

MIL - A - 2 3 6 2 2 (W E P)
15 APRIL 1963

MILITARY SPECIFICATION

ACTUATOR , AIRCRAFT, ELECTRO-MECHANICAL ,
LINEAR, DIRECT CURRENT

This specification has been approved by the Bureau
of Naval Weapons, Department of the Navy,

1. SCOPE

1.1 Scope - This specification defines the requirements for the design and testing of linear electro-mechanical actuators which are electrically reversible and mechanically irreversible with adjustable limit switches, operable from a 20 volt direct current system.

1.2 Classification - The actuators covered by this specification shall be classified by the applicable dash number specified on Military Standard MS18037.

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids shall form a part of this document to the extent specified herein:

SPECIFICATIONS

Federal

QQ-P-418 Plating, Cadmium (Electro deposited)

Military

MIL-P-116 Preservation-, methods of

MIL-W-5088 Wiring, Aircraft, installation of

MIL-E-5272 Environmental Testing, Aeronautical and Associated Equipment, general specifications for

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MIL-C-5541	Chemical Films for Aluminum and Aluminum Alloys
MIL-B-5629	Bearings; Rod End, Plain, Airframe
MIL-I-6181	Interference Control Requirements, Aircraft Equipment
MIL-S-6743	Switches, Pushbutton and Limit
MIL-E-7080)	Electric Equipment, Piloted Aircraft Installation and Selection of, general specification for
MIL-S-7742	Screw Threads, Standard, Optimum Selected Series, general specification for
MIL-P-7936	Parts and Equipment, Aeronautical, preparation for delivery
MIL-S-8516	Sealing, Compound, Synthetic Rubber, Electric Connectors and Electric System, Accelerator required
MIL-M-8809	Motors, Direct Current., 28 Volt System, Aircraft Class A and B, general specification for
MIL-A-8860	Airplane Strength and Rigidity, general specifications for
MIL-N-25027	Nut, Self-Locking, 250 deg F., 500 deg F. , and 800 deg F.
MIL-D-70327	Drawings, Engineering and Associated Lists

STANDARDS

Military

MIL-STD-129	Marking for Shipment and Storage
MIL-STD-130	Identification Marking of U. S. Military Property

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MIL-STD-143	Specifications and Standards, . Order of Precedence
MIL-STD-195	Marking of Connections for Electric Assemblies
MIL-STD-704	Electric Power, Aircraft, Characteristics and Utilization of
MS18037	Actuator, Aircraft, Electromechanical, Linear, Direct Current
MS20995	Wire, Lock
MS33540	Safety Wiring, general practices for
MS33547	Pins, Spring, Functional limitations of
Ms33586	Metal, Definition of Dissimilar

(When requesting any of the applicable documents refer to both title and number, Copies of this specification and applicable documents may be obtained upon application to the Commanding Officer, Naval Supply Depot, 5801 Tabor Avenue, Philadelphia 20, Pennsylvania, Code DCI.)

2.2

NAS 561	Pins - Spring, Slotted and Coiled, Heavy Duty
NAS 669	Ring - Internal, Retainer
NAS 670	Ring - External, Retainer
NAS 1193	Locking Device, Positive Index

Copies of NAS publication may be obtained from the National Aircraft Standards Committee, Aerospace Industries Association of America, Inc. 610 Shoreham Building, Washington D.C.

3. REQUIREMENTS

3.1 Qualification - The actuators furnished under this specification shall be a product which has been tested and has passed the qualification test specified herein.

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3,2 Material. -

3.2.1 Metals- All metal parts, other than current carrying, parts, shall be of corrosion resistant material, or shall be suitably plated to resist corrosion.

3.2.1.1 Dissimilar metals- The use of dissimilar metals in direct contact with each other, which tend toward active electrolytic corrosion (particularly brass, copper, or steel in contact with aluminum or aluminum alloy), shall not be acceptable. Metal plating or metal spraying of dissimilar base metals to provide similar or--suitable abutting surfaces shall be permitted. The use of dissimilar metals separated by suitable non-metallic insulating material shall be permitted. Dissimilar metals are defined in Standard MS33586. Magnesium shall not be used in the actuator.

