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MIL-V-5530C
19 SEPTEMBER 1973

MILITARY SPECIFICATION

VALVES, AIRCRAFT HYDRAULIC SHUTTLE

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

1. SCOPE

1.1. Scope. This specification covers one type (3000 PSI operating pressure) of aircraft hydraulic shuttle valves for use in Type I aircraft hydraulic systems.

2. APPLICABLE DOCUMENTS

2.1. Government documents.

2.1.1. Specifications and standards. The following specifications and standards form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

MILITARY

MIL-P-116	Preservation, Methods Of
MIL-C-5501	Cap And Plug, Protective, Dust And Moisture Seal
MIL-G-5514	Gland Design, Packings, Hydraulic, General Requirements For
MIL-H-5606	Hydraulic Fluid, Petroleum Base, Aircraft, Missile, And Ordnance
MIL-H-6083	Hydraulic Fluid, Petroleum Base, For Preservation And Operation
MIL-A-8625	Anodic Coatings, For Aluminum And Aluminum Alloys
MIL-H-8775	Hydraulic System Components, Aircraft And Missiles, General Specification For

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Oklahoma City Air Logistics Center/TIMLA, Tinker AFB OK 73145-5990 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 4820

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MIL-V-19068	Valves, Shuttle, Hydraulic, Aircraft, Type II Systems
MIL-A-22771	Aluminum Alloy Forgings, Heat Treated
MIL-C-83488	Coating, Aluminum, Ion Vapor Deposited

STANDARDS

Military

MIL-STD-129	Marking For Shipment And Storage
MIL-STD-130	Identification Marking Of U.S. Military Property
MIL-STD-1523	Age Controls Of Age Sensitive Elastometric Material (For Aerospace Applications)
MIL-STD-1949	Inspection, Magnetic Particle
MIL-STD-2073/1A	DOD Material Procedures For Development And Application Of Packaging Requirements
MS28767	Valve, Shuttle, Hydraulic, Internal-thread Tube Fitting Outlet, 3000 PSI, Type II

Air Force - Navy Aeronautical Standards

AN6278	Valve, Hydraulic Shuttle, 3,000 PSI (Universal and Internal Thread Fitting Outlet)

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from Standardization Document Order Desk, Bldg 4D, 700 Robbins Ave., Philadelphia, PA 19111-5094.)

2.2. Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DODs adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

American Society For Testing and Materials (ASTM)

ASTM D3951 Packaging, Commercial

(Application for copies should be addressed to: ASTM, 1916 Race Street, Philadelphia, PA 19103.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3. Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for related associated detail specifications, specification sheets, or MS standards), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1. General Requirements. The requirements of MIL-H-8775 apply as requirements for this specification. When the two specifications conflict, this specification shall govern.

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3.2. Qualification. Valves furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time set for opening of bids (see 4.2 and 6.3).

3.3. Design and construction.

3.3.1. General design. The design of shuttle valves shall be such as to offer the minimum restriction to flow consistent with the other requirements of this specification.

3.3.2. Dimensions. Dimensions of aircraft hydraulic shuttle valves shall conform to MS28767, MIL-V-19068, or AN6278, as applicable.

3.3.3. Weight. The weight of the shuttle valves shall be as low as possible consistent with the requirements of this specification.

3.3.4. Seals. All seals shall be standard aircraft hydraulic seals in accordance with applicable military specifications and shall be installed in accordance with MIL-G-5514.

3.3.5. Temperature. Aircraft hydraulic shuttle valves shall be designed to operate over a temperature range from minus 54°C. to plus 71°C. (minus 65°F. to plus 160°F.).

3.3.6. Aluminum alloy forging. Aluminum alloy forgings used in the manufacture of the shuttle valve shall be of the stress-corrosion resistant type or suitably treated against stress-corrosion. Forgings shall conform to MIL-A-22771.

3.3.7. Material. The valve shall be constructed of the lightest material compatible with the performance requirements.

3.3.8. Nonmetallic parts. All nonmetallic parts shall be compatible for use with hydraulic fluid.

3.3.9. Performance. The valve shall be constructed to meet the flow, leakage, temperature extremes, and pressure drop requirements referenced herein. Valve operation and test procedures are described in Section 4.

3.4. Finish.

3.4.1. Steel parts. Steel parts shall be coated with ion vapor deposited aluminum, where practicable, in accordance with MIL-C-83488, type I or II as applicable and of a class that is adequate to achieve the degree of protection required. Other protective coating, in lieu of MIL-C-83488, may be used if demonstrated to be satisfactory and approved by the cognizant engineering activity. Cadmium plating must be avoided when satisfactory alternative processes can be used.

3.4.2. Painting. Shuttle valves shall not be painted except for marking or identification purposes.

3.4.3. Porosity correction. Sodium silicate or tung oil treatment shall not be applied to valve housings to correct porosity.

3.4.4. Anodizing. Unless otherwise specified by the procuring activity, all aluminum alloy parts shall be anodized in accordance with MIL-A-8625 Type I.

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3.5. Nameplate. Each valve shall be permanently and clearly identified in accordance with MIL-STD-130 with the following information:

VALVE, AIRCRAFT HYDRAULIC SHUTTLE
AN Part No. (As Applicable)

Manufacturer's part number
Manufacturer's name, registered trademark or supply code

A decalcomania will not be considered permanent marking for this purpose.

3.6. Age controls. Age-sensitive elastomeric parts shall be in accordance with MIL-STD-1523.

3.7. Recovered materials. Recovered materials shall be used to the maximum extent possible.

4. QUALITY ASSURANCE PROVISIONS

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

4.1.1. Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

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

a. Qualification inspection (see 4.4)

b. Quality conformance inspection (see 4.5)

4.3. Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified in this specification.

4.3.1. Hydraulic fluid. The hydraulic fluid used for all qualification tests shall conform to MIL-H-5606. Acceptance tests may be performed with oil conforming to MIL-H-5606 or MIL-H-6083.

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4.3.1.1. The test fluid shall be continuously filtered through a filter element which is equivalent to a 25-micron absolute standard filter element. The filter and element used shall be satisfactory for the temperature range encountered, and cleaned or changed regularly to avoid clogging.

