

MIL-A-5070D  
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## MILITARY SPECIFICATION

ADAPTER, HOSE TO TUBE, PIPE AND FLANGE,  
 REUSABLE: HYDRAULIC, FUEL AND OIL LINES

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

### 1. SCOPE

1.1 Scope. This specification covers the requirements for reusable hose adapters to be used with hose conforming to MIL-H-8794 in the fabrication of hose assemblies for hydraulic, fuel and oil flexible lines.

1.2 Classification. The reusable hose adapters shall be of the sizes and styles specified on the applicable standards or drawings. (See 2.1)

### 2. APPLICABLE DOCUMENTS

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

#### SPECIFICATIONS

##### Federal

NN-P-530	Plywood, Flat Panel
TT-S-735	Standard Test Fluids, Hydrocarbon
UU-P-271	Paper, Wrapping, Waterproofed Kraft
PPP-B-566	Boxes, Folding, Paperboard
PPP-B-576	Box, Wood, Cleated, Veneer Paper Overlaid
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-665	Boxes, Paperboard, Metal Stayed (Including Stay Material)
PPP-B-676	Boxes, Setup

##### Military

MIL-P-116	Preservation, Methods Of
MIL-B-121	Barrier Material, Greaseproofed, Waterproofed, Flexible
MIL-F-5509	Fittings, Flared Tube, Fluid Connection
MIL-H-5606	Hydraulic Fluid, Petroleum Base, Aircraft And Ordnance

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MIL-L-6082	Lubrication Oil, Aircraft Reciprocating (Piston) Engine
MIL-H-8794	Hose, Rubber, Hydraulic, Fuel And Oil Resistant
MIL-L-10547	Liners, Case, Waterproof

## STANDARDS

## Federal

Fed Test Method Rubber: Sample and Testing Std. No. 601

## Military

AN818	Nut, Coupling
MIL-STD-105	Sampling, Procedures And Tables For Inspection By Attributes
MIL-STD-129	Marking For Shipment And Storage
MIL-STD-130	Identification Marking Of US Military Property
MS20756	Flange, Swivel, Retaining
MS24587	Adapter, Straight, Tube To Hose, Reusable, Hydraulic, Fuel And Oil Lines
MS24590	Socket, Adapter, Hose To Tube, Reusable, Hydraulic, Fuel And Oil Lines, 3/16 through 3/4 Inch Tubing Size
MS24591	Socket, Adapter, Hose To Tube, Reusable, Hydraulic, Fuel And Oil Lines, 1 Through 2 Inch Tubing Size
MS27073	Nut Swivel, Tube Coupling, Designed For Adapter, Hose To Tube, Reusable, Hydraulic, Fuel And Oil Lines
MS27234	Elbow Tube, 90° (Used On MS27244 And MS27228 Hose To Tube Adapters)
MS27235	Elbow Tube, 45° (Used On MS27226 And MS27230 Hose To Tube Adapters)
MS27236	Shoulder, Designed For 45° And 90° Swivel Nut, Hose To Tube Adapters, Reusable, Hydraulic, Fuel And Oil Lines
MS27237	Shoulder, Swivel Flange, Adapter, Hose To Tube, Reusable, Hydraulic, Fuel And Oil Lines 1/2 through 3 Inch Tubing Sizes
MS27238	Hose To Tube, Reusable, Hydraulic, Fuel And Oil Lines

(See Supplement 1 for additional applicable Military Standards)

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

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

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## CONSOLIDATED CLASSIFICATION COMMITTEE PUBLICATION

## Consolidated Freight Classification Rules And Container Specifications

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

SOCIETY OF AUTOMOTIVE ENGINEERS, INC.

ARP908      Hose Fitting - Installation And Qualification Test Torque Requirements

(Application for copies should be addressed to Society of Automotive Engineers, Inc., Two Pennsylvania Plaza, New York NY 10001.)

### 3. REQUIREMENTS

- **3.1 Qualification.** The adapters furnished under this specification shall be products that have been tested and passed the qualification tests specified herein, and have been listed on or approved for listing on the applicable Qualified Products List. Components of the assembly used on, and referenced to Military Standards, and not listed on the QPL, shall be acceptable without being listed if furnished by the qualified sources in the latest QPL. Products of the qualified sources on the QPL are acceptable and qualified by virtue of association with the qualified items.
- **3.2 Materials.** Adapter components shall be fabricated from materials as specified on the applicable standards.
  - **3.2.1 Heat treatment.** Aluminum swivel nuts per MS27073 and AN818, and aluminum swivel flanges per MS20756 shall be heat-treated in accordance with MIL-F-5509. All other aluminum adapter components shall be heat-treated as specified in the applicable MS standards.
- **3.3 Design and construction.** The adapters shall be designed and constructed in accordance with applicable drawings and Military Standards, and shall withstand all test requirements of this specification.
  - **3.3.1 Adapters** shall be so designed and constructed as to be suitable for use with hose conforming to MIL-H-8794 to form flexible assemblies for use in hydraulic, fuel, and oil lines at the pressures listed in Table I.
- **3.4 Performance.** When assembled with the specified hose, adapters shall satisfy the performance requirements specified in 4.5 when subjected to the following tests.
  - **3.4.1 Hydraulic proof pressure.** Adapters shall withstand the hydraulic proof pressures specified in Table I without leakage of or damage to the hose or adapters.
  - **3.4.2 Hydraulic leakage.** When subjected to 70 percent of the hydraulic burst pressure specified in Table I, the assemblies shall show no evidence of leakage through the adapters, adapter movement relative to the hose, or other mal-function.

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TABLE I. Physical requirements of adapters assembled with MIL-H-8794 hose

Dash Number	Length of Hose Assemblies for All Tests (Inches)	Bend Radius at Inside of Bend (Min. Inches)	Hydraulic		Fuel		Oil			Burst Pressure (psi)
			Operating Pressure (psi)	Proof Pressure (psi)	Operating	Proof	Operating	Surge	Proof	
3	14	3	3,000	6,000	1,000	1,500	50	400	600	12,000
4	14	3	3,000	6,000	1,000	1,500	50	400	600	12,000
5	16	3-3/8	3,000	5,000	1,000	1,500	50	400	600	10,000
6	18	4	2,000	4,500	1,000	1,500	50	400	600	9,000
8	21	4-5/8	2,000	4,000	1,000	1,500	50	400	600	8,000
10	23-1/2	5-1/2	1,750	3,500	1,000	1,500	50	400	600	7,000
12	27-1/2	6-1/2	1,500	3,000	1,000	1,500	50	400	600	6,000
16	18	Straight	800	1,600	750	1,000	50	400	600	3,200
20	18	Straight	600	1,250	500	750	50	400	600	2,500
24	18	Straight	500	1,000	250	375	50	400	600	2,000
32	18	Straight	350	700	200	300	50	400	600	1,400
40	18	Straight	-	-	200	300	-	-	-	1,000
48	18	Straight	-	-	200	300	-	-	-	800

