

INCH-POUND

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DETAIL SPECIFICATION

ADAPTER, HOSE TO TUBE, PIPE, AND FLANGE, REUSABLE - HYDRAULIC, FUEL, AND OIL LINES, GENERAL SPECIFICATION FOR

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

1. SCOPE

1.1 Scope. This specification covers general requirements for reusable hose to tube, pipe, and flange adapters for use in hydraulic, fuel, and oil lines (see 6.1).

1.2 Classification. Reusable hose adapters will be of the sizes and styles as specified on the applicable specification sheets (see 3.1 and 6.2).

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 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

DEPARTMENT OF DEFENSE

MIL-H-5606	-	Hydraulic Fluid, Petroleum Base; Aircraft, Missile, and Ordnance
MIL-DTL-8794	-	Hose, Elastomeric - Hydraulic Fluid, Fuel, and Oil Resistant
MIL-PRF-83282	-	Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Metric, NATO Code Number H-737

(See Supplement 1 for list of associated specification sheets.)

Beneficial comments (recommendations, additions, deletions) and any pertinent data that may be of use in improving this document should be addressed to: Defense Logistics Agency, Defense Supply Center, Columbus (DSCC-VAI), P.O. Box 3990, Columbus, OH 43216-5000, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A
 DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

FSC 4730

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STANDARDS

DEPARTMENT OF DEFENSE

MIL-STD-130 - Identification Marking of US Military Property

(Unless otherwise indicated, copies of the above specifications and standards are available from the Document Automation and Production Service, Building 4/D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents that are DoD 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 D380 - Standard Test Methods for Rubber Hose (DoD adopted)
 ASTM D471 - Standard Test Method for Rubber Property-Effect of Liquids
 (DoD adopted)

(Application for copies should be addressed to the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

NATIONAL CONFERENCE OF STANDARDS LABORATORIES (NCSL)

ANSI/NCSL Z540-1 - Calibration Laboratories and Measuring and Test Equipment,
 General Requirements (DoD adopted)

(Application for copies should be addressed to the National Conference of Standards Laboratories, 1800 - 30th Street, Suite 305B, Boulder, CO 80301-1032.)

SAE INTERNATIONAL

SAE ARP603 - Impulse Testing of Hydraulic Hose Tubing and Fitting Assemblies
 (DoD adopted)
 SAE ARP908 - Torque Requirements, Installation and Qualification Test, Hose and
 Tube Fitting (DoD adopted)
 SAE J1966 - Lubricating Oil, Aircraft Piston Engine (Nondispersant Mineral Oil)
 (DoD adopted)

(Application for copies should be addressed to SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001.)

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for related associated specifications or specification sheets), 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 Specification sheets. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheet cited in the solicitation by the procuring activity (see 6.2). In the event of any conflict between the requirements of this specification and the specification sheet, the latter shall govern. (See 4.6.1.)

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3.2 Qualification. Adapters or components thereof furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable qualified products list (QPL) before contract award (see 4.4 and 6.3). (See 4.6.1.)

3.3 Materials. Adapter components shall be fabricated from the materials specified on the applicable specification sheet. (See 4.6.1 and 6.2.)

3.3.1 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible, provided that the material meets or exceeds the operational and maintenance requirements and promotes economically advantageous life cycle costs.

3.4 Interface. Adapters shall interface with hose conforming to MIL-DTL-8794 for use in hydraulic, fuel, and oil lines. (See 4.6.1.)

3.5 Performance.

3.5.1 Pressure. Adapters shall not leak, burst, or separate from a hose at any pressure less than the burst pressure specified in table I. Adapters shall not deform or move relative to the hose at any pressure less than 70 percent of the burst pressure specified in table I. (See 4.6.2.)

3.5.2 Bulge. Adapters shall not cause a bulge in the inner tube of the hose to reduce the ID of the hose to less than the C dimension shown on figure 1 when assembled with a hose. (See 4.6.3.)

TABLE I. Physical requirements for adapters assembled with hose conforming to MIL-DTL-8794.