4.3.2. Temperature. Except where otherwise specified, tests shall be conducted at a room temperature of approximately 70°F. to 90°F. (21°C. to 32°C.) and an oil temperature of approximately 70°F to 110°F. (21°C. to 43°C.). The actual oil temperature during tests shall be recorded.

4.3.3. Hydraulic pressure. Hydraulic pressure shall be applied by means of a hand pump, a power-driven pump, or an accumulator system with a means for controlling the rate of flow and pressure as required. Care shall be taken that all air is bled from the system. Pressure shall be measured by means of properly calibrated gages.

4.4. Qualification tests.

4.4.1. Test samples. Qualifications tests shall be conducted on two samples of each part number of hydraulic shuttle valves unless otherwise specified.

4.4.1.1. Minimum clearance sample. One of the valves to be tested shall be assembled of parts which have been selected to provide that the clearance, with regard to linear and diametral tolerances between moving members and nonmoving members, conducive to malfunctioning at extreme temperatures, will not exceed 110 percent of the minimum designed clearance permitted by the manufacturer's drawings. For cases of sliding where packing friction would influence the performance of the valve, such as pistons operated by springs, etc., the maximum packing friction anticipated shall be induced in the test specimen. In these cases, O ring packing glands shall be designed to provide maximum O ring squeeze, including the effect of adverse O ring cross-section tolerances and high-swell fluids. This specimen shall be marked MIN.

4.4.1.2. Maximum clearance sample. The second specimen shall be assembled of parts which have been selected to provide that the clearance, with regard to linear and diametral tolerances between moving members, conductive to malfunctioning as a result of wear associated with prolonged operation, will not be less than 90 percent of the maximum designed clearance permitted by the manufacturer's drawings. This specimen shall be marked MAX.

4.4.1.3. High- low- temperature. The manufacturer shall apply all tests of this specification to the MAX sample, with the exception of the high- and low-temperature functioning tests. The manufacturer shall subject the MIN sample to the temperature functioning tests and acceptance tests set forth in this specification. Upon satisfactory completion of these tests, the manufacturer shall forward one copy of a report of these tests and one set of prints of detail and assembly drawings of the valve to the preparing activity, together with a letter stating vendor's desire to obtain qualification tests. Upon acceptance of the report and drawings by the cognizant service, notice of authorization of qualification tests and shipping instructions for the MIN and MAX samples will be forwarded to the manufacturer. An additional copy of the test report and drawings shall accompany the sample units.

4.4.2. Tests. The qualification tests of hydraulic shuttle valves shall consist of all the tests of this specification as described in 4.6 with the exception of reverse flow unseating and magnetic inspection. The qualification tests may, at the option of the procuring service, be supplemented with tests under actual service conditions.

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4.5. Quality conformance inspection. The quality conformance shall consist of individual tests and sampling tests.

4.5.1 Individual tests. Each aircraft hydraulic shuttle valve submitted for acceptance under contract shall be subjected to the following tests, as described in 4.6:

a. Examination of product
b. Magnetic inspection
c. Proof pressure
d. Leakage and shuttling with oil
e. Air pressure shuttling and leakage
f. Reverse flow unseating

In addition, the valves may be subjected to any other nondestructive tests specified herein which the inspector considers necessary to determine conformance with any of the requirements of this specification.

4.5.2 Sampling tests. Unless otherwise specified in the contract or order, three valves which have passed the individual tests shall be selected at random from each lot and shall be subjected to one or more of the following tests:

a. Immersion
b. Pressure drop
c. Extreme temperature operation
d. Endurance
e. Impulse
f. Washout
g. Shuttling against closed line
h. Surge flow shuttling
i. Burst pressure

Samples from the first lot and every 10th lot thereafter shall be subjected to all of the above tests. The lot shall be rejected if any defect is found in the sample. Shuttle valves in quantities of not greater than 100 and offered for delivery at approximately the same time shall be considered a lot. A sample shall be defined as three valves selected at random from a lot.

4.5.3. Rejection criteria. If any defect is found in a sample the contractor shall:

a. Determine the cause of the defect.
b. Take the necessary action to prevent recurrence of the defect.
c. Submit to the procuring activity for approval, the proposed corrective action to prevent recurrence of the defect.
d. Select six additional shuttle valves at random from the same lot and subject them to the acceptance tests of 4.5 The lot will be accepted if no defect is found. If any defects are found in the sample, the remainder of the lot shall be rejected and the disposition of the lot shall be determined by the procuring activity.

4.6. Test methods.

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4.6.1. Examination of product. Each hydraulic shuttle valve shall be carefully examined to determine conformance with the requirements of this specification for materials, workmanship, conformance to the applicable drawings, and marking.

4.6.2. Magnetic inspection. All magnetizable, highly-stressed parts of the shuttle valves shall be subjected to magnetic inspection according to MIL-STD-1949. Such inspection, where necessary, shall be called for on the manufacturer's drawings. Cracks or other injurious defects shall be cause for rejection.

4.6.3. Immersion.

4.6.3.1. Oil immersion. Shuttle valves containing non-metallic parts other than AN standard seals in glands conforming to MIL-G-5514 shall be immersed in hydraulic fluid for period of seven days at a temperature of $158^{\circ} \pm 2^{\circ}$ F. ($70^{\circ} \pm 1^{\circ}$ C.) prior to conducting the qualification tests specified herein. All internal parts shall be in contact with fluid during this period. If the packings pass over holes, ports, step diameters, etc., or if the inside diameter, outside diameter, or the sides of the seal are unrestrained during any part of their normal operation, the packings used in the test samples shall be fabricated of the highest swell approved compound listed on the appropriate QPL (latest issue) and shall be immersed in accordance with the above requirements in a high swell approved fluid listed on QPL 5606 (latest issue). The activities responsible for the packing QPL, and QPL 5606 shall identify the packing and the fluid with the highest swell respectively. After the above immersion, the valve shall remain in the fluid at normal room temperature until ready for test. The valve shall not be exposed to the air for any appreciable length of time during the test.