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- 3.4.3 Burst pressure. The adapters shall not leak, burst, or blow off the hose at any pressures less than the burst pressures specified in Table I.
- 3.4.4 Coupling. When the adapter is coupled to the hose assembly, the bulge of the inner tube shall not exceed the "C" dimensions shown on Figure 1.
- 3.4.5 Hydraulic impulse. When subjected to the dynamic impulses in the manifold of the magnitude and frequency shown on Figure 2, there shall be no evidence of leakage, blowoff of adapters, or other malfunction of the assemblies.
- 3.4.6 Lubricating oil circulation. The assemblies shall meet the oil proof pressure requirement of Table I, without leakage, after 200 hours of oil circulation at the operating pressure specified in Table I.
- 3.4.7 Fuel immersion. The assembly shall show no evidence of leakage after being immersed in fluid conforming to TT-8-735 for 72 hours at room temperature and then subjected to a static pressure for 5 minutes at the proof pressure specified for fuel in Table I.
  - 3.4.8 Overtightening torque. There shall be no evidence of failure or deformation of the adapter, and the swivel nut shall be free enough to permit turning on the hose nipple by hand after subsection to the overtightening torque test of 4.5.9. In addition, there shall be no leakage when proof tested as specified in 4.5.9.
  - 3.4.9 Cold temperature. There shall be no leakage at the adapter nor evidence of failure of the adapter when the assembly is subjected to the test specified in 4.5.10.
- 3.5 Special tools. No special tools other than a mandrel shall be necessary to assemble the adapters to the hose. If a mandrel is necessary, it shall be used only on -3 through -12 adapters, in which case the bore diameter of the adapters shall conform to dimension "B" on Figure 1. The mandrel if used, shall be straight and the diametrical clearance between the mandrel outside diameter (OD) and the adapter bore shall be not greater than 0.008 inch.
- 3.6 Dimensions. The dimensions for adapters shall be as shown on the applicable standards.
- 3.7 Finish. Adapters shall be finished in accordance with the applicable standards.
  - 3.8 Identification of product. Equipment, assemblies, and parts shall be marked for identification in accordance with MIL-STD-130.
  - 3.9 Workmanship. Adapters shall be free from cracks, laps, seams, burrs, longitudinal and spiral tool marks, or any other defects which may detrimentally affect their suitability for the service use intended.

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## 4. QUALITY ASSURANCE PROVISIONS

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

4.1.1 Inspection of components and materials. In accordance with 4.1 above, the supplier is responsible for insuring that components and material used were manufactured, tested, and inspected in accordance with the requirements of referenced subsidiary specifications and standards to the extent specified, or, if none, in accordance with this specification. In the event of conflict, this specification shall govern.

- 4.2 Classification of inspections. The inspection requirements specified herein shall be classified as follows:

- a. Quality conformance inspection (see 4.3).
- b. Qualification inspection (see 4.6).

- 4.3 Quality conformance inspection. Quality conformance inspection shall consist of the sampling plan and inspections of 4.3.2.

4.3.1 Lots. A lot shall consist of all hose adapters of one type and size made from the same material and submitted for inspection at the same time and place.

- 4.3.2 Resubmitted lots. Sampling and inspection of resubmitted lots shall be performed by the contractor, under the supervision of the Quality Assurance Representative. Sampling shall be in accordance with MIL-STD-105 using tightened inspection. If the original acceptance number is zero, a sample size, represented by the next higher sample size code letter, shall be chosen with the acceptance number remaining zero. Before a lot is resubmitted, full particulars concerning the cause of previous rejection and the action taken to correct the defects in the lot shall be furnished by the contractor to the inspector.

- 4.3.3 Sampling plan and inspections. A random sample shall be selected from each lot in accordance with MIL-STD-105 and submitted to the following inspections. The acceptable quality level (AQL) for all tests shall be 1.0 percent defective, and the inspection level S<sub>4</sub>. The AQL for examination of product shall be as specified in 4.5.1.

- a. Examination of product
- b. Proof pressure
- c. Leakage

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- d. Burst pressure
- e. Coupling
- f. Overtightening torque

- 4.3.4 End item examination. End item examination shall be in accordance with the classification of defects listed below. The inspection level shall be II and the AQL expressed in defects per hundred units, shall be 2.5 for Major and 4.0 total defects with no individual defects exceeding the AQL specified in 4.5.1.

Examine	Defects	Classification	
		Major	Minor
Construction	Material not as specified Dimensions not within specified limits Components do not fit or mate properly Excessive tool marks in evidence Surface sealing not smooth Colors not as specified	X	X X X X X
Workmanship	Adapters not free from cracks, laps seams, burrs, longitudinal and spiral tool marks, etc.		X
Identification	Missing, incorrect or illegible		X

#### 4.4 Test conditions.

4.4.1 Oil-aging. In all of the oil-aging tests in which MIL-H-5606 hydraulic oil is specified, the fluid and hose samples shall be put into a nonpressurized, closed-type container or a reflux-type condenser to prevent distillation of the volatile matter in the fluid. The test fluid shall not be used for more than 10 aging tests. In each case, the volume of oil used shall be sufficient to completely cover the hose. The hose shall be immersed in hydraulic oil for 7 days at a temperature of  $158^{\circ} \pm 2^{\circ}$  Fahrenheit. The bore of the hose assembly shall be open and no air shall be entrapped therein during this aging process.

4.4.2 Air-aging. Air-aged samples shall be kept in air at a temperature of  $158^{\circ} \pm 2^{\circ}$  Fahrenheit for 7 days.

4.4.3 Test fluid. Unless otherwise specified, the test fluid shall be lubricating oil conforming to MIL-L-6082, grade 1100, or hydraulic oil conforming to MIL-H-5606.

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- \* 4.5 Examination and tests.
- \* 4.5.1 Examination of product. Samples of adapters selected in accordance with MIL-STD-105, inspection level II, shall be examined to determine conformance to this specification and applicable MS standards with respect to finish, dimensions, marking, tolerances, and workmanship (cracks, laps, seams, burrs longitudinal, spiral tool marks, et cetera). The AQL shall be 2.5 for finish and workmanship and 1.0 for marking. The concentricity gauge shown on figure 3 shall be used for the inspection of sockets only. The AQL for dimensions and tolerances for nipples, nuts, and sockets, shall be in accordance with Figures 4, 5, and 6, respectively.
- \* 4.5.1.1 Tool controls and machine processes shall be adequate to insure uniform quality. The items specified in Table II may be controlled through the use of first piece approval and random spot check techniques.