Dash number (size)	Length of hose assemblies for tests (inches) ^{1/}	Minimum bend radius at inside of hose bend (inches)	Hydraulic		Fuel		Oil			Burst pressure (psi)
			Operating pressure (psi)	Proof pressure (psi)	Operating pressure (psi)	Proof pressure (psi)	Operating pressure (psi)	Surge pressure (psi)	Proof pressure (psi)	
-3 ^{2/}	14	3	N/A ^{2/}	N/A ^{2/}	1,000	1,500	50	400	600	4,000
-4	14	3	3,000	6,000	1,000	1,500	50	400	600	12,000
-5	16	3.375	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	4.625	2,000	4,000	1,000	1,500	50	400	600	8,000
-10	23.5	5.5	1,750	3,500	1,000	1,500	50	400	600	7,000
-12	27.5	6.5	1,500	3,000	1,000	1,500	50	400	600	6,000
-16	18	N/A	800	1,600	750	1,000	50	400	600	3,200
-20	18	N/A	600	1,250	500	750	50	400	600	2,500
-24	18	N/A	500	1,000	250	375	50	400	600	2,000
-32	18	N/A	350	700	200	300	50	400	600	1,400
-40	18	N/A	N/A	N/A	200	300	N/A	N/A	N/A	1,000
-48	18	N/A	N/A	N/A	200	300	N/A	N/A	N/A	800

Notes:

1/ Except as otherwise specified in the individual test description.

2/ Size -3 adapters shall not be used with size -3 hose in hydraulic applications.

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3.5.3 Hydraulic impulse. Adapters of sizes -4 through -16 shall withstand not less than 200,000 dynamic hydraulic impulse cycles at a nominal rate of 70 pulses per minute at 125 percent of the operating hydraulic pressure specified in table I without leakage, deformation, or separation from a hose. Adapters of sizes greater than -16 through -32 shall withstand not less than 100,000 dynamic hydraulic impulse cycles at a nominal rate of 70 pulses per minute at 100 percent of the operating hydraulic pressure specified in table I without leakage, deformation, or separation from a hose. (See 4.6.4.)

3.5.4 Torque. Adapters shall not leak, fail, or deform after having been tightened to the maximum torque limit specified in SAE ARP908 applicable for the material used. Upon disconnection of the adapter after completing repeated torquing, the swivel nut shall be free enough to permit turning on the nipple by hand. (See 4.6.5.)

3.5.5 Operating temperature. Adapters shall be capable of operating over the temperature range of -65 to 250 °F without leakage, deformation, or separation from a hose. (See 4.6.6 and 4.6.8.)

3.5.6 Fuel immersion. The adapters, when coupled to the hose as an assembly, shall not leak after immersion in hydrocarbon-based fuels. (See 4.6.7.)

3.5.7 Lubricating oil circulation. The adapters, when coupled to the hose as an assembly, shall be capable of circulating oil at fluid temperatures up to 250 °F and under surge conditions of 325 °F without leakage while operating at the oil operating pressure specified in table I. (See 4.6.8.)

3.5.8 Reusability. Adapters shall be reusable. (See 4.6.9.)

3.6 Special tools. Adapters shall not require any special tools other than a mandrel for assembly with a hose. The mandrel may, if necessary, be used on sizes -3 through -12 adapters only, in which case the bore diameter of the adapters shall conform to dimension B on figure 1. If used, the mandrel shall be straight and the diametrical clearance between the mandrel outside diameter (OD) and the adapter bore shall be not greater than .008 inch. (See 4.6.1.)

3.7 Identification of product. Adapters and components shall be marked for identification in accordance with MIL-STD-130 and, as applicable, in accordance with the applicable specification sheet. (See 4.6.1.)

3.8 Workmanship. Adapters shall be free from cracks, laps, seams, burrs, longitudinal and spiral tool marks, or any other defects that may detrimentally affect their intended use. (See 4.6.1.)

4. VERIFICATION

4.1 Test equipment and inspection facilities. Test and measuring equipment and inspection facilities of sufficient accuracy, quality, and quantity to permit performance of the required inspection shall be established and maintained by the contractor. The establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment shall be in accordance with ANSI/NCSL Z540-1 or equivalent.

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).
 1. Sampling tests (see 4.5.2).
 2. Periodic tests (see 4.5.3).

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4.2.1 Disposition of test specimens. Test specimens that have been subjected to qualification or periodic tests (P1 and P2) (see 4.5.3.2 and 4.5.3.2) shall not be delivered on a contract or purchase order.

4.3 Inspection conditions. All inspections shall be performed in accordance with the test conditions specified herein. Room temperature shall be 68 to 78 °F.

4.3.1 Test fluid. Unless otherwise specified in the verification paragraph, the test fluid shall be water; lubricating oil conforming to SAE J1966, grade 50; hydraulic fluid conforming to either MIL-H-5606 or MIL-PRF-83282; or fuel conforming to ASTM D471, ASTM Reference Fuel B. Water is an acceptable test fluid only for the leakage, proof pressure, and burst tests. If water is used, the test article must be thoroughly dried before use in further testing or prior to delivery.