4.6.4. Proof pressure. A hydrostatic pressure of 4500 psi shall be applied twice to each inlet port with the opposite inlet port open to the atmosphere. Pressure shall be held for two minutes each time and the valve shall be actuated between applications of pressure. There shall be no evidence of leakage, failure, distortion, or permanent set.

4.6.5. Leakage and shuttling with oil. The valve shall be tested with a setup similar to Figure 1. The pump shall be operated until the valve shuttles at a flow rate not exceeding 10 cubic inches per minute. Leakage during a single shuttling operations shall not exceed 3cc. The pressure for shuttling shall not be less than 25 psi and not greater than 100 psi. With the outlet port plugged, the pressure shall be adjusted to five psi, and the leakage shall not exceed 0.50cc (10 drops) per hour. The pressure shall then be raised to the rated pressure and there shall be no leakage when measured after a three-minute period allowing the valve to seat. the valve shall also meet the above test requirements with the inlet ports interchanged.

4.6.6. Air pressure shuttling and leakage. The shuttle valve shall be set up substantially as shown in figure 2. With the air pressure reducing valve set at 100 psi, and shutoff valve A closed, quick-opening valve B shall be opened and the valve shall shuttle satisfactorily. Leakage of air past the shuttle valve piston, as collected in the graduate, shall not exceed 10 cubic inches of free air per shuttling cycle, and the air pressure, as shown on the gage, shall not exceed 100 psi. The shuttle valve shall be wet internally, but not filled with hydraulic fluid. The air pressure shall then be adjusted to 15 psi and the leakage shall not exceed five cubic inches of free air per minute. Pressure shall then be raised to 1500 psi and the leakage shall not exceed five cubic inches of free air per minute.

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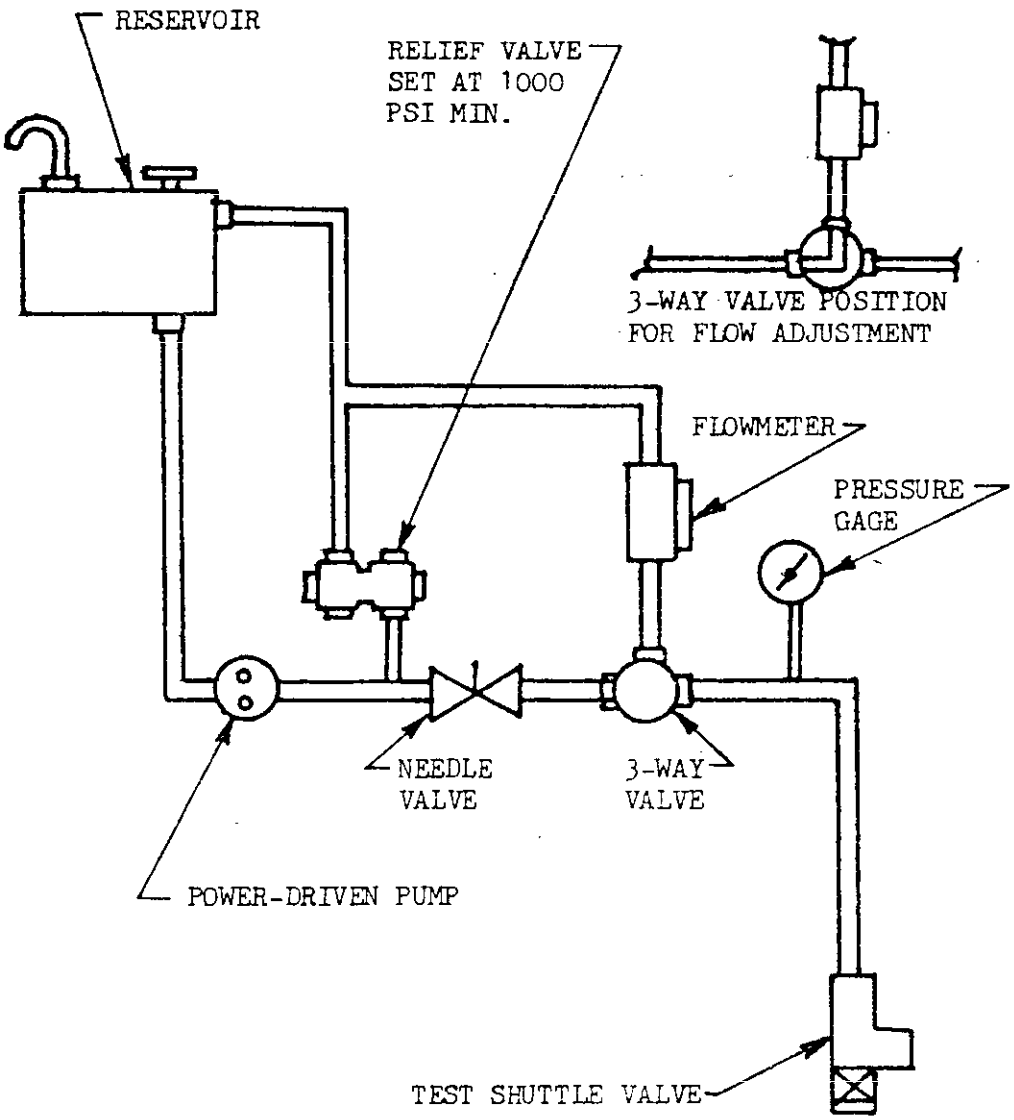

NOTE: ADJUST FLOW TO SPECIFIED VALVE USING NEEDLE VALUE AND FLOWMETER

FIGURE 1. Set up for leakage and shuttling with oil test.