TABLE II

Component	Item
Sockets	Taper angle of O.D. - "O" Internal taper angle at hose end - "P" Width of recess - "Q" Lefthand thread size and form - "R" Concentricity of "K" diameter with thread "N"
Nuts	Concentricity of thread P.D. to I.D.s "B" and "M" Maximum thread length - "H" Unmachined portion of Hex "N"

- \* 4.5.2 Proof pressure. Assemblies shall be subjected to the hydraulic proof pressure specified in Table I for a period of not less than 1 minute nor more than 5 minutes. There shall be no leakage nor damage to the hose or adapters.
- \* 4.5.3 Leakage. Two unaged assemblies shall be subjected to 70 percent of the hydraulic burst pressure specified in Table I for 5 minutes. The pressure shall then be reduced to zero, after which it shall be raised to 70 percent of the specified burst pressure for a final 5-minute check. The adapters shall be carefully checked during this period, and there shall be no evidence of leakage through the adapter, adapter movement or other adapter malfunction. After completion of the hydraulic leakage test on these samples, they shall be subjected to the test specified in 4.5.4 and these pressures recorded.
- \* 4.5.4 Burst pressure. Two unaged assemblies shall be subjected to the hydraulic burst pressure specified in Table I within 24 hours after assembly of the adapters to the hose. The adapters shall not leak, burst, or blow off the hose at any pressure less than the burst pressure of Table I. The burst pressure test shall be conducted in accordance with Method 10011 of Federal Test Method Std. No. 601, except that pressure shall be applied at the rate of 25,000  $\pm$  0, -10,000 pounds per square inch per minute. During this test, one end of the test assembly shall be free.



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4.5.5 Coupling. All samples prepared for the test specified in 4.5.6 shall be checked for bulging of inner tube and reduction of fitting nipple inside diameter (ID) caused by the attachment of the adapter. The measurement shall be taken on aged assemblies with a ball-end-type gauge. The diameter of the ball shall be  $0.001 +0, -0.001$  inch under minimum bulge diameter specified on Figure 1. The weight of each gauge in ounces shall be equal to the dash number of the size hose for which designed. In taking the measurement, the gauge shall be placed inside the end of the hose assembly at the bulge gauge inspection point shown on Figure 1, without lubrication and without pushing it through. The gauge shall fall through the section at the end of the adapter insert in the hose under its own weight.

- 4.5.6 Hydraulic impulse test. Six hose assemblies of the lengths specified in Table I shall be subjected to impulse tests. Two shall be oil-aged, two shall be air-aged, and two shall be unaged in each case. Oil- and air-aging shall be accomplished in accordance with 4.4.1 and 4.4.2. All assemblies shall be subjected to the applicable hydraulic proof pressure specified in Table I prior to impulsing. The test assemblies, in size -4 through -16, shall then be connected to a manifold and installed in an impulse test machine that will produce dynamic impulses in the manifold of the magnitude and frequency shown on the graph of Figure 2. Sizes -3 and -20 through -32 shall be impulsed in a similar manner except that they need not be subjected to any peak above the specified operating pressure. Electronic pressure measuring devices in determining and controlling the impulse pressure shall be used. There shall be no evidence of leakage, blow-off of adapters, or other malfunctioning. Record all test data and comments with particular reference to the need for retightening adapters, et cetera. The fluid used for this test shall be in accordance with MIL-H-5606, except that up to 25 percent MIL-L-6082, grade 1100 oil may be added to the test fluid, and shall be held to a temperature of  $120^{\circ} \pm 10^{\circ}$  Fahrenheit measured at the test manifold. Sizes -3 through -12 hose shall be installed in the impulse test machine bent into a "U" shape, and sizes -16 through -32 may be installed straight. Both ends of the bent samples shall be connected to a rigid support and one end of the straight sample shall be free. Sizes -3 through -16 shall withstand 200,000 cycles of pressure impulses, and sizes -20 through -32 shall withstand 100,000 impulse cycles. The failure of the hose, especially away from the adapter, shall not be cause for rejection of any adapter but shall be recorded in the test report. In cases of failure of this kind, the adapter shall be removed from the end of the hose closest to the break, the defective end of the hose removed, and the end replaced on the longer, remaining piece of hose. The testing of the adapters may then proceed, even though the hose remains straight, until the required number of impulses are obtained.

4.5.7 Lubricating oil circulation. Hose assemblies shall be subjected to tests in oil conforming to MIL-L-6082, grade 1100, at the operating pressure specified for oil in Table I and at a fluid temperature of  $250^{\circ} \pm 5^{\circ}$  Fahrenheit. with the exception that the temperature shall be raised to  $325^{\circ}$  Fahrenheit for 15 minutes out of every 20 hours of circulation and a 400 pounds per square inch surge pressure shall be applied for the first 30 seconds of each 20 hours of circulation. Hose assemblies up to the -24 size shall have 9 inches of free length hose between end adapters. For assemblies of -24 size and larger, the ratio of free length hose between adapters to nominal hose size in inches shall be 6 to 1. The following sequence of tests shall be used:

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- a. The attached assembly shall be installed in a control temperature box. The temperature of the ambient air shall be reduced to  $-40^{\circ} \pm 5^{\circ}$  Fahrenheit and held there for a minimum of 3 hours. Circulation of the fluid at the specified pressure and at a minimum flow of 3 gallons per minute shall then be started.
  - b. The temperature of the fluid shall then be increased within 1 hour to the specified circulation temperature ( $250^{\circ} \pm 5^{\circ}$  Fahrenheit). The ambient air temperature shall be increased to  $140^{\circ} \pm 10^{\circ}$  Fahrenheit.
  - c. Circulation shall be continued for a minimum of 20 hours at which time the above cycle shall be repeated. It is recommended that the 15-minute period at  $325^{\circ}$  Fahrenheit be conducted during the last 30 minutes of the 20-hour cycle. The assembly shall be subjected to 10 such cycles to obtain a minimum of 200 hours fluid circulation.
  - d. Upon completion of the above tests, the assembly shall be subjected to a static pressure as specified for oil proof pressure in Table I for 5 minutes. The assemblies shall show no evidence of leakage.
- \* 4.5.8 Fuel immersion. A hose assembly having 9 inches of free hose between the adapters shall be immersed in fluid conforming to TT-S-735 for 72 hours at room temperature. Upon completion of this period, the assembly shall be removed from the fluid and then subjected to a static pressure for 5 minutes at the proof pressure specified for fuel in Table I. The assembly shall show no evidence of leakage.
  - \* 4.5.9 Overtightening torque. The type adapters of an assembly shall be subjected to the repeated torque test as specified in paragraph 3 of ARP 908. The torque values used shall be those specified in Table 1 of ARP 908 (either steel or aluminum, as applicable). At the completion of these tests there shall be no evidence of failure or deformation of the adapter assembly, and the swivel nut shall be free enough to permit turning on the nipple by hand. The adapters shall then be subjected to the hydraulic proof pressure test for a minimum of 5 minutes not exceeding the applicable maximum torque values of ARP 908 and with no leakage.
  - \* 4.5.10 Cold-temperature test. Two assemblies with lengths as specified in Table I shall be used. Samples shall be filled with oil conforming to MIL-H-5606 and shall be placed in a cold chamber, the temperature, of which can be controlled within  $-65^{\circ} \pm 2^{\circ}$  Fahrenheit, and allowed to remain for 24 hours. The assemblies shall be proof-tested immediately after removal from the cold chamber, and any leakage shall be evidence of failure of the adapter. The -16 size may be tested at  $-40^{\circ}$  Fahrenheit in lieu of  $-65^{\circ}$  Fahrenheit.
- 4.6 Qualification.
  - \* 4.6.1 Qualification test samples. Qualification test samples shall consist of the number of adapters required to make the hose assemblies specified in Table II. The test samples shall be assembled with hose of applicable size conforming to MIL-H-8794, and each test shall be conducted on assemblies fabricated from hose approved on QPL-8794. Only the number of hose assemblies (for each size) listed in Table III, fabricated from any approved hose, shall be required.