3.2.2 Non-metallic material - Non-metallic material when used shall be flame-resistant and shall not support-combustion.

3.2.3 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 Standard MIL-STD-143 except as provided . in paragraph 3.2.3.1,

3,2,3,1 Standard parts - Standard parts shall be used whenever they are suitable for.. the purpose, and shall be identified on the drawing by their part number. Any standard part, of the same part number, shall be-readily interchangeable as applied within the unit. Commercial utility parts such as scraps, bolts, nuts, cotter pins etc. may be used provided they possess suitable properties and are replaceable by the military standard part numbers-referenced in the parts-list, and if practical on the contractor's drawings. In the event there is no suitable military standard part in effect on date of invitation-for bids, equivalent commercial parts may be used provided they conform to all requirements-of this specification,

3.4 Design -

3.4.1 Simplicity of design - The actuator shall be of the simplest possible design for the proposed use. Simplicity of design resulting from use of the same part for as many applications as possible is highly desirable.

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

3.4.3 Structural strength - The actuator shall be structurally designed in general accordance with Specification MIL-A-8860. Pertinent factors required for rigidity, fatigue life, static strength, or column strength shall be applied to the maximum operating load to determine the limit load of the member under consideration.

3.4.4 Serviceability - Construction shall be such as to accommodate to the greatest possible extent, disassembly, reassembly, service maintenance and inspection by means of those tools and items of maintenance equipment which are normally available as commercial standard. Designs requiring specially designed items of maintenance tools and equipment shall be avoided. The actuator shall be designed and constructed so that no parts will work loose in service. It shall be built to withstand the strains, jars, vibrations, and other conditions incident to shipping, storage, installation, and service. The actuator shall be constructed so that adjustments and repairs can easily be made by personnel of operating units and overhaul bases.

3.4.5 Loads-

3.4.5.1 Rated - The actuator shall be rated for operation under aiding and opposing loads as specified on the applicable MS drawing,

3.4.5.2 M - The actuator shall be capable of starting and operating with a maximum operating load of 2 1/2 times the rated load under the most adverse combinations of environmental and electrical conditions specified herein.

3.4.5.3 Static limit load - The actuator shall withstand, without any permanent deformation, a static load of 10 times the rated load or 150 percent of the maximum actuating load, whichever is greater. Operation under this condition is not required.

3.4.5.4 Ultimate static load - The actuator shall withstand, without structural failure, an ultimate static load of 150 percent of the static limit load. The actuator components may be permanently deformed and the actuator may become inoperative when subject to the ultimate static load.

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3.4.5.5 Load limiting devices - Load limiting devices are not applicable, However, under maximum voltage conditions, the stall torque of the motor for the actuator shall not exceed 350 percent relative to maximum rated load of the motor.

3.4.6 Anti-rotation device - Means shall be provided within the actuator to provide anti-rotation to the limit of maximum operating load and maximum dynamic stall torque of the motor.

3.4.7 E&zSl&-

3.4.7.1 Operating stroke - The electrical stroke shall be infinitely adjustable from full stroke down to 1/2 inch. This minimum 1/2 inch stroke shall be available anywhere within the full rated stroke specified in the applicable MS drawing.

3.4.7.2 Overtravel - The overtravel of the actuator stroke under all operational loads, voltage frequency, and environmental conditions shall not exceed the limit specified on the applicable MS drawing. Overtravel is defined as movement after interruption of electrical power.

3.4.7.3 Mechanical - Non-jamming stops shall be provided to limit overtravel at the ends of the rated stroke. Adjustability of such stops for shorter operating strokes is not required.

3.4.8 Endplay - Actuator endplay measured between attaching fittings shall not exceed .005 inch full indicating reading (F.I.R.) when new or .010 inch F.I.R after completion of rated life when measured under 10 pound reversing load.

3.4.9 Reversibility - The power screw shall be mechanically irreversible without the aid of a brake for any load up to the static limit load exclusive of any vibration. Actuators shall be electrically reversible and mechanically irreversible under any adverse combinations of operating and environmental conditions specified herein.

3.4.10 Movable end fitting - Movable end fitting shall be as specified on applicable MS drawings. When a rod end fitting is specified, plain self-aligning bearings per Specification MIL-B-5629 shall be provided. The fitting shall be secured with a locking device conforming to Standard NAS 1193.