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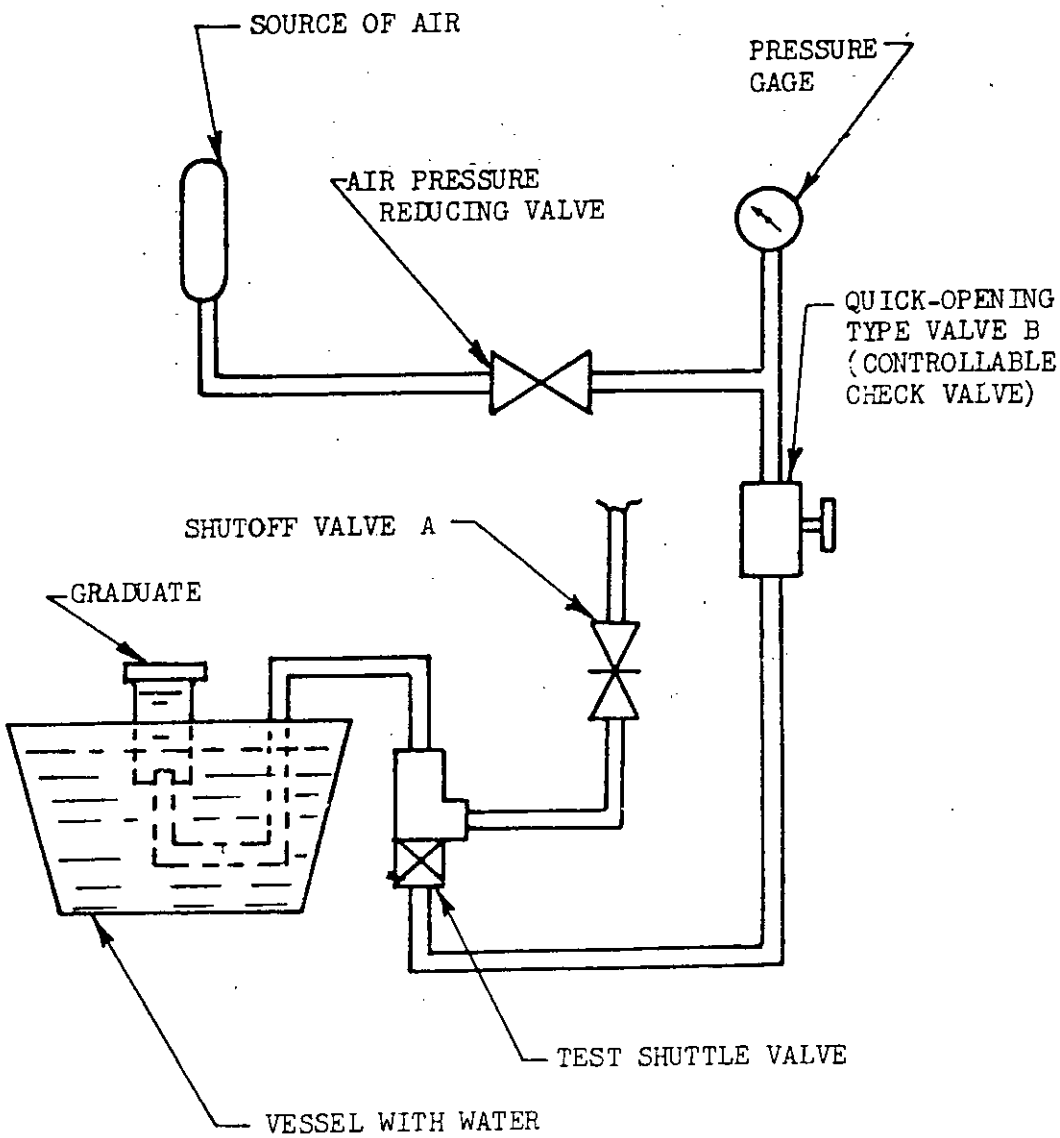

FIGURE 2. Air pressure shuttling and leakage test.

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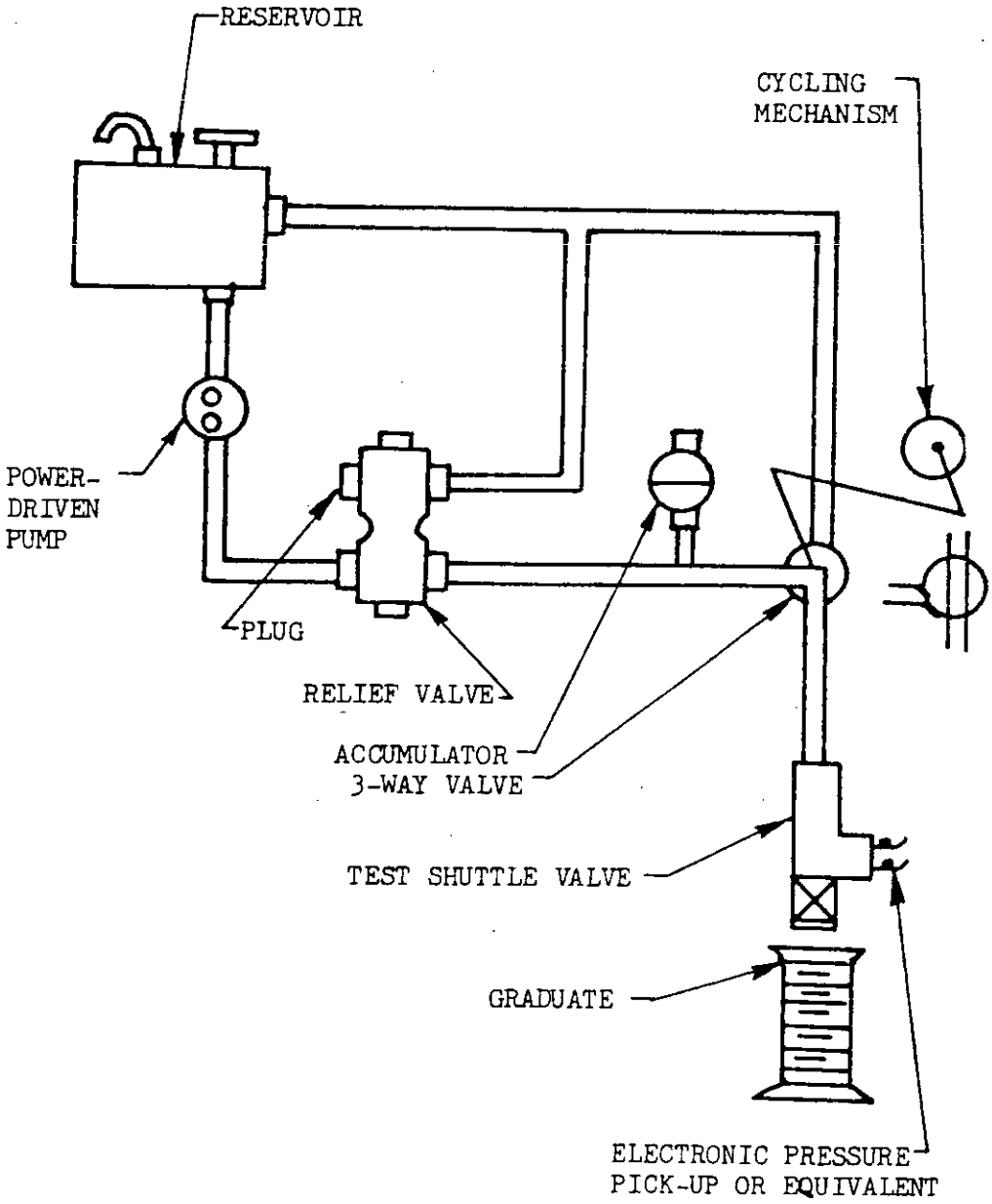