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TABLE III. Qualification Test Schedule

Sample Number:	1	2	*3	*4	5	6	7	8-13
Para No.:	4.5.1	4.5.1	4.5.1	4.5.1	4.5.1	4.5.1	4.5.1	4.5.1
	4.5.2	4.5.2	4.5.2	4.5.2	4.5.2	4.5.2	4.5.2	4.5.2
	4.5.3	4.5.3	4.5.7	4.5.8	4.5.9	4.5.10	4.5.10	4.5.5
	4.5.4	4.5.4	-	-	-	-	-	4.5.6

\* The length of the test samples shall be as specified in Table I except samples #3 and #4. The lengths of these samples shall be as specified in 4.5.7 and 4.5.8.

4.6.2 Qualification required. Prior to actual procurement, the product which this specification covers shall pass the qualification tests specified herein. If the product is later modified in any way, the modified form shall be subjected to and shall pass the same qualification tests.

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

Examine

Marking (interior package or container and exterior container as applicable)

Materials

Workmanship

Contents (interior and exterior container as applicable)

Weight (exterior container)

Defects

Omitted, incorrect, illegible, improper size, location, sequence or method of application.

Component missing, damaged, defective, or not as specified.

Inadequate or improper packaging or packing, such as closure of interior packages or containers, closure of case liners or container flaps, taping of seams, corners, and manufacturer's joint, closure of alternate containers; loose strapping or tape banding; inadequate stapling; bulging or distortion of containers.

Number per container not as specified.

Weight per container exceeds maximum specified.

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## 5. PREPARATION FOR DELIVERY

5.1 Preservation and packaging.

5.1.1 Level A. Adapters, in unit quantities specified in Table IV, shall be packaged in accordance with Method III of MIL-P-116.

5.1.1.1 Unit packaging. Adapters shall be packaged in quantities indicated in Table IV in containers conforming to PPP-B-566, PPP-B-636, PPP-B-665, or PPP-B-676. Each container shall have interior separations that shall support and separate each individual adapter in such a manner as to prevent movement or contact of the adapters with each other. All surfaces of the container coming in direct contact with the item shall be coated with a neutral barrier. Adapters fabricated from steel shall be wrapped with barrier material conforming to Grade A of MIL-B-121.

5.1.1.2 Intermediate packaging. Unit packages in the quantities indicated in Table IV shall be overpackaged in containers conforming to PPP-B-566, PPP-B-636, PPP-B-665, or PPP-B-676.

- 5.1.2 Level C. Preservation and packaging which affords adequate protection against corrosion, deterioration and physical damage during shipment, handling and limited tenure of storage, or for immediate use at the first receiving activity.

TABLE IV. Packaging

OD Size - Inches	Quantity Per Unit Container	Number of Unit Packages per Intermediate Container
1/8 thru 3/8	5	20
1/2 thru 1	5	10
1-1/4 thru 1-1/2	5	0
1-3/4 up	1	0

- 5.2 Packing.

- 5.2.1 Level A. Adapters preserved and packaged as specified in 5.1.1 shall be packed in export-type or overseas-type shipping containers conforming to PPP-B-585, PPP-B-601, PPP-B-621, PPP-B-636. Plywood when used shall conform to uniform shape and size, of minimum cube and tare consistent with the protection required, and shall contain identical quantities. The gross weight of each pack shall be limited to 200 pounds. Fiberboard containers shall not exceed the weight limitations of the applicable container specification. Containers shall be closed and strapped in accordance with the applicable container specification or appendix thereto. When the interior package is not water resistant, the exterior container shall be provided with a case liner conforming to UU-P-271 and shall be fabricated and sealed in accordance with MIL-L-125-7.

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- 5.2.2 Level B. Adapters packaged as specified in 5.1.1 shall be packed in domestic containers conforming to PPP-B-585, PPP-B-591, PPP-B-601, PPP-B-621, PPP-B-636, class weather resistant, V3c and V3s, or PPP-B-576. Exterior containers shall be of minimum cube and tare consistent with the protection required. Insofar as practicable, exterior containers shall be of uniform shape and size and shall contain identical quantities. The gross weight of each pack shall be limited to 200 pounds. Closures shall be in accordance with the appendix of the applicable container specification. Fiberboard, when used, shall have a Mullen test of not less than 275 pounds. Fiberboard containers shall not exceed the weight limitations of the applicable container specification.
- 5.2.3 Level C. Adapters shall be packed to afford adequate protection of the lowest rate against damage during direct shipment from the supply source to the first receiving activity. Containers shall conform to applicable carrier rules and regulations applicable to the mode of transportation.

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

#### 6. NOTES

- 6.1 Intended use. MS24587, MS27224, and MS27226 adapters covered by this specification are intended for use on hose, conforming to MIL-H-8794, to fabricate flexible hose assemblies for use in hydraulic, fuel and oil lines. Flanged type fittings MS27232, MS27230, and MS27228 shall be used on fuel and oil lines only.
- 6.2 Ordering data. Procurement documents should specify the following:
  - a. Title number and date of this specification.
  - b. Part number required (see 1.2 and 3.3).
  - c. Selection of levels of packaging and packing (see 5.1 and 5.2).
- 6.3 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 the San Antonio Air Materiel Area, Service Engineering Division, ATTN: SAMME, Kelly AFB, Texas 78241, and information pertaining to qualification of products may be obtained from that activity. Components of the assembly used on, and referenced to Military Standards, and not listed on the QPL, shall be acceptable without being listed if furnished by the qualified sources in the latest QPL. Products of the qualified sources on the QPL are acceptable and qualified by virtue of association with the qualified items.

