects may exist in items previously accepted, full particulars concerning the defects, including recommendations for correction, shall be furnished to the procuring activity.

4.5 Test conditions.

4.5.1 Cleaning. All oil and grease or other corrosion-resisting compounds shall be removed from the interior and exterior parts of the hydraulic motor.

4.5.2 Direction of rotation. Unless otherwise specified, each motor may be installed and tested in either direction of rotation.

4.5.3 Fluid. Unless otherwise specified, all tests shall be conducted using hydraulic fluid conforming to MIL-H-5606 for quality conformance inspection. MIL-H-6083 fluid may be used for Type I systems.

4.5.4 Measurements and apparatus. Test apparatus shall be set up to accurately record test conditions as specified herein. Hydraulic flow to the motor inlet will be recorded (high pressure) unless otherwise specified in the detail specification.

4.5.4.1 Inlet pressure. The inlet pressure shall be measured with a pressure gage located as close to the inlet port as practical.

4.5.4.2 Outlet pressure. The outlet pressure shall be measured with a pressure gage as close to the outlet port as practical.

4.5.4.3 Fluid flow. The fluid flow from the inlet or the outlet and case drain as specified shall be measured by any method which will give results within 1 percent accuracy.

4.5.4.4 Motor speed. The motor shall be measured at a shaft directly connected to the motor shaft or positively driven from that shaft.

4.5.4.5 Torque. The torque developed by the motor shall be measured in any suitable manner, such as with a dynamometer.

4.5.4.6 Accuracy. Accuracy of the instrumentation for all tests shall be consistent with the accepted industry practice and the degree of accuracy considered achieved shall be attested to in the test records.

4.5.5 Oil temperature. Unless otherwise specified, the fluid inlet temperature shall be the rated temperature, i.e., Type I, $110^{\circ} \pm 5^{\circ}F$ ($43^{\circ} \pm 2^{\circ}C$), Type II, $225^{\circ} \pm 5^{\circ}F$ ($107^{\circ} \pm 5^{\circ}C$), Type III, $350^{\circ} \pm 10^{\circ}F$ ($178^{\circ} \pm 5^{\circ}C$).

4.5.6 Filtration. A 10 micron nominal or equivalent filter shall be installed for all tests, except in the endurance test where filtration shall be per paragraph 4.6.14.2.

4.6 Inspection methods.

4.6.1 Examination of product. The motor and component parts shall be examined to determine compliance with the applicable drawings and with all other requirements of this specification for which there are no specific procedures or tests.

4.6.2 Break-in-run. The break-in-run shall be for a duration of 1 hour and shall be made at a minimum of one-half rated speed while the shaft is loaded to impose a minimum of 1,500 psi (103 Bar) inlet pressure. At the option of the procuring activity the break-in-run may be reduced to not less than 1/2 hour.

4.6.3 Rated speed run. Run at speeds beginning at 1/2 rated speed and increase at equal speed increments of fixed duration and increasing pressure to include one increment at rated speed and rated pressure. Run of 1.5 hours total. Shaft seal leakage shall not exceed 5 ml/hr during this test.

4.6.3.1 Overspeed run. The motor shaft shall be unloaded. With return pressure set to 100 ± 50 psig accelerate the motor to 125 percent of rated speed unless otherwise specified in the detail specification for two minutes. There shall be no evidence of case drain flow surges or speed instability.

4.6.4 Proof pressure run. The motor shall be operated for 1 minute at a speed not less than rated, 500 psig (35 Bar) outlet pressure, 125 percent rated inlet pressure, $125^{\circ} \pm 10^{\circ}F$ inlet oil temperature, and a case pressure of 500 psi (35 Bar). The motor shaft shall be locked against rotation. Pressurize the inlet port to 4500 ± 50 psi, with case and return at 0 to 100 psi. Fluid temperature to be $100^{\circ} \pm 25^{\circ}F$. Retain above pressure for 2 minutes. If hi-directional motor, repeat on alternate inlet port. There shall be no fluid leakage sufficient to form a drop through the motor housing or cover, or at the gasket or ports. The rate of drive shaft seal leakage shall not exceed 1/8 ml per minute or as specified in the detail specification.