3.4.11 O - The actuators shall operate within the speed-load ranges defined by the applicable MS drawing.

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3.4.12 Electrical power, components, and circuits -

3.4.12.1 Input power - The actuator shall meet all applicable requirements of MIL-STD-704 and shall give specified performance from 28 volt DC Category "B" power sources with characteristics as defined MIL-STD-704. The power required shall not exceed that shown on the applicable MS drawing.

3.4.12.2 Motor - The electrical motor incorporated in the actuator shall meet the requirements of Specification MIL-M-8609 for Class B motors.

3.4.12.3 Limit switches - The actuator shall be provided with Internal limit switches of the sealed type specified in Specification MIL-S-6743. The limit switch adjustment shall be accessible, and vibration and tamper proof, Neither the adjustment, operation, nor the switches shall be adversely affected by maximum overtravel to the mechanical stops; as with minimum electrical stroke, The switches shall not be subjected to side loads.

3.4.12.4 Electrical connections - Electrical wiring, connectors, and connections shall conform to the requirements of Specifications MIL-W-5088, MIL-E-7080, and MIL-STD-195 as applicable. All leads shall be firmly clamped and potted. Sealing compound shall be in accordance with MIL-S-8516. Wire sizes less than 222 AWG shall not be used.

3.4.12.5 Electrical circuits - The actuators electrical circuit shall conform to the wiring diagram shown on the applicable MS drawing.

3,4.13 Interference - Conducted and radiated radio frequency noise shall not exceed the limits specified in Specification MIL-I-6181. A filter shall be provided when specified on applicable MS drawing.

3.4.14 Locking of parts - All threaded parts shall be locked by safety wiring by self-locking nuts conforming to Specification MIL-N-25027, cotter pins, or other approved methods, Mounting screws for motor base and motor shall be drilled for safety wire. Safety wire shall be installed In accordance with Standard MS33540 and shall conform to Standard MS20995. Use of lockwashers or staking is not permitted.

3.4.15 Weight - The maximum allowable weight of the actuator shall be as shown on the applicable MS drawing.

3.4.16 Screw threads - Screw threads shall conform to the requirements of Specification MIL-S-7742.

3*5 Construction -

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3.5.1 Housing - The actuator shall be adequately protected by a suitable housing. Housings shall be substantial to withstand handling and shall be designed for easy access to the internal actuator components, Housing shall not exceed the maximum dimensions shown on the applicable drawing.

3.5.2 Finish - External aluminum surfaces shall be prepared for painting in accordance with the requirements of Specification MIL-C-5541. External steel surfaces shall be prepared for painting in accordance with the requirements of Specification QQ-P-416, Class 2, Type II.

3.5.3 Retaining rings - Use of retaining (snap) rings is not desired. However, when necessary, they shall be used in accordance with Standard NAS 669 and NAS 670. They shall not be used where loss of the ring will adversely affect the operation of the actuator.

3*5*4 Spring pins - Use of spring (roll) pins is not desired. However, when necessary, NAS 561 pins shall be used and they shall be installed in a manner which will preclude any possibility of disengagement. Refer to Standard MS33547 for limitations on usage.

3.6 Performance -

3.6.1 Design considerations - The actuator shall be capable of 10,000 full stroke cycles.

3.6.2 Rated duty cycle - Under long stroke cycling conditions with any adverse combination of maximum operating load and electrical and environmental parameters specified at standard conditions the actuators shall be capable of meeting the requirements shown on the applicable MS drawing for continuous duty.

3.6.3 Operational environment - The actuator shall be capable of satisfactory operation under any of the following conditions; and pertinent combinations thereof.

- (a) Temperature - Temperatures ranging from -54°C to $+93^{\circ}\text{C}$
- (b) Humidity - Relative humidity up to 100 percent
- (c) Altitude - Altitudes ranging from sea level to 50,000 feet
- (d) Vibration As shown on applicable MS drawing

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- (e) Salt spray - Exposure to salt sea atmosphere
- (f) Shock - Procedure V of Specification MIL-E-5272
- (g) Explosion proof - Exposure to explosion producing atmosphere

3.7 Identification of product -

3.7.1 Nameplates and product markings - The actuator shall be legibly marked for Identification by a firmly attached nameplate in accordance with Standard MIL-STD-130. The applicable MS drawing number and dash number as a suffix shall be shown on the nameplate,

3.7.2 Wiring diagram - A plate legibly showing the internal wiring, shall be firmly attached to the actuator,

3.7.3 Motor data - Data pertaining to the motor which is Included on the motor need not be duplicated on the actuator nameplate.