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- 6.4 The margins of this specification are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

**Custodians:**

Navy - AS  
Air Force - 82

**Preparing Activity:**

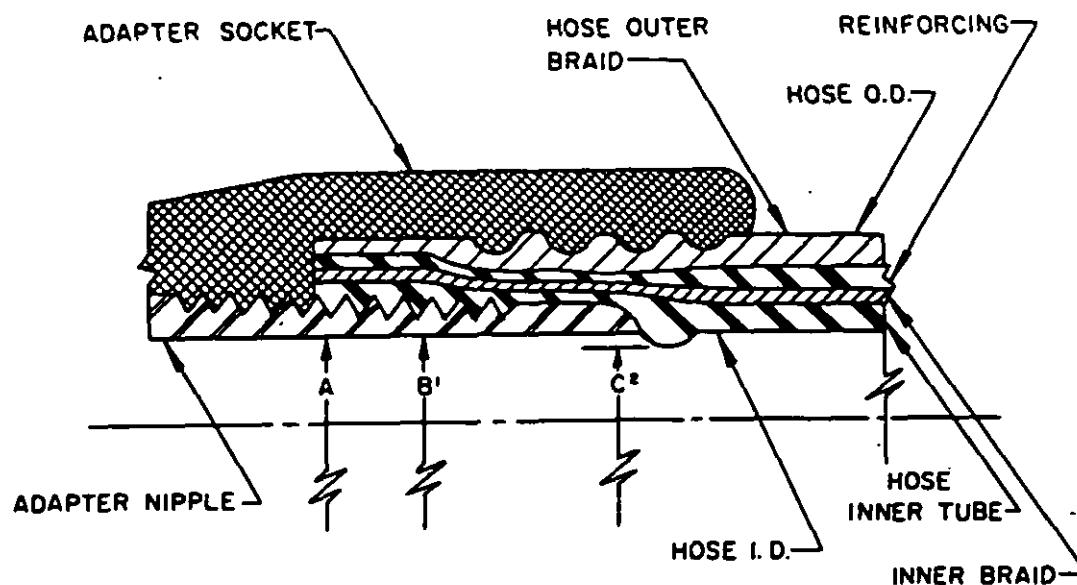
Air Force - 82

**Review Activities:**

Air Force - 82  
Army - ME, WC  
Navy - AS  
DSA - CS

**Project No. 4730-0936**

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Adapter Dash No.	A Dia. (Ref)	B' Dia. $\pm .005$ $-.000$ (Ref.)	C² Dia. min.
-3	.123	.123	.080
-4	.157	.170	.132
-5	.219	.232	.200
-6	.281	.295	.260
-8	.383	.390	.350
-10	.469	.484	.450
-12	.578	.608	.575
-16	.781	.813	.781
-20	1.031	1.045	1.015
-24	1.276	1.279	1.250
-32	1.745	1.748	1.719
-40	2.209	.....	2.178
-48	2.834	.....	2.803

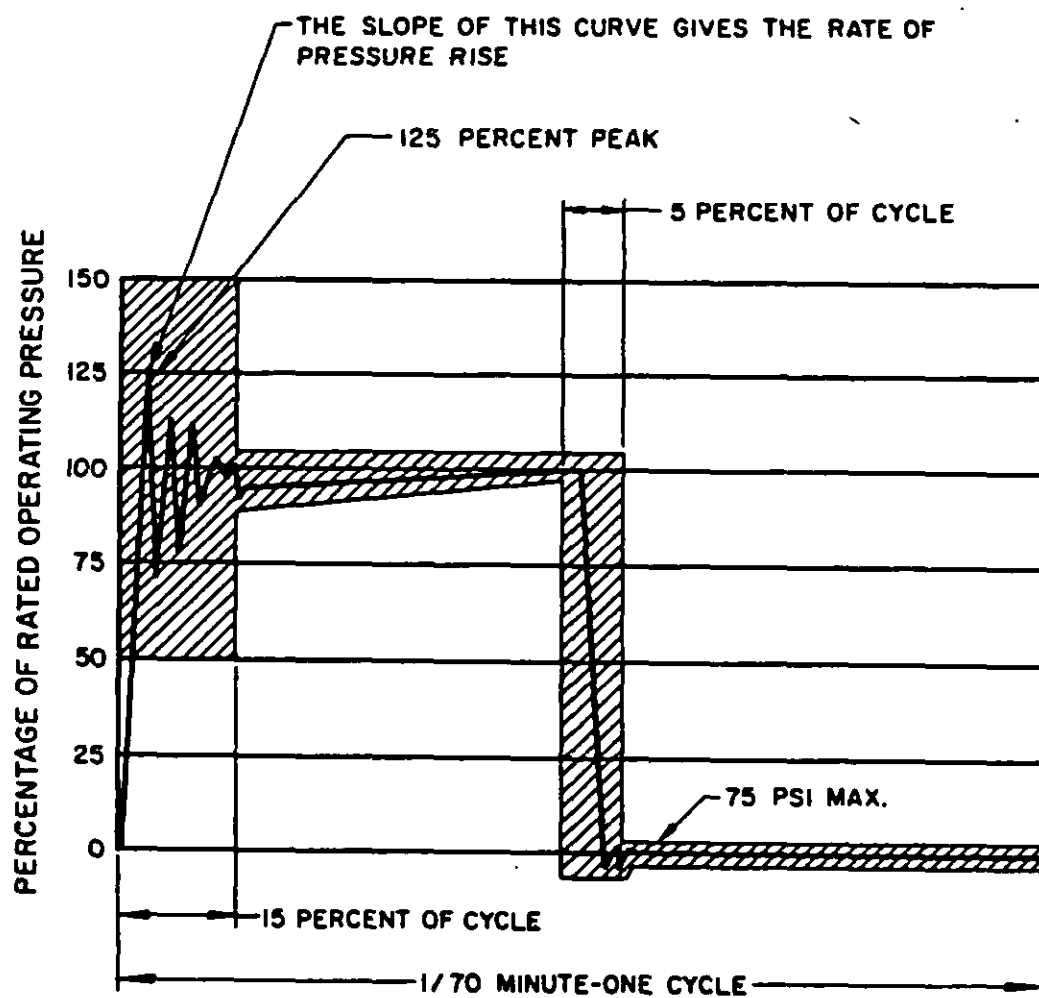
## NOTES:

1. "B" Dia. shall be applicable to adapters which require a mandrel for assembling adapters to the hose

2. "C" Dia. indicates max. permissible bulge of innertube when hose is assembled with adapters

**FIGURE I. Maximum Bulge of Hose Inner Tube when Adapters are Assembled with MIL-H-8794 Hose**

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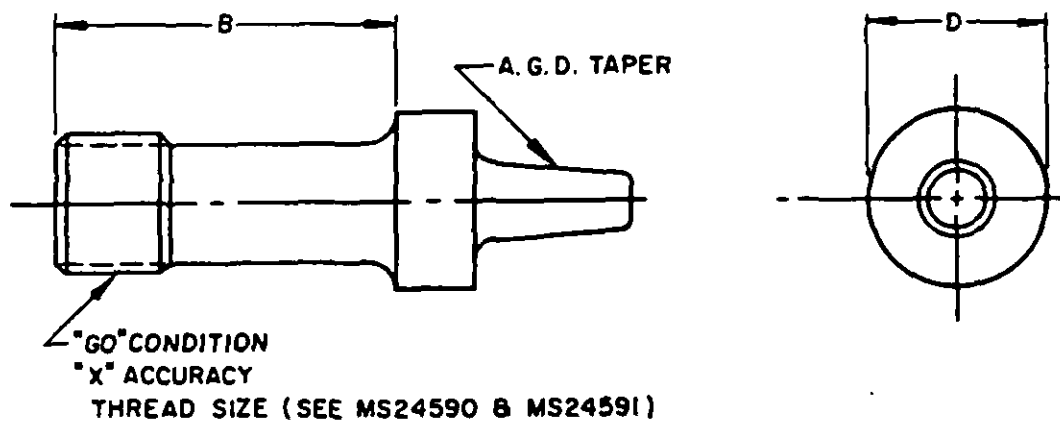