4.6.4.1 Teardown inspection (optional). After the break-in-run and proof tests, the motor may be disassembled and inspected at the option of the motor manufacturer. If all parts are in acceptable condition, the motor shall be reassembled and re-run in accordance with paragraph 4.6.4. If at any phase in the testing, working parts require replacement, the entire quality conformance test procedure shall be repeated.

4.6.5 Shaft seal leakage.

4.6.5.1 Shaft seal and external leakage. The shaft seal leakage shall be determined at 50 percent rated speed, rated inlet pressure, 25 to 200 psig (2-14 Bar) outlet pressure, 25 to 200 psig (2-14 Bar) case drain line pressure. Unless otherwise specified in the detail specification the rate of shaft seal leakage shall not exceed 5 ml per hour.

4.6.5.2 Shaft seal leakage (sampling test). The shaft seal leakage shall not exceed 5 ml per hour when the motor is operated under conditions called for under paragraphs headed "Torque (sampling test)" (4.6.6.1), "Stalled leakage (sampling test)" (4.6.8.1), and "Torque-breakout (sampling test)" (4.6.6.4).

4.6.6 Torque.

4.6.6.1 Torque (sampling test). The output torque of the motor shall be measured at 160° ± 5°F oil inlet temperature after at least 5 minutes of operation under each of the conditions specified in Table II.

TABLE II. Torque (sampling test) conditions.

Motor Speed Percent Rated	Motor Outlet and Case Pressure	Motor Differential Pressure
25	25-200 psig (2-14 Bar)	Rated
50	25-200 psig (2-14 Bar)	Rated
100	25-200 psig (2-14 Bar)	Rated

The output torque under any of the above conditions shall be not less than the rated torque specified in the detail specification.

4.6.6.2 Torque-stalled. The stalled output torque of the motor shall be measured with rated inlet pressure 0-200 psig (0-14 Bar) outlet and case pressure and 115° ± 10°F inlet fluid temperature. The measurements shall be made with the output shaft locked at four equally spaced positions within one revolution. The pressure shall be removed and re-applied for each test point. The torque measurement shall be made after applying the pressure. The minimum torque measurement and maximum differential pressure permissible shall be specified in the detail specification.

4.6.6.3 Torque-stalled (sampling test). Conduct test as indicated in 4.6.6.2 except torque values shall be recorded at every 10 degrees of rotation of the shaft within one revolution. The minimum torque shall be specified in the detail specification.

4.6.6.4 Torque-breakout (sampling test). The motor shall be connected to a variable opposing load which is capable of backdriving the test motor at rated torque and also capable of being driven by the test motor. Shaft torque between the test motor and the load shall be recorded when the shaft begins to rotate, both in test motor "driven" conditions. Fluid temperature and pressures shall be as specified in paragraph 4.6.6.1. Minimum torque at breakout shall be specified in the detail specification.

4.6.7 Consumption.

4.6.7.1 Consumption-rated torque. The rate of oil flow required to drive the motor at rated speed, rated torque, 25-200 psig (2-14 Bar) outlet and case pressure and rated oil inlet temperature shall not exceed the value specified in the detail specification. Flow shall be measured at the inlet port to the motor or as specified in the detail specification.

4.6.7.2 Consumption-zero torque. The rate of oil flow required to drive the motor at rated speed, zero torque, 25-100 psig (2-7 Bar) outlet pressure shall not exceed the value specified in the detail specification.

4.6.8 Stalled leakage.

4.6.8.1 Stalled leakage (sampling test). The combined total leakage from the outlet port and the case drain line, with the output shaft stalled at any position, at rated inlet pressure, and $160^{\circ} \pm 5^{\circ}F$ ($71^{\circ} \pm 2^{\circ}C$) inlet oil temperature, shall not exceed the value specified in the detail specification.

4.6.8.2 Stalled leakage (individual test). The leakage from the housing drain line with the output port blocked, the output shaft free, rated inlet pressure, and $160^{\circ} \pm 5^{\circ}F$ ($71 \pm 2^{\circ}C$) inlet oil temperature shall not be more than twice the value specified for stalled leakage (sampling test).

4.6.9 Breakout pressure-unloaded. The differential pressure measured between the inlet and outlet ports required to break the shaft away from a stalled condition shall not exceed the pressure specified in the detail specification with 50 psig (10 Bar) case and outlet pressure.