FIGURE 3. Set-up for impulse test.

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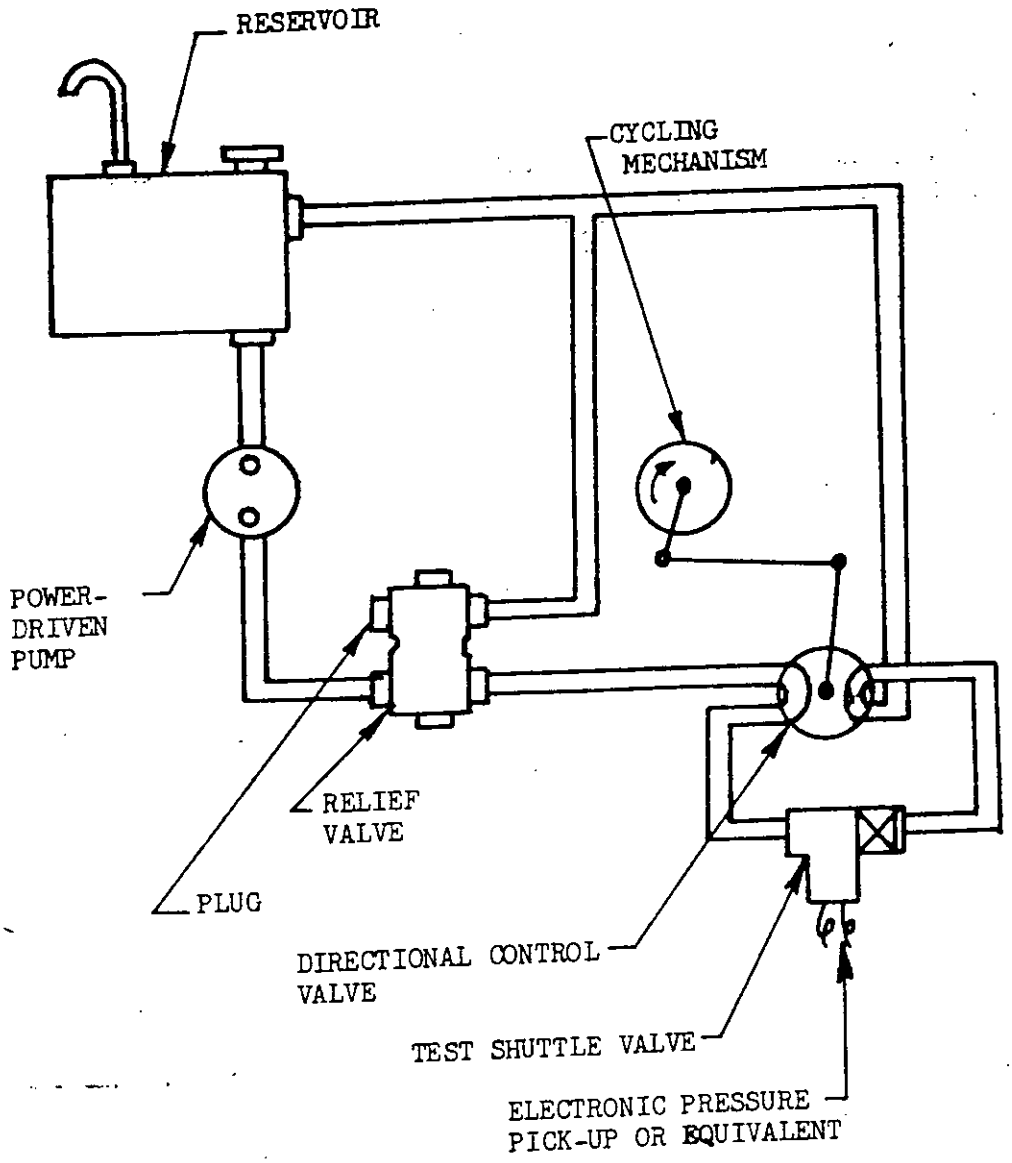

FIGURE 4. Set-up for endurance test.