The curve shown above is the approximate pressure-time cycle determined to be of proper severity for impulse testing of hydraulic hose. While it is mandatory only that pressure peak rises to 125 percent of the operating pressure at some point prior to leveling off at rated pressure, it is considered highly desirable that the pressure-time curve be confined to the shaded area indicated. One very desirable benefit to be gained in this manner is that results of tests performed on different test machines will be more nearly comparable.

FIGURE 2. Impulse Pressure Curve



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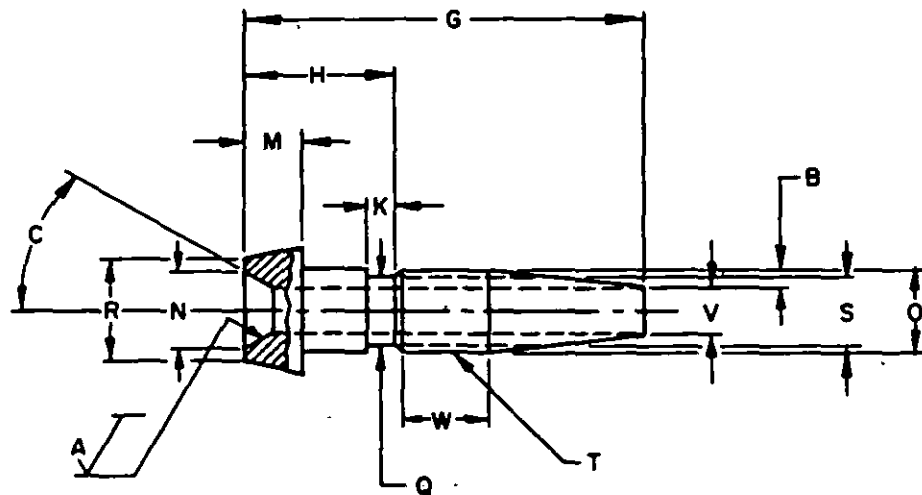


MS Part No. to be inspected	B Inches $\pm 1/64$	D +.0002 -.0000	PD
MS24591-3	27/32	.4853	.2141
MS24591-4	15/16	.5453	.2607
MS24591-5	1	.6253	.3418
MS24591-6	1-3/32	.7153	.3978
MS24591-8	1-1/2	.8053	.5354
MS24591-10	1-5/8	.9853	.6604
MS24591-12	1-31/32	1.1453	.7800
MS24590-16	1-5/8	1.2753	1.0264
MS24590-20	1-5/8	1.5403	1.2764

NOTE: This gauge is not required for the -24 and -32 sizes

FIGURE 3 Socket Gauge

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1.0 AQL

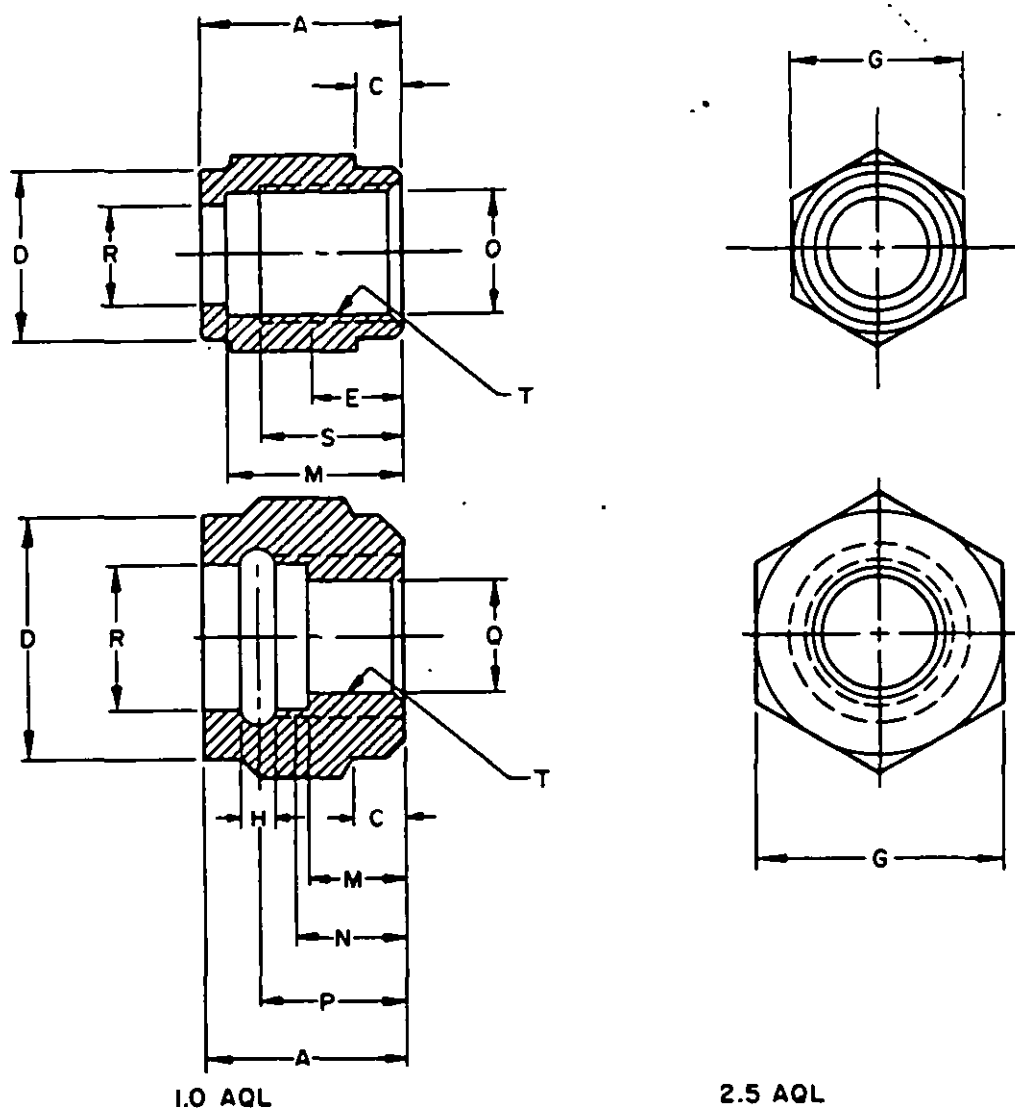
Cone seal surface finish "A"  
Nose angle "B"  
Cone seat angle "C"