4.6.10 Braking test. A constant flow source of oil shall be provided to the motor inlet port sufficient to maintain rated speed with no load. The test circuit must be so arranged that the pressure will rise to rated pressure as soon as the motor load is increased. A load shall be applied to the motor shaft in such a manner as to reduce its speed from rated to zero in 0.02 seconds. There shall be no evidence of any degradation to the motor structure of subsequent operational performances. A fast response relief valve shall be located in the motor inlet line to prevent surges of above 125 percent of rated inlet pressures.

4.6.11 Vibration tests.

4.6.11.1 Test motor mounting orientation. The test motor shall be mounted on a vibration generating mechanism successively in each of at least three positions. All of the testing specified shall be performed in each of mutually perpendicular positions. All of the testing specified shall be performed in each of the mounting positions. One of these mounting positions shall be such that the direction of vibratory motion shall be parallel to the shaft axis of the motor. Another mounting position, if and when practicable, shall be such that the direction of vibratory motion shall be parallel to the axis of any control mechanism.

4.6.11.2 Resonant frequency vibration. Resonant frequencies shall be searched according to the double amplitude and frequency charts of MIL-STD-810. Applicable procedures and test values shall be specified in the detail specification.

4.6.11.3 Cyclic frequency vibration. Upon completion of the resonant frequency vibration, a cycling vibration shall be imposed in accordance with MIL-STD-810. Applicable procedures and test values shall be specified in the detail specification.

4.6.11.4 Motor operation. Throughout the above vibration tests the motor shall be operated in a test circuit capable of maintaining an oil inlet temperature of $140^{\circ} \pm 15^{\circ}F$ regardless of the rated temperature of the motor being tested, and ambient temperatures shall be maintained at room ambient conditions. The motor supply pressure shall be rated pressure with a corresponding load applied at rated speed.

4.6.12 Low temperature operation. The hydraulic motor and hydraulic fluid shall be cooled to a temperature of $-65^{\circ} \pm 5^{\circ}F$ ($-54 \pm 2^{\circ}C$), or a temperature specified in the detail specification. After a minimum time of 72 hours at this temperature, the motor shall be started and brought up to rated speed unloaded 50 times. These starts shall be made with as low an inlet and outlet restriction as practical. In addition, 25 starts shall be made at 120 percent rated differential pressure +100 -0 psi (7 Bar) with the motor loaded to a minimum of rated torque. The capacity of the refrigerating equipment and the length of time between starts shall be such that the motor body temperature and the oil reservoir temperature shall be $-65^{\circ} \pm 5^{\circ}F$ ($-54^{\circ} \pm 2^{\circ}C$) at each of the 75 starts. During the start-up to rated speed the fluid temperature-time control shall be as specified in the detail specification. A trace of break-out torque shall be made during the 25 loaded starts. If applicable, the detail specification shall specify a minimum torque. There shall be no evidence of any degradation to the motor structure or subsequent operational performance.

4.6.12.1 Thermal shock. The motor shall be placed in a suitable temperature chamber for a period of 6 hours with the ambient temperature at $-65^{\circ}F$, or a temperature specified in the detail specification. The motor shall be started and brought up to rated speed within 2 seconds

with an inlet fluid temperature that has been stabilized and maintained at 200°F minimum and at rated operating pressures. There shall be no evidence of any degradation to the motor structure or subsequent operational performance.

4.6.13 Oscillating endurance test apparatus. Apparatus for the oscillating endurance test shall be set up to provide for the cyclic flow rate as required herein.

4.6.13.1 Oscillating endurance test. An oil flow, in sufficient quantity for the motor to attain its rated speed, shall be reversed to and from the motor inlet and outlet ports at a rate of 60 cpm. One cycle shall constitute one complete reversal of oil flow of aforementioned quantity. During this test, the motor shaft shall not be loaded, and the test shall be run continuously for one hour. There shall be no evidence of any degradation to the motor structure or subsequent operational performances.

4.6.14 Endurance test apparatus. Apparatus for the endurance test shall be set up to test and record the parameters referenced herein. The motor shall satisfactorily complete the specified hours of operation with no failure of parts and no excessive wear.

4.6.14.1 Inlet and outlet lines. The size of the inlet and outlet lines shall be as specified in MS33649 for the port size shown on the motor drawing.