4.3.2 Oil-aging. For tests that require a hose assembly to be oil-aged, the hose assembly shall be completely immersed in hydraulic fluid within a non-pressurized closed container or reflux condenser (to prevent distillation of the volatile matter in the fluid) and maintained at a temperature of 160 ± 5 °F for 7 days prior to the start of the test. During the aging period, the bore of the hose assembly shall be open and no air shall be entrapped therein. No more than 10 hose assemblies shall be aged in a given quantity of test fluid.

4.3.3 Air-aging. For tests that require a hose assembly to be air-aged, the hose assembly shall be maintained in air at a temperature of 160 ± 5 °F for 7 days prior to the start of the test.

4.3.4 Hose assemblies for adapter testing. The hose assemblies used for adapter testing shall be assembled using hose conforming to MIL-DTL-8794 of the applicable size in accordance with the adapter manufacturer's instructions. Hose assemblies shall be examined to verify that there has been no degradation of the hose or adapters resulting from the assembly process. Unless otherwise specified, hose assembly lengths shall be as specified in table I.

4.4 Qualification inspection. Qualification inspection shall be performed on units produced with equipment and procedures used in production.

4.4.1 Samples for qualification. Samples for qualification shall be representative of the products proposed to be furnished to this specification. Samples, consisting of 13 hose assemblies using adapters of each size and of the configuration specified, shall be subjected to qualification testing specified in table II. Adapters shall be qualified with approximately equal amounts of hose from a minimum of two specific manufacturers.

TABLE II. Qualification inspection.

Hose assembly number	Assembly type	Test sequence – paragraph numbers			
1 and 2	Hose assembly using MIL-DTL-8794 hose and MS27224 adapters (see 6.3, 6.3.1, 6.3.2)	4.6.1	4.6.2.1	4.6.2.2	4.6.2.3
3 through 8 ^{1/}		4.6.1	4.6.2.1	4.6.3	4.6.4
9		4.6.1	4.6.2.1	4.6.5	-
10 and 11		4.6.1	4.6.2.1	4.6.6	-
12		4.6.1	4.6.2.1	4.6.7	-
13		4.6.1	4.6.2.1	4.6.8	-
see note ^{2/}		4.6.9	-	-	-

NOTES:

^{1/} These hose assemblies shall use MS24587 adapters.

^{2/} The adapter for the reusability test of 4.6.9 shall be selected from among hose assemblies 3 through 8, and shall have previously passed the tests specified for those hose assemblies.

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4.4.2 Failures. One failure shall be cause for refusal to grant qualification approval.

4.4.3 Retention of qualification. To retain qualification, the contractor shall forward a report at 12-month intervals to the qualifying activity. The qualifying activity will establish the initial reporting date. The report shall consist of:

- a. A summary of the results of the sampling tests performed and completed during the 12-month period, including as a minimum the number of lots and the quantities that have passed and the number that have failed. The results of tests of all reworked sampling lots shall be identified and accounted for.
- b. A summary of the results of all periodic tests performed and completed during the 12-month period, including the number and mode of failures.

If the summary of test results indicates nonconformance with specification requirements, and corrective action acceptable to the qualifying activity has not been taken, action may be taken to remove the failing product from the qualified products list.

Failure to submit the report within 30 days after the end of each 12-month period may result in loss of qualification for the product. In addition to the periodic submission of inspection data, the contractor shall immediately notify the qualifying activity at any time during the 12-month period that the inspection data indicate failure of the qualified product to meet the requirements of this specification. In the event that no production occurred during the reporting period, a report shall be submitted certifying that the company still has the capabilities and facilities necessary to produce the item. If during two consecutive reporting periods there has been no production, the manufacturer may be required, at the discretion of the qualifying activity, to submit his qualified products to testing in accordance with the qualification inspection requirements.

4.5 Quality conformance inspection.

4.5.1 Inspection of product for delivery. Inspection of product for delivery shall consist of sampling and periodic tests.

4.5.2 Sampling tests. Sampling tests shall consist of the tests specified in table III performed in the order shown. These tests shall be performed on a production lot basis. Random samples from the production lot, without regard to quality, shall be selected in the inspection sample quantity specified in table IV to form an inspection sample. If one or more defects are found in the inspection sample, then the production lot shall be inspected for the particular defect and the defects removed. A second inspection sample shall be selected from the production lot and all sampling tests again performed. If one or more defect items are found in the second inspection sample, the production lot shall be rejected and shall not be supplied to this specification.