2.5 AQL

Overall length "G"  
Length from cone seat end to thread "H"  
Width of thread relief "K"  
Width of nipple head "M"  
Cone seat diameter "N"  
Thread OD "O"  
Thread relief OD "Q"  
Nipple head OD "R"  
Nose gauge point "S"  
Thru ID "T"  
Minimum thread length "V"  
Thread size "W"

FIGURE 4. Inspection Characteristics and AQLs for Nipples

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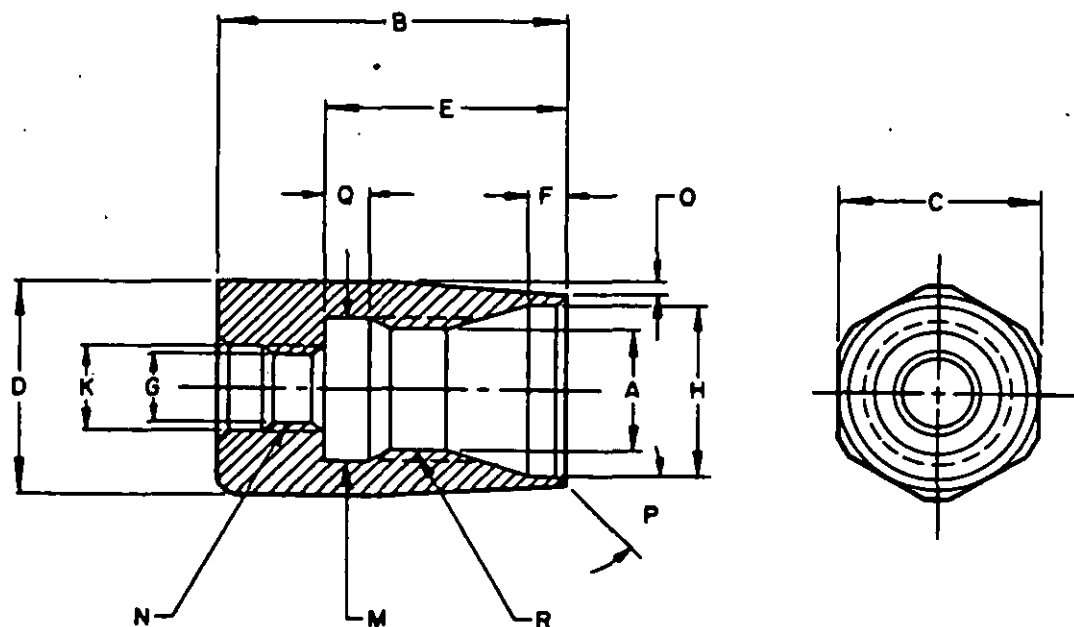
Overall length "A"  
 Diameter "R"  
 Thread size "T"  
 Minimum thread depth "E"  
 Depth to ID shoulder "M"  
 Depth to center of wire groove "P"  
 Width of wire groove "H"

Hex size "G"  
 Length of machined OD, thread end "C"  
 Machined OD (both ends) "D"  
 Thread ID "Q"  
 Maximum thread depth "N"

NOTE: For inspection data on thread length "S" see 4.5.1.1 and Table III

FIGURE 5. Inspection Characteristics & AQLs for AN-818 and MS 27073 Nuts

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## 1.0 AQL

Left-hand thread ID—"A"  
 Concentricity of right-hand thread to skirt ID.  
 (Gaged with socket gauge per Figure 3)

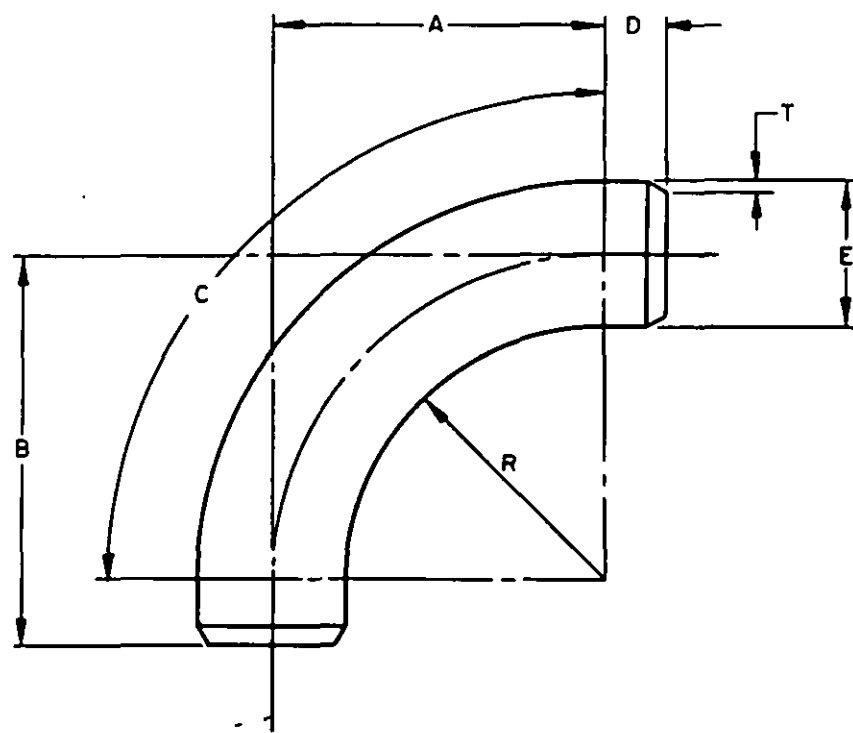
## 2.5 AQL

Overall length—"B"  
 Hex size—"C"  
 Machined OD of hex—"D"  
 Location of recess—"E"  
 Counterbore depth—"F"  
 Right-hand thread ID—"G"  
 Skirt ID—"H"  
 Counterbore ID—"K"  
 Recess diameter—"M"  
 Right-hand thread size—"N"

NOTE: Inspection data relative to O, P, Q, and R are defined in 4.5.1.1 and Table IV.