4.6.14.2 Filtration for endurance test. The hydraulic fluid to be charged into the endurance test system shall be passed through a 5-micron absolute filter before entering the test system. Filters in accordance with MIL-F-8815 or equivalent, either 5-micron absolute or 15-micron absolute as specified in the detail specification (MIL-F-25682 for Type III systems) shall be installed in the motor inlet, outlet, and case drain lines throughout the endurance test.

4.6.14.2.1 Filter check. At intervals of 50 ± 8 hours, during the endurance test, clean filter elements shall be installed in all 3 filters, and the endurance test schedule resumed for 2 hours, at the end of which these filter elements shall be removed and replaced with clean filter elements. The filter elements removed after 2 hours running shall be checked in accordance with 4.6.14.2.2.

4.6.14.2.2 Patch test. The fluid in each filter bowl shall be collected in clean containers. Rinse both the filter bowl and element with a minimum of 15 cubic centimeters (cc) of a suitable fluid solvent and add to the applicable container. The total resulting fluid shall be passed through a 47 millimeter (mm) disc, #40 Watman paper. Wash the disc free of fluid with a minimum of 15 cc of fluid solvent. After drying, the resultant filter patch shall be coated with clear lacquer and permanently attached to the log sheet of the test. All fluid solvent shall be filtered through a 0.45-micron pore size membrane prior to use during the foregoing procedure. Each filter patch resulting from the preceding test shall be compared with the previous patch and any discrepancy noted in the test log.

4.6.15 Endurance test. For Category A motor applications test per paragraph 4.6.15.1. For Category B motor applications, test per paragraph 4.6.15.2.

4.6.15.1 Category A, endurance test. Unless otherwise specified in the detail specification, the endurance test shall be conducted for 750 hours for Type I and Type II motors and for 250 hours for Type III motors as outlined in TABLE III.

4.6.15.1.1 Time schedule and cycles. The specified hours of running time shall consist of repeating cycles of high and low pressure operation. One low pressure period and one high pressure period together shall constitute one cycle. The low pressure period shall consist of 12 $\pm$ 1/2 minutes of operation at 50 percent rated differential pressure. This shall be followed immediately by a high pressure period which shall consist of 3 $\pm$ 1/4 minutes at 100 percent rated differential pressure. The change in pressures shall occur in less than one second. The oil inlet temperature shall be maintained at the temperature as shown in TABLE III. At the option of the procuring activity, to depend on the application, the direction of rotation may be reversed after each cycle. The loads may also be made retarding in both directions or aiding in one direction and retarding in the other as applicable.

4.6.15.1.2 Start-stop tests. After the first and last phase of the endurance test, shown in TABLE III, 500 starts and stops of the motor will be conducted. The system loading and supply conditions shall be so controlled that motor differential pressure surges, between 120 percent and 150 percent of rated differential pressure, occur during each start and stop.

TABLE III. Endurance test.

Test Phase	Percent of Rated Endurance (Time)	Percent Rated Speed RPM	Percent Rated Diff. Pressure	Case and Outlet Pressure	Inlet Fluid Temperature
1	9	36 $\pm$ 6*	50-100	Minimum	100 $\pm$ 5°F (39 $\pm$ 2°C)
2	15	66 $\pm$ 3	50-100	200 psig (14 Bar)	Rated (Type I, II or III)
3	45	86 $\pm$ 2	50-100	Minimum	Rated (Type I, II or III)
4	9	100 $\pm$ 2	50-100	100 psig (7 Bar)	Rated (Type I, II or III)
5	2	20 $\pm$ 2	50-100	500 psig (34 Bar)	Rated (Type I, II or III)
6	20	110 $\pm$ 2*	60-100	Minimum	Rated (Type I, II or III)

*See 4.6.15.1.2 Start-stop tests.

4.6.15.2 Category B load cycling endurance test. Category B hydraulic motors shall be subjected to load cycling tests as shown in TABLE IV using a test circuit as shown in FIGURE 1. Unless otherwise specified in the detail specification the minimum number of cycles shall be 2 million.

TABLE IV. Load cycling tests.