3.7.4 Lubrication data - If lubrication of the actuator is' required during its normal service life, the lubrication requirements shall be included on the nameplate, unless too extensive. In such case, they shall be shown on a separately attached, plate, or reference shall be made to the applicable technical order publications.

3.8 Reliability - The actuator shall be designed for 10,000 full stroke cycles without failure or replacement of parts, at the rated load, duty cycle, and at maximum altitude and standard temperature. Load shall average not less than the rated load, whether or not it is applied uniformly, and shall change direction so as to oppose the actuating force throughout both the extend and retract strokes.

3.§ Workmanship - The actuator shall be fabricated and finished in a workmanlike manner. Particular attention shall be given to freedom from defects, bumps, and sharp edges; accuracy of dimensions and marking of parts and assemblies; the alignment of parts and tightness of assembly screws and bolts.

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

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as otherwise specified', the supplier may utilize his own facilities or any 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 tests - The inspection and testing of actuators shall be as-follows:

(a) Qualification tests - Qualification tests are those tests performed on samples submitted as qualified products to determine that the item meets all the requirements of this specification.

(b) Acceptance tests . Acceptance tests shall be performed on actuators which have been submitted under contract to determine conformance of the product with requirements set forth in the specification -prior to acceptance.

4.3 Qualification tests -

4.3.1 Qualification test sample - The qualification test sample shall consist of 3 actuators upon which qualification is desired. The manufacturer shall furnish all samples.

4.3.2 Tests - The qualification tests shall consist of all the tests of this specification as described under section on test methods (4.6),"

The tests shall be conducted on each of the three actuators in the sequence as shown in table I.

4.3.3 Electric motor tests - When electric motors are constructed integrally into the actuator, all environmental life tests conducted on the assembled actuator are applicable to the motor also. In addition, motor specification tests such as commutation, dielectric strength, brush life, locked rotor protection, etc., which are not included in the required actuator testing, shall be conducted on the motor. Some improvisation of duty cycle or other operating conditions may be necessary to permit determination of all necessary motor characteristics since the specific motor requirements must meet the actuator specification requirements as well as the motor specification requirements, Procuring activity approval of the proposed test program shall be obtained prior to Initiation of the testing.

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TABLE I
QUALIFICATION TESTING SEQUENCE

Test	Sample numbers			Applicable test para.
	1	2	3	
	Sequence of testing			
Examination of product	1	1	1	4.6.1
Monitored operational check	2	2	2	4.6.2.2
Stall Force	3	3	3	4.6.3
(Initial) Dimensional check	4	4	4	4.6.4
Static limit load	5	5	5	4.6.5
Vibration	6	6	6	4.6.6
Mechanical stops	7	7	7	4.6.7
Acceleration	8	8	8	4.6.8
Shock	9	9	9	4.6.9
Combined Humidity Temperature - Altitude	10	10	10	4.6.10
Fungus resistance	11	11	11	4.6.11
Monitored operational check	12	12	12	4.6.2.2
Salt spray	13	13	13	4.6.12
Monitored operational check	14	14	14	4.6.2.2
Sand and dust	15	15	15	4.6.13
Monitored operational check	16	16	16	4.6.2.2
Reliability	17	17	--	4.6.14
Monitored operational check	18	18	17	4.6.2.2
Interference	19	19	18	4.6.15
(Final) Dimensional check	20	20	19	4.6.4
Explosion proof	--	--	20	4.6.16
Ultimate load	--	--	21	4.6.17

4.4 Acceptance tests - The acceptance tests shall consist of individual tests and Sampling tests. These tests shall be conducted by the contractor under the Surveillance of the Government Inspector.