FIGURE 6. Inspection Characteristics and AQLs for Sockets

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**1.0 AQL**

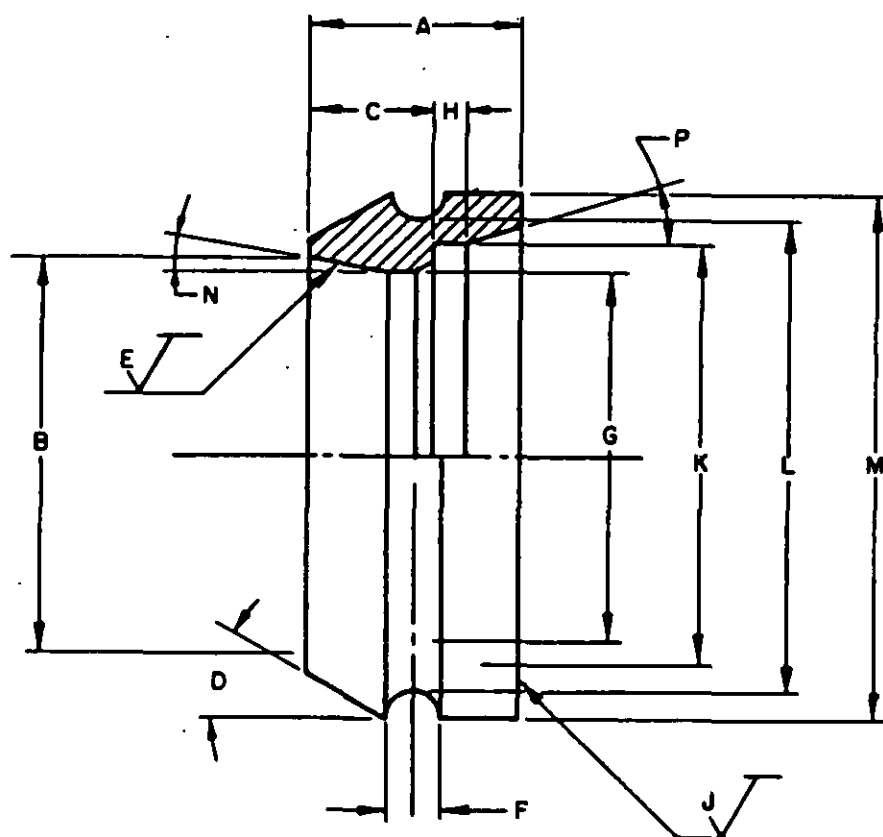
Ovality of tube  
 Length of straight portion "D"  
 OD of tube "E"  
 WALL thickness—"T"

**2.5 AQL**

Length of leg—"A"  
 Length of leg—"B"  
 Degree of bend—"C"  
 Radius of bend—"R"

**FIGURE 7. Inspection Characteristics and AQLs for Tubes MS27234 and MS27235**

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## 1.0 AQL

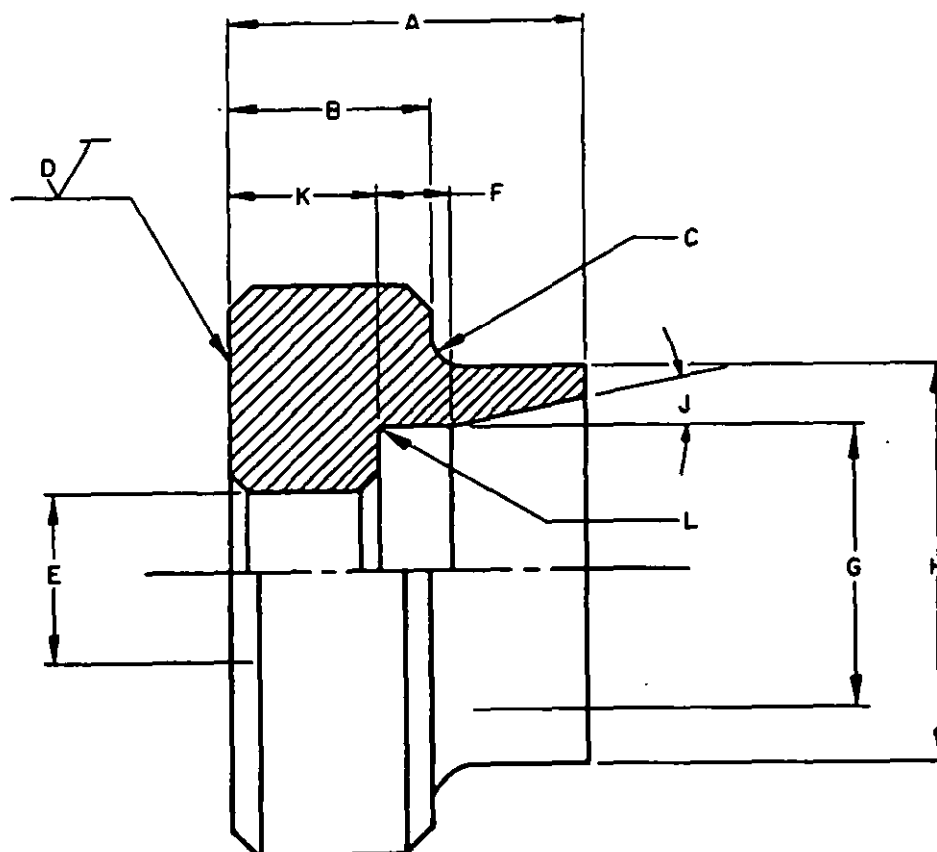
1. Seat angle "N"
2. Seat surface "E"
3. Overall length "A"

## 2.5 AQL

1. Max ID "B" at cone seat.
2. Depth of shoulder "C" extending from end of tube.
3. Relief angle "D"
4. Width of wire relief "F"
5. Min ID "G"
6. Tube support length "H"
7. Surface finish "J"
8. Tube accommodating ID "K"
9. Wire relief groove ID "L"
10. Outside diameter "M"
11. Brazing accommodation angle "P"

FIGURE 8. Inspection Characteristics and AQLs for Shoulder, MS27236

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**I.O. AQL**

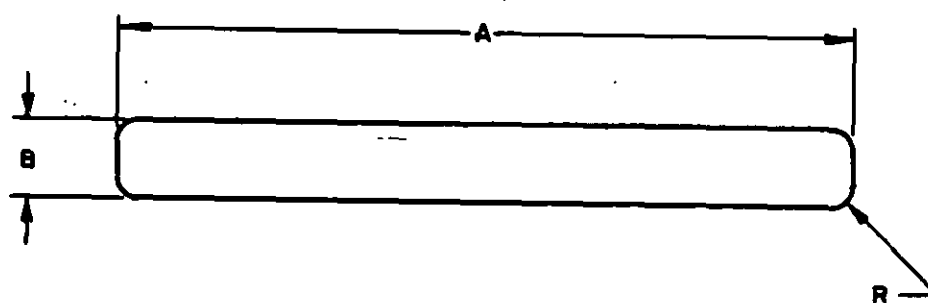
Overall length "A"  
 Flange shoulder height "B"  
 Radius "C"  
 Surface finish "D"

**2.5 AQL**

Inside diameter "E"  
 Tube support length "F"  
 Diameter for O.D. of tube "G"  
 O.D. of shank portion "H"  
 Brazing accommodations angle "J"  
 Depth "K" of I.D. "E"  
 Inside radius "L"

**FIGURE 9. Inspection Characteristics and AQLs for Shoulder, MS27237**

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.10. AQL

2.5 AQL

Wire length "A"  
Wire diameter "B"

Radius "R"

FIGURE 10. Inspection Characteristics and AQLs for Wire MS27238



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