Percent of Total Cycles	Rate	Input Signal (a)	Percent Rated Speed (rpm)	Rated Torque Load	Outlet & Case Pressure (b)	Inlet Fluid Temp
	4 sec/cycle	Per Fig. 2	100 ± 5	50%	50-100 psi (4-7 Bar)	100 ± 5°F (39 ± 2°C)
37	3 cycles/sec	Sine Wave	25 ± 5	20%	50-100 psi (4-7 Bar)	150 ± 5°F (66 ± 3°C)
5	3 cycles/sec	Sine Wave	50 ± 5	40%	50-100 psi (4-7 Bar)	Rated
5	3 cycles/sec	Sine Wave	100 ± 5	80%	75-150 psi (5-10 Bar)	Rated
10	3 cycles/sec	Sine Wave	25 ± 5	80%	75-150 psi (5-10 Bar)	Rated
12.5	5 cycles/sec	Sine Wave	10 ± 2	25%	75-150 psi (5-10 Bar)	Rated
5	3 cycles/sec	Sine Wave (1/2 Sine Wave As Aiding Load)	50 ± 5	45%	75-150 psi (5-10 Bar)	Rated

(a) Sine wave to be plus clockwise and minus counterclockwise passing thru 0 rpm.

(b) The total pressure shall be specified in the detail specification for motors controlled by servo valves.

4.6.15.3 Overspeed. Upon completion of endurance test (4.6.15) the motor shall be operated for 1/2 hour at 125 percent of rated speed and at rated inlet temperature. The differential pressure and torque load shall be as specified in the detail specification.

4.6.15.4 Test data. The endurance test data shall be graphically presented with consumption, torque, ratio of theoretical flow to volume consumed (comparable to volumetric efficiency of a pump), and overall efficiency plotted against the motor speed for each pressure run. The report shall contain a tabulation of rpm, inlet and outlet pressures, oil temperatures, shaft seal leakage, and room temperature for both the high and low pressures for each of the conditions. The readings shall be recorded at least twice during each 24 hour period; however, when the test period is less than 24 hours long, readings shall be recorded at least twice during each 10 hour period.

4.6.15.5 Replacement of parts. If during the endurance test a major part fails, the test shall be terminated. The replacement hydraulic motor shall have a redesigned part or one of a different material corresponding to the failed part except that, if the failure was caused by faulty material or workmanship, the testing activity may authorize the installation of a part of the original design and material with the defect overcome. The endurance test shall be considered completed when every major part has concurrently undergone the test. Minor parts may be replaced and penalty runs conducted with the approval of the procuring activity. Major parts are defined as those that affect form, fit or function.

4.6.15.6 Recalibration. Following the endurance test, the motor shall be recalibrated at 25, 50 and 100 percent of rated speed at zero or lowest possible outlet pressure, and at 100 percent rated inlet pressure. The rate of leakage of the shaft seal shall not exceed 5 ml per hour. Motor consumption shall not have increased more than 25 percent from the consumption rate prior to the endurance test at 100 percent of the rated speed and 100 percent rated pressure conditions of operation. The motor shall be operated at 20 percent rated speed and 100 percent rated pressure for a period of 15 minutes.

4.6.15.7 Static burst pressure test. Unless otherwise specified in the detail specification, a static burst pressure test at 2.5 times the rated pressure shall be included in the first article test procedure.

4.6.15.7.1 Inlet port pressure. Apply a static pressure of 2.5 times the rated pressure to the motor inlet port or ports independently with the motor shaft locked to prevent rotation. Return the case drain lines to be open.

4.6.15.7.2 Case drain port pressure test.

4.6.15.7.2.1 Category A motors. With inlet and outlet ports plugged, apply 750 psi to case drain port unless otherwise specified in the detail specification.

4.6.15.7.2.2 Category B motors. With inlet and outlet ports plugged, apply 1/2 the rated inlet pressure to case drain port unless otherwise specified in the detail specification.

4.6.15.7.2.3 Rate of pressure rise. Pressure shall be increased at a rate of 500 psi per sec and held for a period of at least 2 minutes. The motor shall not rupture during the above tests, but is not required to operate subsequent to the tests.

4.6.15.8 Drive shaft shear test. If a shear section is provided, the drive coupling shall be removed from the motor and set up for the torsion test. It shall be loaded torsionally until failure takes place, and the load producing the failure shall be recorded. The failure shall take place at the shear section of the coupling. If none is provided the drive shaft assembly shall be removed and sheared to verify compliance with paragraph 3.5.12.

4.6.15.9 Tear down inspection. After completion of the endurance tests, the motor shall be disassembled and all parts visually inspected. The general condition of parts shall be described in the report.