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4.4.1 Individual tests - Each actuator submitted for acceptance under contract shall be subject to the following tests as described under section on test methods (4.6) in the sequence listed. Actuators not meeting the requirements of these tests may be corrected prior to resubmitting them for acceptance. Before resubmission, full particulars concerning previous rejection and corrective action shall be furnished the government inspector.

- (a) Examination of product (4.6.1)
- (b) Acceptance operational check (4.6.2.1)
- (c) Stall Force (4,6.3).

In addition, any actuator shall be subject, with the approval of the procuring activity, to any other tests specified herein which the Government inspector considers necessary to determine unit compliance with the requirements of this specification.

4.4.2 Sampling tests

4.4.2.1 Sampling plan - Actuators shall be selected at random. From each lot submitted for acceptance and subjected to the static limit load test (4,6.5) In accordance with the following sampling plan:

<u>Lot Size</u>	<u>Sample size</u>
0 - 99	2
100 - 299	3"
300 - 500	4

A lot shall consist of actuators of the same type, produced under essentially the same manufacturing conditions, and submitted for inspection at one time. The unit of inspection shall be one actuator.

4*5 Standard test conditions - Unless otherwise specified herein, all tests shall be conducted at the ambient temperature, pressure, and humidity conditions specified in MIL-E-5272.

4.6 Test me--

4,6.1 Examination of product - The actuator shall be examined to determine conformance to this specification and the applicable MS drawing with respect to material, workmanship, dimensions and markings.

4.6.2 Operational check -

4.6.2.1 Acceptance operational check - Each actuator shall be operated through five complete cycles at rated load to determine satisfactory operation. The time and current required for operation shall be observed as in indication of faulty or defective units, and shall be within the limits specified on the applicable MS drawing. Measurements shall be made to verify compliance with overtravel (3.4.7.2), operating stroke (3.4.7.1), operating rate (8.4.11) and endplay (3.4.8). There shall be no noticeable arc-over between electrical contacts, terminals, or parts having a difference of potential between them, nor shall there be any evidence of malfunction or failure.

4.6.2.2 Monitored operational check - The actuator shall be operated through a minimum of five complete cycles, of which at least one cycle shall be of instantaneous reversal. For this check the operating load shall be uniformly applied over the full rated stroke so as to oppose both extension and retraction. With limit switches bypassed, the first cycle in each direction shall be run into the mechanical stops at each end. Starting and running current shall be measured and normal electrical operation (particularly commutation) shall be observed by means of an oscilloscope connected across the motor terminals. Measurements shall be made to verify compliance with overtravel (3.4.7.2) operating stroke (3.4.7.1), operating rate (3.4.11) and endplay (3.4.8). There shall be no noticeable arc-over between electrical contact terminals or parts having a difference of potential between them, nor shall there be any evidence of malfunction or failure;

4.6.3 Stall force - The actuator shall be subject to a monitored operational check (4.6.2.2) except that the load shall be gradually increased from rated load in increments of 25 percent thereof during each extension or retraction until the actuator stalls. Stall force shall be measured. With electrical power removed, actuator irreversibility shall be checked with this maximum stall force applied.

4.6.4 Dimensional check - Parts of the actuator that are subject to wear shall be measured in the sequence as shown in Table 1. There shall be no excessive wear as shown in the difference between the initial measurements and the final measurements.

4.6.5 Static limit load - While in maximum extended position, the actuator shall be subjected to static limit load (3.4.5.3) without incurring any damage or permanent deformation of any component. Irreversibility of the power screw (3.4.9) with associated gearing only (without benefit of braking or motor inertia) shall also be verified under this loading.

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4.6.6 Vibration - The actuator shall be subjected to the vibration test as shown on the applicable MS drawing, except that the resonance search in each of the three axes specified, shall be conducted with the actuator operating under the conditions specified for the monitored operational check (4.6.2.2). Irreversibility of the actuators electrically unenergized, shall also be verified by such resonance search with the static load applied.

4.0.7 Mechanical stops - A minimum of 100 jams into each mechanical stop shall be performed at maximum energy. The actuator must, in each case, pull off the stop at minimum voltage and maximum operating load. The test fixture shall not provide any rotational restraint to the actuator during the test in order to ensure that the requirements of the anti-rotation device (3.4.6) are satisfied.