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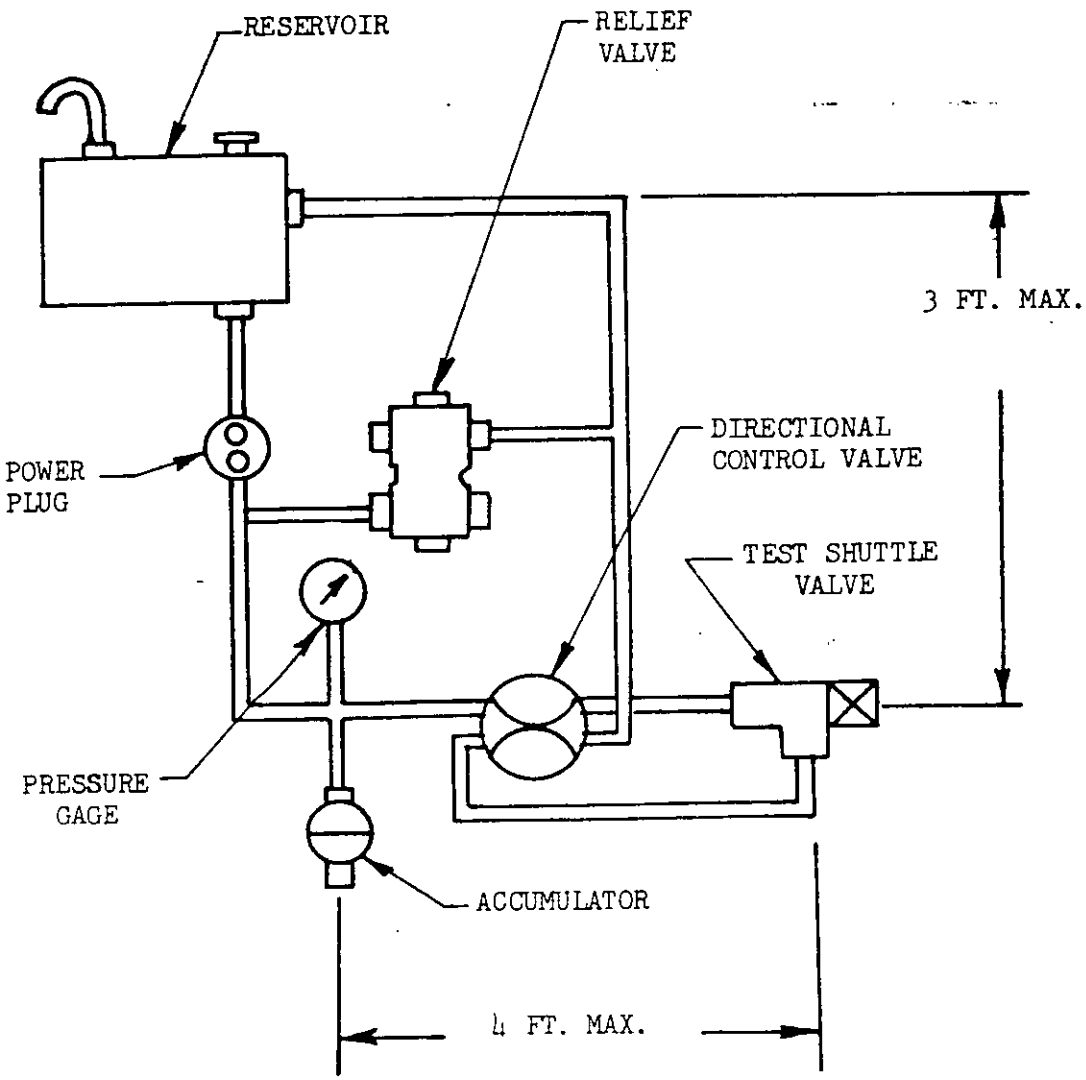

FIGURE 5. Set-up for leakage and shuttling with oil.

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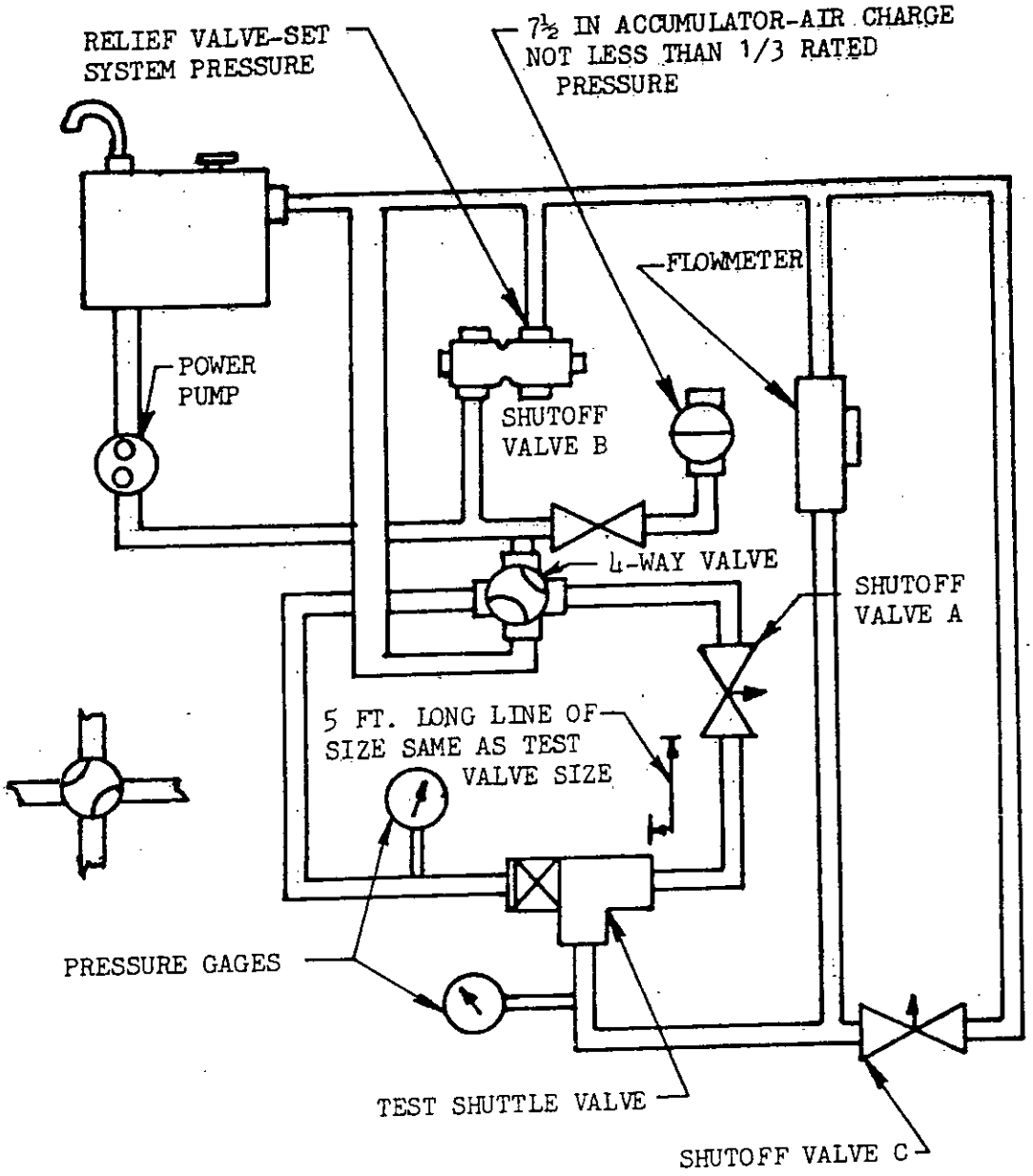

FIGURE 6. Set-up for shuttling against closed line and surge flow shuttling test.