4.6.16 Reliability qualification test. The purpose of this test is to demonstrate that the equipment design will meet specified performance and reliability requirements. This test shall be performed when required by the detail specification.

4.6.16.1 Test plan. The reliability qualification test shall be conducted in accordance with MIL-STD-781, test plan VC.

4.6.16.2 Accept-reject criteria. The accept-reject criteria shall be as shown graphically for test plan VC of MIL-STD-781. The decision risk for this plan is 10 percent and the discrimination ratio is 3.0:1. Testing shall continue until the total unit hours together with total count of revelant failures permit either an accept or reject decision. The test will be completed when the total unit test hours in multiples of lower test MTBF, θ_1, plotted against total failures falls in an accept or reject area of the graph. (θ_1 is 667 hours unless otherwise specified in the detail specification.

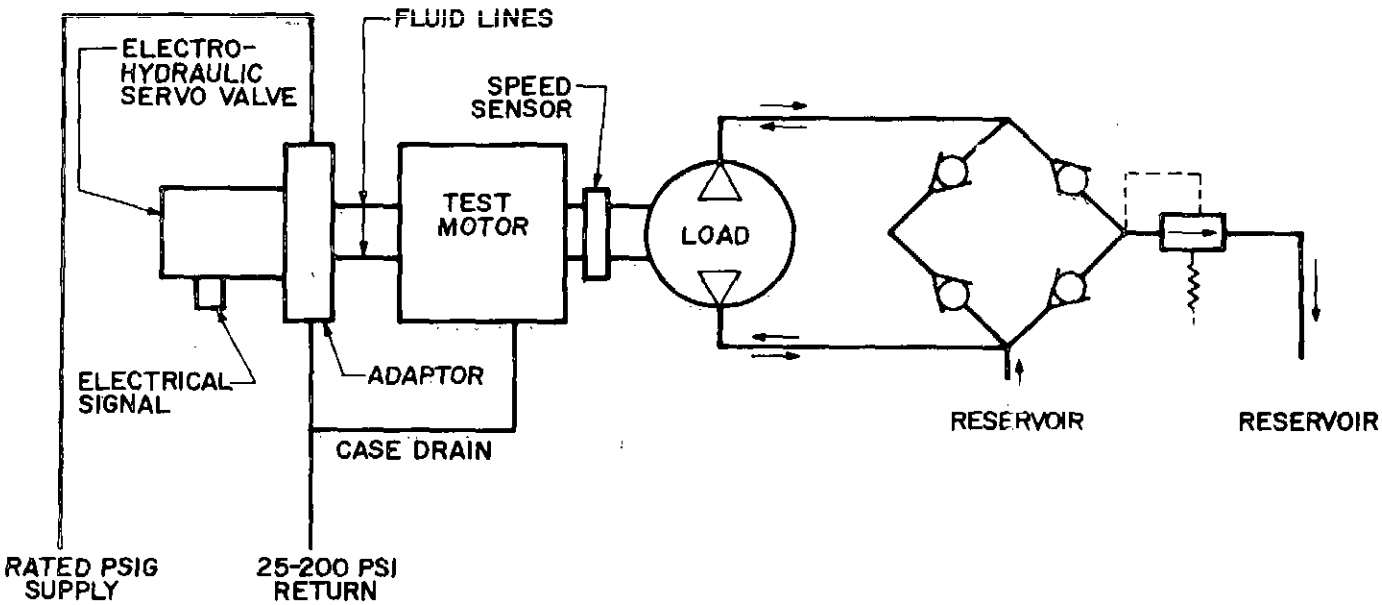

FIGURE 1. Category B, load cycling test circuit setup.