TABLE III. Quality conformance inspection table.

Title	Requirement	Inspection	Quality control inspection		
			Sampling tests	P1 tests	P2 tests
Examination of product	3.1, 3.7, 3.8	4.6.1	X	X	
Proof pressure	3.5.1	4.6.2.1	-	X	
Burst pressure	3.5.1	4.6.2.3	-	X	
Leakage	3.5.1	4.6.2.2	-	X	
Torque	3.5.4	4.6.5	-	-	X

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TABLE IV. Inspection sample.

Production lot size	Accept on zero sample size
1 to 8	All
9 to 90	8
91 to 150	12
151 to 280	19
281 to 500	21
501 to 1,200	27
1,201 to 3,200	35
3,201 to 10,000	38
10,001 to 35,000	46

4.5.2.1 Production lot. A production lot shall consist of the quantity of adapter assemblies or adapter components of one type and size manufactured on the same production lines by means of the same production techniques, materials, controls, and design during the same production run.

4.5.3 Periodic tests.

4.5.3.1 Periodic 1 (P1) tests. P1 tests shall consist of the tests specified in table III in the order shown. P1 tests shall be performed on three assemblies (six adapters) for each size at least once per year, regardless of the total number of adapters produced. The only exception is that P1 tests do not need to be performed for a specific size if there has been no production during the past year for that size. At least three of the six adapters shall be of the greatest bend angle produced during the period. The six adapters selected shall be as representative as possible of those produced during the period in terms of the adapters materials (example: all steel adapters, combination steel and aluminum adapters, etc.) and joint configurations (one piece, brazed joint, welded joint, mechanical joints, etc.).

4.5.3.2 Periodic 2 (P2) tests. P2 tests shall consist of the tests specified in table III conducted in the order shown. P2 tests shall be performed on two adapters at least once per year, regardless of the total number of adapters produced. The only exception is that P2 tests do not need to be performed if there has been no production during the past year. The adapters may be of any bend angle and joint configuration. The two adapters selected shall be as representative as possible of the metals used for the threaded parts if the parts have been produced from more than one type of metal (example: aluminum threads, steel threads, etc.). The size of the two adapters shall be determined based on the size of the adapters produced during the period and based on an engineering decision of the size produced that would be most likely to fail if there was a defect.

4.5.3.3 Nonconformance. If an adapter or component thereof fails to pass either periodic test, the manufacturer shall immediately notify the qualifying activity and cognizant inspection activity of such failure and take corrective action of the materials or processes, or both, as warranted, and on all units of product that can be corrected and that were manufactured under essentially the same conditions, with essentially the same materials and processes, and that were considered subject to the same failure. Acceptance and shipment of the product shall be discontinued until corrective action acceptable to the qualifying activity has been taken. After that corrective action has been taken, the periodic test shall be repeated on additional adapters (all inspections, or the inspection that the original sample failed, at the option of the qualifying activity). Periodic tests may be re-instituted; however, final acceptance shall be withheld until the periodic tests have shown that the corrective action was successful. In the event of failure after inspection, information concerning the failure and the corrective action taken shall be furnished to the cognizant inspection activity and the qualifying activity.

4.5.3.4 Periodic hose assembly testing. Required periodic tests at the hose assembly or adapter level that were already performed at the bulk hose level by the same manufacturer of both products may be eliminated if documented approval has been obtained from the qualifying activity.

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4.6 Test methods.

4.6.1 Examination of product. Adapters, and their related records, shall be examined to determine conformance to this specification and the applicable specification sheet with respect to materials, finish, dimensions, interfaces, tolerances, identification marking, and workmanship (see figures 3 through 8). The concentricity gauge shown on figure 2 shall be used only for the inspection of sockets. (See 3.1, 3.2, 3.3, 3.4, 3.6, 3.7, and 3.8.)

4.6.2 Pressure. (See 3.5.1.)

4.6.2.1 Proof pressure. An unaged hose assembly shall be subjected to the hydraulic proof pressure (except -3 to fuel proof pressure) specified in table I for a period of not less than 1 minute. The test shall be conducted in accordance with the Proof Pressure Tests of ASTM D380. There shall be no evidence of adapter leaking, burst, deformation, movement relative to the hose, or separation from the hose.