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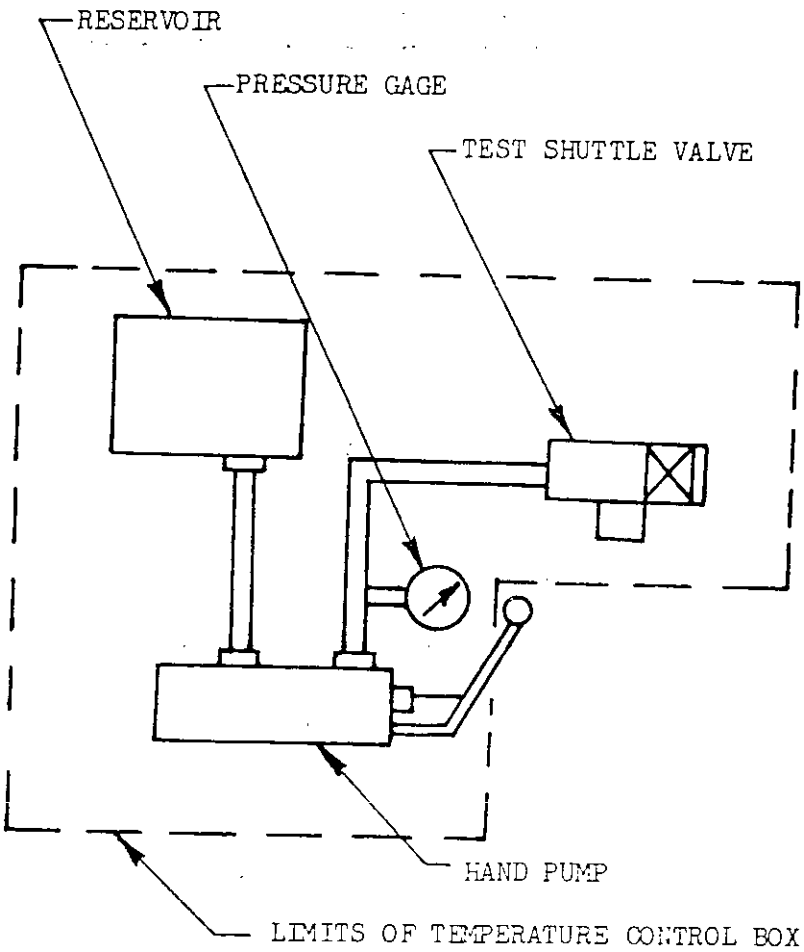

FIGURE 7. Set-up for extreme temperature test.

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4.6.7. Impulse. The shuttle valve shall be tested for impulse by using a test set-up similar to that shown in Figure 3. The directional control valve shall alternately apply rated pressure and a back pressure of 75 psi maximum to either inlet port of the valve at a rate of 30 ± 5 cycles per minute for 20,000 cycles. surge flow pressure, which occurs during the pressure application portion of the cycle, shall be 150 ± 5 percent of rated pressure as measured by electronic equipment or equivalent. the shuttle valve shall be mounted in such a manner that the disconnected inlet port is down and open to the atmosphere in order to collect leakage. Leakage shall not exceed 1 cc (20 drops) per 100 cycles at the open port and there shall be no external leakage. There shall be no evidence of excessive wear in any part of the valve.

4.6.8. Endurance. With a set-up similar to Figure 4, 2,000 cycles of shuttling shall be conducted. Rated pressure shall be applied by means of the power-driven pump and the directional control valve shall be operated at a rate of 30 ± 5 cycles per minute. Surge flow pressure, which occurs during the pressure application portion of each half-cycle, shall be 150 ± 5 percent as measured by electronic equipment or equivalent. After cycling, the shuttling pressure and leakage shall be as specified in 4.6.5 and there shall be no evidence of excessive wear in any part of the valve.

4.6.9. Washout. With a test set-up similar to that shown in Figure 5, high surge flow from an accumulator shall be directed alternately to either inlet port in the normal flow direction and to the outlet port in the reverse flow direction. Sufficient time shall elapse between reversals of flow direction to allow the accumulator pressure to rise to the rated pressure. The accumulator shall have a volumetric capacity of 500 cubic inches, and shall be preloaded with dry gaseous nitrogen to 0.33 rated pressure for the shuttle valve. The pump source shall deliver rated flow at rated pressure. The pressure line between the accumulator and the shuttle valve shall not be greater than four feet in length. The line and fitting sizes shall not be smaller than the corresponding size of the test valve, and the pressure drop through the directional control valve shall be subjected to the above test with the inlet ports interchanged. The leakage from the open inlet port shall not exceed 0.50 cc (10 drops) per cycle nor shall there be any washing out of packings or malfunctioning of any part of the valve.

4.6.10. Shuttling against closed line. The shuttle valve shall be set up as shown in Figure 6. With shutoff valves B and C closed, and shutoff valve A open, flow shall be directed through the flowmeter until the air is thoroughly bled from the system. Shutoff valve A is then positively closed after which the 4-way valve is reversed from the position shown so as to direct flow to the emergency inlet port on the shuttle valve. The pressure drop from the emergency inlet through outlet shall not exceed 10 time normal pressure drop at rated flow. Five seconds are allowed before pressure drop reading is taken. The test is to be repeated 20 times.