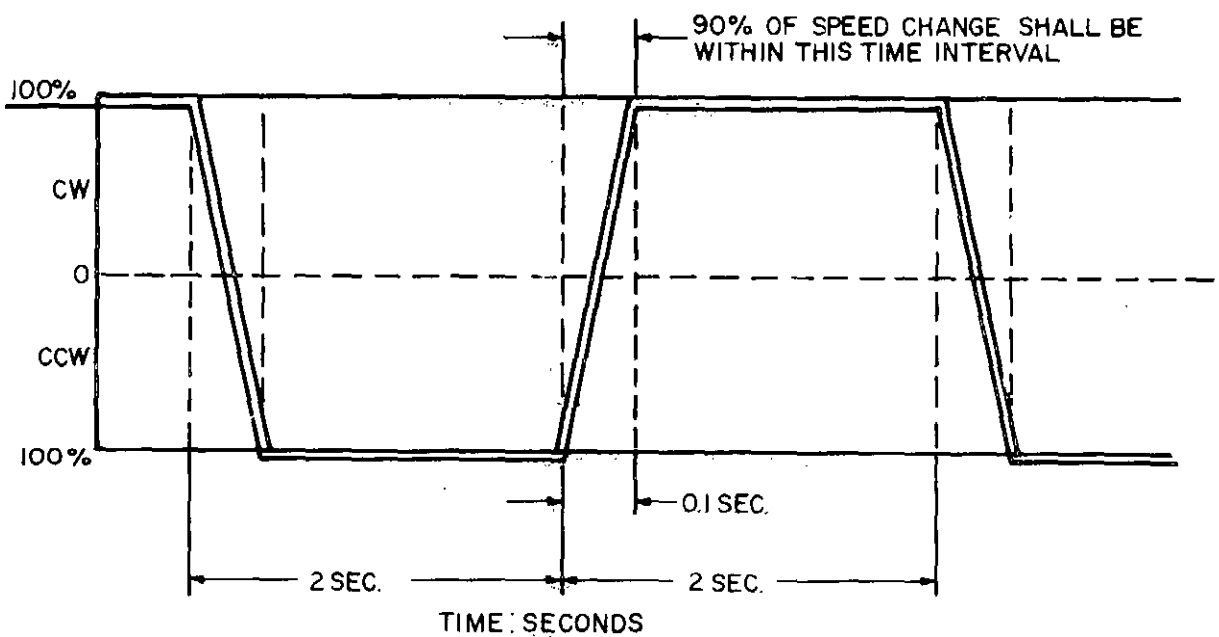

FIGURE 2. Square wave speed cycle test.

5. PACKAGING

5.1 Preservation. Unless otherwise specified in the detail specification, each hydraulic motor shall be filled with a rust-inhibitor fluid conforming to MIL-H-6083, allowing space for internal thermal expansion, and sealed with noncorrosive plug or cap closures conforming to MIL-C-5501. The fluid shall be filtered through a MIL-F-8815, 5-micron absolute filter prior to its use as specified.

5.1.1 Level A. Unless otherwise specified by the contract or purchase order (see 6.2), or by the detail specification, all exterior surfaces of the motor shall be protected from corrosion in accordance with Method IC of MIL-P-116, using a corrosion-preventive compound conforming to MIL-C-11796 or MIL-C-16173. The motor shall then be wrapped or bagged in grade A, greaseproof paper conforming to MIL-B-121 and sealed with tape conforming to PPP-T-60. Each wrapped motor shall be cushioned and securely packaged within the most economical interior carton or box conforming to either PPP-B-566, PPP-B-676, or PPP-B-636. The choice of the container shall be consistent with the weight and dimensions of the motor.

5.1.2 Level C. The components shall be packaged in accordance with the manufacturer's commercial practice.

5.2 Packing.

5.2.1 Level A (overseas shipments). Components, preserved and packaged as specified in 5.1.1 shall be packed in exterior shipping containers conforming to PPP-B-601 (overseas type). Plywood, if used, shall be in accordance with NN-P-530. Case liners conforming to MIL-L-10547 and appendix thereto shall be furnished. Box closures shall be as specified in the appendix of the applicable box specification.

5.2.2 Level B (domestic shipments). Components, preserved and packaged as specified in 5.1.1, shall be packed in exterior shipping containers conforming to PPP-B-591, PPP-B-621, PPP-B-585 (class 1), PPP-B-636 (class weather-resistant), or PPP-B-601 (domestic type). Closures shall be as specified in the applicable box specification or appendix thereto. Fiberboard boxes shall conform to the special requirements of the applicable box specification and shall be limited to not more than 90 pounds gross weight.

5.2.3 Level C. Components, packaged as specified in 5.1.2, shall be packed in containers of the type, size, and kind commonly used for the purpose, in a manner that will insure acceptance by common carrier and safe delivery at destination. Shipping containers shall comply with the Uniform Freight Classification Rules, or regulations of other carriers as applicable to the mode of transportation.

5.3 Marking of shipment. In addition to any special marking required by the contract or order, or the detail specification, interior packages and exterior shipping containers shall be marked in accordance with MIL-STD-129.