4.6.2.2 Leakage. A pair of unaged hose assemblies shall be subjected to 70 percent of the burst pressure specified in table I for 5 minutes. The pressure shall then be reduced to zero, after which the pressure shall again be raised to 70 percent of the specified burst pressure and held for an additional 5 minutes. There shall be no evidence of adapter leakage, burst, deformation, movement relative to the hose, or separation from the hose.

4.6.2.3 Burst pressure. A pair of unaged hose assemblies shall be subjected to the burst pressure specified in table I within 24 hours after assembly of the adapters to the hose. The burst pressure test shall be conducted in accordance with the Straight Bursting Test of ASTM D380, except that pressure shall be applied at a rate between 15,000 and 25,000 pounds per square inch (psi) per minute. During this test, one end of the hose assembly shall be free. The adapter shall not burst and there shall be no evidence of leak or separation of the hose and adapter at any pressure less than the burst pressure.

4.6.3 Bulge. All hose assemblies prepared for the test specified in 4.6.4 shall be aged as specified in 4.6.4 and then measured for bulging of the hose inner tube. A ball-type gauge is recommended for the bulge measurement. The diameter of the ball gauge shall be within .001 inch of the C diameter shown in table I. Holding the hose in a vertical orientation, the gauge is inserted into the end of the hose assembly at the bulge inspection point C shown in figure 1. The gauge shall fall through the section at the end of the adapter in the hose under its own weight without lubrication and without forcing the gauge through the adapter-to-hose interfacing section. The weight of the gauge is equal in ounces to the dash number of the hose for which designed. (See 3.5.2.)

4.6.4 Hydraulic impulse. Six hose assemblies of the length specified in table I shall be subjected to hydraulic impulse testing in accordance with SAE ARP603. Two assemblies shall be oil-aged (see 4.3.2), two shall be air-aged (see 4.3.3), and two shall be unaged. All hose assemblies shall be subjected to and successfully withstand the applicable hydraulic proof pressure specified in table I prior to impulse testing. Hose assemblies in sizes -4 through -16 shall be connected to a manifold and installed in an impulse test machine that shall produce dynamic impulses in the manifold of the magnitude and frequency required by SAE ARP603. The peak pressure shall be 125 percent of the hydraulic operating pressure specified in table I. Hose assemblies in size -20 through -32 shall be impulse tested in a similar manner except that the hose assembly shall be subjected to a peak pressure of 100 percent of the hydraulic operating pressure specified in table I. In all cases, the backpressure shall be a maximum of 75 psi. There shall be no evidence of leakage or separation of the adapter from the hose. The fluid used for this test shall conform to either MIL-H-5606 or MIL-PRF-83282, except that the test fluid may contain up to 25 percent by volume of SAE J1966, grade 50, lubricating oil. The fluid shall be held to a temperature of 120±10 °F measured at the test manifold. Hose sizes -4 through -12, when installed on the impulse test machine, shall be bent into a "U" shape with a bend radius as specified in table I. Hose sizes -16 through -32 may be installed straight. Both ends of the bent hose assembly shall be connected to a rigid support and one end of the straight hose assembly shall be free. Sizes -4 through -16 shall be subjected to 200,000 impulse cycles, and sizes -20 through -32 shall be subjected to 100,000 impulse cycles. There shall be

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no evidence of leakage or separation of the hose from the adapter. Impulse testing of sizes -40 and -48 is not required. (See 3.5.3.)

4.6.4.1 Hose failure. The hose should not fail, especially away from the adapter, but such failure does not cause the test to fail. 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 adapter replaced on the longer, remaining piece of hose. The testing of the adapter may then proceed, even though the hose remains straight, until the required number of impulses are obtained.

4.6.5 Torque. The adapters of a hose assembly shall be subjected to repeated torque testing as specified in SAE ARP908. The torque values used shall be those specified in SAE ARP908 as applicable for the material used. There shall be no evidence of failure of the adapter assembly, or failure of the swivel nut to remain free enough to permit turning on the nipple by hand. The hose assembly shall then be subjected to the hydraulic proof pressure specified in table I for a minimum of 5 minutes. There shall be no evidence of leakage of the adapter or adapter-to-hose interface. (See 3.5.4.)

4.6.6 Low operating temperature. Two hose assemblies shall be filled with hydraulic fluid conforming to either MIL-H-5606 or MIL-PRF-83282 and shall be placed in a cold test chamber. The temperature shall be lowered to -65 ± 5 °F and held for 24 hours. The hose assemblies shall be subjected to the proof pressure test immediately after removal from the cold test chamber. There shall be no evidence of leakage. The size -16 and larger hose assemblies may be tested at -40 ± 5 °F in lieu of -65 °F. (See 3.5.5.)