4.6.11. Surge flow shuttling. The shuttle valve shall be set up as shown in Figure 6, with shutoff valves A, B, and C open. The 4-way valve is to be cycled 20 times. at the end of each shuttling operation, or half-cycle, the rated pressure shall be allowed to build up in the accumulator. There shall be no malfunctioning of or damage to the valve during this test.

4.6.12. Pressure drop. Hydraulic pressure, sufficient to produce rated flow, shall be applied to either inlet, first in the normal flow direction and then the reverse flow direction through the same ports, by means of a power-driven pump. This

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procedure shall then be repeated, except that the pressure shall be applied to the opposite inlet. Pressure and rate of flow shall be maintained. A monometer, or suitable pressure gages, connected across the shuttle valve shall be used for accurate measurement of the pressure drop. The temperature of the test oil shall be maintained at 100 ± 5° F. (38 ± 3° C.). The pressure drop shall not exceed the values specified in Table I.

TABLE I

Size	Tube Size In inches	Rated Flow Capacity (MIN) gpm	Pressure Drop (MAX) psi
-4	0.250	1.2	10
-5	0.312	2.3	10
-6	0.375	3.5	10
-8	0.500	6.0	10
-10	0.625	10.5	10

4.6.13. Extreme temperature operation. Extreme temperature tests shall be conducted on a valve (or valves) assembled of parts most conducive to binding at the temperature specified in high temperature operation, low temperature operation, and rapid warmup.

4.6.13.1. High temperature operation. With the valve set up similar to that shown in Figure 7, the temperature shall be maintained at 160° F. (71° C.) minimum for six hours. After this period, the valves shall operate without binding. The shuttling pressure and leakage shall be checked and shall be as specified in 4.6.5.

4.6.13.2. Low temperature operation. With the valve set up similar to that shown in Figure 7, the temperature shall be maintained at a temperature not warmer than minus 65° F. (54° C.) for a period of 72 hours if the valve contains non-metallic parts other than AN standard seals. If all parts of the valve are metal except for AN standard seals, this period may be reduced to 24 hours. After this period the valves shall operate without binding. The leakage and shuttling pressure shall be checked and shall be as specified in 4.6.5

4.6.13.3. Rapid warmup. The low-temperature test set up shall be allowed to warmup rapidly to 70° F. (21° C.). While the temperature is being raised, and without waiting for the temperature to stabilize throughout the set-up, the valve shall be shuttled at least four times, and the pressure for shuttling shall be observed. The shuttling pressure shall be checked and shall be as specified in 4.6.5.

4.6.14. Burst pressure. Aircraft hydraulic shuttle valves shall withstand hydrostatic pressure of 7500 psi for five minutes without evidence of rupture. The pressure shall be increased at a maximum rate of 25,000 psi per minute until the specified burst pressure is reached. The pressure may be increased above the value specified in order to secure data on actual burst pressures.

4.6.15. Reverse flow unseating. Three times the rated flow of the shuttle valve shall be applied in a reverse direction discharging through an open inlet port. During the test the shuttle valve shall not unseat and the leakage out of the opposite inlet port shall not exceed 0.50 cc (10 drops) per minute. This test is to be performed for inspection purposes only.

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4.7. Internal treatment. Following all sampling, inspection, and test procedures specified above, each valve shall be internally flushed with hydraulic preservative oil conforming to MIL-H-6083 and all ports shall be capped or plugged with closures conforming to MIL-C-5501, to prevent oil leakage.

5. PACKAGING

5.1. Preservation. Unless otherwise specified by the procuring activity, the valve shall be Level A, C, or Industrial IAW MIL-STD-2073/1A.

5.1.1. Level A.

5.1.1.1. Cleaning. Cleaning shall be accomplished in accordance with the procedures of MIL-P-116.

5.1.1.2. Unit Packaging. Each valve shall be packaged in quantity unit packs of one each in accordance with method 1A of MIL-P-116.

5.1.2. Level C. Each valve shall be provided preservation which will afford adequate protection against corrosion, deterioration, and physical damage during shipment from supply source to the first receiving activity. This level may conform to the supplier's industrial practice.

5.2. Packing. Packing shall be Level A, B, C, or Industrial as specified (see 6.2).

5.2.1. Level A. Valves preserved as specified in 5.1.1 shall be packed in exterior type weather resistant shipping containers.

5.2.2. Level B. Valves preserved as specified in 5.1.1 shall be packed in domestic type shipping containers.

5.2.2.1. Closure. All containers shall be closed, sealed, and reinforced in accordance with the applicable container specification.

5.2.3. Level C. Packing shall be applied which affords adequate protection during domestic shipment from the supply source to the first receiving activity for immediate use. This level shall conform to applicable carrier rules and regulations.

5.2.4. Industrial. The packaged valve shall be packed in accordance with ASTM D3951.

5.3 Marking. In addition to any special markings required by the contract or order, each unit and shipping container shall be marked in accordance with MIL-STD-129.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The aircraft hydraulic shuttle valves covered by this specification are intended for use in aircraft hydraulic systems to provide an emergency passage for fluid in case of loss of pressure in the normal service lines.

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6.2 Acquisition requirements. Acquisition documents must specify the following:

a. Title, number, and date of the specification.
b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1).
c. Applicable AN, MS part number and manufacturer's part number or cage number.
d. Level of packaging and packing required (see section 5).

6.3. Qualification. With respect to products requiring qualification, awards will be made only for products which are at the time set for opening of bids, qualified for inclusion in the applicable Qualified Products List whether or not such products have actually been so listed by that date. The attention of the suppliers 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 or orders for the products covered by this specification. The activity responsible for the Qualified Products List is OC-ALC/TIMLA Tinker AFB OK 73145-5990 and information pertaining to qualification of products may be obtained from that activity.

6.4 Subject term (key word) listing.

Emergency flow path
Operating pressure 3000 PSI
Operating temperature -65° to $+275^{\circ}$F

6.5. Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:
Air Force - 99
Army - AV
Navy - AS

Preparing activity:
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