5.3.1 Reinspection marking. Reinspection marking shall be as specified by the procuring activity.

6. NOTES

6.1 General. The notes contained in MIL-H-8775 or MIL-H-8890, as applicable, form a part of this specification.

6.2 Ordering data. Acquisition documents should specify:

a. Title, number, and date of this specification.

b. Type and class of system in which the motor is to be used (see 1.1).

c. Manufacturer's Part No.

d. Selection of applicable levels of packaging (see Section 5).

e. Reinspection marking (see 5.3.1).

f. Check list information (see Table V). To assure recognition of various requirements of this specification, the contracting activity is urged to use the check list in Table V to supplement the ordering requirements for the particular application.

6.2.1 First article inspection. (When required by the detail specification or applicable procurement codes.) When a contractor is in continuous production of the hydraulic motor from contract to contract, consideration should be given to waive the first article inspections. If inspection is required, indicate:

a. Where the first article inspection is to be conducted (at the supplier's plant, procuring agency, or Government or commercial laboratory).

b. That the approval of first article samples or the waiving of the first article inspection shall not relieve the contractor of his obligation to fulfill all other requirements of the specification and contract.

6.2.1.1 First article samples. First article samples shall be accompanied by an installation drawing, plus a reproducible copy of this drawing, and a complete test report showing results of the manufacturer's inspections. Assembly drawing shall show a cutaway section showing all details in their normal assembly position. The following data shall be furnished on or with the above drawings:

a. Mounting dimensions.

b. Port dimensions.

c. Over-all dimensions.

d. Rated temperature.

e. Rated torque.

f. Rated differential pressure.

g. Weight.

h. Any special installation or operating instructions considered necessary.

i. Hydraulic fluid.

j. Rated speed.

k. Detail parts list (including subassemblies).

First article samples shall be identified by securely attached durable tags marked with the following information:

Sample for First Article Inspection
MOTOR, AIRCRAFT HYDRAULIC
Torque _____at _____psi (Bar) differential
Rated Speed _____rpm
Manufacturer's Part No. _____
Manufacturer's Serial No. _____
Submitted by (name) (date) for first article inspection in accordance with the requirements of MIL-M-7997C under authorization (reference authorizing letter).

Custodians:
Army - AV
Navy - AS
Air Force - 11

Preparing Activity
Navy - AS
(Project No. 1650-3365)

TABLE V. MIL-M-7997C procuring agency check list.

PARA	TITLE	REQUIREMENT	PARA	TITLE	REQUIREMENT
1.1	Type System;		3.9.1	Fluid	
	MIL-H-5440	☐		MIL-H-5606	☐
	MIL-H-8891	☐		MIL-H-83282	☐
1.2	Classification;			Other	☐
	Type I	☐	3.10.5	Endurance	
	Type II	☐		Type I-II (750 Hrs)	☐
	Type III	☐		Type III (250 Hrs)	☐
	Class 1500	☐	4.4.2	Sampling Tests	☐
	Class 3000	☐	4.6.15	Endurance Tests;	☐
	Class 4000	☐			
	Category A	☐		Category A	☐
	Category B	☐		Category B	☐
3.2	Type Components;		4.6.16	Reliability Tests	☐
	MIL-H-8775	☐	5.0	Type Packaging	☐
	MIL-H-8890	☐		Level A (Overseas)	☐
3.5.11.2	Shaft Loads (Additional)	☐		Level B (Domestic)	☐
				Level C (Standard)	☐
3.5.12	Shear Section (Required)	☐	6.2.1	First Article Insp.	☐

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DOCUMENT IDENTIFIER *(Number)* AND TITLE

MIL-M-7997C MOTORS, AIRCRAFT HYDRAULIC, CONSTANT DISPLACEMENT GENERAL SPECIFICATION FOR

NAME OF ORGANIZATION AND ADDRESS OF SUBMITTER

☐ VENDOR ☐ USER ☐ MANUFACTURER

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A. GIVE PARAGRAPH NUMBER AND WORDING

B. RECOMMENDED WORDING CHANGE

C. REASON FOR RECOMMENDED CHANGE(S)

2. REMARKS

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

TELEPHONE NO.

DATE

DD FORM 1 OCT 76 1426 EDITION OF 1 JAN 72 WILL BE USED UNTIL EXHAUSTED.