4.6.8 Acceleration - The actuator shall be tested in accordance with Procedure III, Specification MIL-E-5272. Acceleration equivalent to 10g shall be applied in the directions specified, and in such directions as are likely to cause malfunctions as by lifted brushes or switch contacts. Each acceleration vector shall be maintained for the period required for the monitored operational check (4.6.2.2).

4.6.9 Shock- With the actuator operating and monitored for the operational check (4.6.2.2), shock shall be applied when the actuator is in mid-stroke in accordance with Procedure V of Specification MIL-E-5272. When specified on applicable MS drawing, the actuator shall be mounted on suspension equipment carrying stores.

4.6.10 Combined- ~~humidity-temperature-altitude~~ - The actuator shall be subject to the combined environmental test procedures specified in steps a. through e. below. These fulfill the requirements of the several individual and combined procedures" for these parameters,

- (a) Conduct the temperature Shock Test of Procedure I of Specification MIL-E-5 272 except that:

Form cycles shall be conducted.

For the first cycles the low temperature shall be minus 62°C, the time at each temperature shall be 48-hours, and the actuator shall not be operated.

For the three other cycles the temperature shall be plus 93°C and minus 54°C.

During the second (of the four) cycle the monitored operational check shall be conducted soon

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after changing the ambient temperature when the difference between the internal and housing temperatures (the thermal gradient) is greatest and also after stabilization has been attained at each temperature

During the third and fourth cycles the monitored operational check shall be conducted when the thermal gradient is greatest, but not after temperature stabilization has been attained.

- (b) Maintaining final low temperature (-54°C), reduce chamber pressure to 3,44 inches of mercury (corresponding to an altitude of 50,000) feet above sea level) and proceed with the Altitude Test, Procedure VI-C Specification MIL-E-5272 for a period of at least 9-hours.
- (c) Maintaining simulated altitude, proceed with the Humidity Test in accordance with Procedure IV, Specification MIL-E-5272 except as otherwise specified in this and the following steps,
Increase temperature to plus 93°C and relative humidity to 95% over a two hour period. After 6-hours under these conditions conduct a monitored operational check.
- (d) Reduce temperature and simulated altitude together over a period of from 2 to 16-hours, so as to maintain condensation on the walls of the test chamber and the actuator at all times, until standard pressure and a temperature of -54°C are attained, Conduct a monitored operational check,
- (e) Repeat steps b, c, and d for a total of ten cycles.

4.6.11 Fungus resistance - The actuator shall be tested in accordance with procedure I Specification MIL-E-5272. Immediately after completion of this test, the actuator shall be removed from the chamber and subject to the monitored operational check (4.6.2.2) and shall meet the requirements specified therein. The actuator shall be disassembled and inspected. There shall be no fungus on the electrical wiring or parts made of organic material where damage might result.

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4.6.12 Salt - The actuator shall be tested in accordance with procedure I, Specification MIL-E-5272. Within one hour after compliance with this test procedure, the actuator shall be subject to the monitored operational check (4.6.2.2) and shall meet the requirements specified therein. There shall be no corrosion or other defect that affects the operation or structural strength of any load carrying part.

4.6.13 Sand and dust - The actuator shall be tested in accordance with Procedure II, Specification MIL-E-5272 for a period of 24 hours. Immediately after completion of this test, the actuator shall be removed from the chamber and subject to the monitored operational check (4.6.2.2) and shall meet the requirements specified therein. Accumulated sand or dust within the actuator shall have no detrimental effects upon its operation and shall not be allowed in locations where excessive wear or failure might result. There shall be no damage to the exterior protective finishes.

4.6.14 Reliability - The actuator shall be subject to 10,000 full stroke cycles at the-rated load, duty cycle, and voltage and at maximum altitude and standard temperature. Load shall average not less than the rated load, whether or not it is applied uniformly, and shall change direction so as to oppose the actuating force throughout both the extend and retract strokes. There shall be no failure to operate during this test. There shall be no replacement of parts during this test. At the conclusion of this test, the actuator shall be subject to the monitored operational check (4.6.2.2) and shall meet the requirements thereof.

4.6.15 Interference - The actuator shall be tested in accordance with specification MIL-I-6181. Interference limits shall be within those specified up to 150mc only.

4.6.16 Explosion proof - The actuator shall meet the requirements for explosion testing, "specified in Specification MIL-E-5272, procedure III.

4.6.17 Ultimate load - When specified in Table I, the actuator shall be subject to an ultimate static load of 150 percent of the static limit load. The actuator may be permanently deformed and it may become inoperative, but it shall not have any structural failure as a result of this test.

5' PREPARATION FOR DELIVERY

5.1 Preservation and packaging - The actuators shall be unit packaged in accordance with Specification MIL-P-7936, levels A or C as specified. (see 6.2)

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5.1.1 Level A - For level A packaging, preservation shall be in accordance with Specification MIL-P-116, Method II without preservative compounds,

5.1.2 Level C - The actuators shall be preserved and packaged individually in accordance with manufacturer's commercial practices,

5.2 Packing - Packing shall be in accordance with specification MIL-P-7936, level A, B, or C as specified in contract or order. (see 6.2)

5.3 Marking - Interior and exterior containers shall be marked in accordance with MIL-STD-129.

6. NOTES

6.1. Intended use - The actuators covered by this specification are intended for use in aircraft control and actuator systems to actuate landing gears, bomb-bay doors, wing flaps, trim tabs, Cowl flaps, duct doors, selector valves and similar items. One of these actuators may be used in any application where its ability to meet the requirements is determined by engineering analysis.

6.2 Ordering data - Procurement documents should specify the following:

- (a) Title, number and date of this specification
- (b) Number of actuators required
- (c) Applicable MS and dash part number .
- (d) Required level of packaging and packing (see 5.1)
- (e) Installation instructions, handbooks, or manuals when required,

6.3 Definitions -

6.3.1 Linear actuator - An item consisting of an electric motor plus at least the following accessories:

- (a) Limit switch(s), clutch, or other similar device to control the amount of movement or force.
- (b) A screwjack or similar device to convert the motor torque to linear (straight line) motion.

6.3.2, Maximum operating load - The maximum operating load is the maximum or peak load which the actuator will ever be required to withstand during normal operation.

6.3.3 Ultimate load - Ultimate load is the load which the unit

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is designed to withstand and is obtained by applying factors required for column strength, fatigue life, etc. to the maximum operating loads .

6.4 Qualification With respect to products requiring qualification awards will be made only for such products as have, prior to the time set for opening of bids, been tested and approved for inclusion in the applicable Qualified Products List whether or not such products have actually been so listed by that date. The attention of supplies is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Bureau of Naval Weapons, Washington 25, D. C. and information pertaining to qualification of products may be obtained from that activity,

NOTICE - When Government drawings, specifications. or other data. are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever and the fact that the Government may have formulated, furnished or in any way supplied the said drawings, specifications or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or Corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

SPECIFICATION ANALYSIS SHEET
 NAVWEPS FORM 4121/3 (8-62)
FORM APPROVED
BUDGET BUREAU NO. 45-R309

INSTRUCTIONS

This sheet is to be filled out by Government or contractor personnel involved in the use of this specification in procurement of products for ultimate use by the activity shown on the reverse of this sheet.

of this specification suitable products can be procured with a minimum amount of delay and at the least cost.

Comments and the return of this sheet will be appreciated.

This sheet is provided for obtaining information which will aid the activity shown in insuring that through use

Fold on dotted lines on reverse side, staple in corner, and send to the activity shown.

SPECIFICATION (No. and abbrev. title)

ORGANIZATION		CITY	STATE
CONTRACT NUMBER	QUANTITY OF ITEMS PROCURED		DOLLAR AMOUNT
			\$
MATERIAL PROCURED UNDER A DIRECT GOVERNMENT CONTRACT		OR A SUBCONTRACT	

1. HAS ANY PART OF THIS SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?
(If so, give paragraph number and wording, and recommendations for correcting the deficiencies.)

2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID

3. IS THE SPECIFICATION RESTRICTIVE?

YES

NO

IF YES, IN WHAT WAY?

4. REMARKS (Attach any pertinent data which may be of use in improving this specification. If additional papers are attached, send this form and papers in an envelope. This form is addressed for use in window envelope when appropriate.)

SUBMITTED BY (Print name and title)

DATE