4.6.7 Fuel immersion. A hose assembly having a minimum of 9 inches of free hose between the adapters shall be immersed in fluid conforming to ASTM D471, ASTM Reference Fuel B, for 72 hours at room temperature. Upon completion of this period, the hose assembly shall be removed from the fluid and immediately subjected to a static pressure for 5 minutes at the proof pressure specified for fuel in table I. There shall be no evidence of leakage of the adapter or adapter-to-hose interface. (See 3.5.6.)

4.6.8 Lubricating oil circulation. A hose assembly shall be subjected to lubricating oil circulation testing. The test fluid used for this test shall be SAE J1966, grade 50 oil, or either MIL-H-5606 or MIL-PRF-83282 hydraulic fluid. A hose assembly smaller than size -24 shall have 9 inches of free-length hose between adapters. For a hose assembly of size -24 and larger, the ratio of free length hose between adapters to the nominal hose size in inches shall be six to one. The following sequence of steps shall be performed: (See 3.5.5 and 3.5.7)

- a. The hose assembly shall be filled with test fluid while at room temperature. The hose assembly shall remain filled for the total testing. The hose assembly shall be installed in a temperature-controlled box. The temperature of the ambient air shall be reduced to -40 ± 5 °F and held for a minimum of 3 hours. Circulation of the fluid shall then be started at the specified operating pressure for oil in table I at a minimum flow rate of 3 gallons per minute. A 400-psi surge pressure shall be applied for the first 30 seconds of fluid circulation while the ambient temperature is at -40 °F.
- b. The temperature of the fluid shall then be increased within 1 hour to the specified circulation temperature of 250 ± 5 °F. The ambient air temperature shall be increased to 140 ± 10 °F.
- c. Circulation shall be continued for a minimum of 20 hours. The temperature of the fluid shall be raised to 325, +0, -5 °F and held for 15 minutes during the last 30 minutes of each 20-hour cycle. The ambient air temperature shall be maintained at 140 ± 10 °F. Fluid circulation shall then be stopped.
- d. Steps a, b, and c shall be accomplished a total of 10 times to obtain a minimum of 200 hours fluid circulation.

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- e. Upon completion of the above test sequence, the hose assembly shall be subjected to the proof pressure test (see 4.6.2.1) at the proof pressure specified for oil in table I and held for 5 minutes. There shall be no evidence of leakage of the adapter or adapter-to-hose interface.

4.6.9. Reusability. A hose assembly used in qualification inspection (see table III) shall be disassembled following its required tests and reassembled using a new hose section. The reassembled hose assembly shall then be tested in accordance with 4.6.2.1, 4.6.3, and 4.6.2.3 in that sequence. (See 3.5.8.)

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point packaging activity within the Military Department or Defense Agency, or within the Military Department's Systems Command. Packaging data retrieval is available from the managing Military Department or Defense Agency automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

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

6.1 Intended use. This specification is being retained as a military detail specification because of the unique military requirements for use in systems operating in an environment from -65 °F to 250 °F. The reusable adapters covered by this specification are intended for use with hose conforming to MIL-DTL-8794 in fabricating flexible hose assemblies following such practices as in MIL-DTL-8795. The hose assemblies are intended for use in hydraulic, fuel, and oil lines. Flanged type fittings covered by MS27228, MS27230, and MS27232 are normally intended to be used only on fuel and oil lines. Size -3 adapters are not to be used with size -3 hose conforming to MIL-DTL-8794 in hydraulic applications (see table I).

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Classification (sizes and styles) and quantity of adapters to be acquired, and applicable specification sheet. (See 1.2, 3.1, 3.3, and 4.6.1.)
- c. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (See 2.2.1 and 2.3.)
- d. Packaging requirements (See 5.1.)

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products that are, at the time of award of contract, qualified for inclusion in Qualified Products List No. 5070, whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, 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 purchase orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from the qualifying activity (Defense Logistics Agency, Defense Supply Center, Columbus (DSCC-VQP), P.O. Box 3990, Columbus, OH 43216-5000).

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6.3.1 Requalification. If an adapter design is modified in any way, the modified form must be subjected to and pass the same qualification tests as the original design.

6.3.2 Qualification by similarity. Qualification testing will be performed on MS27224 hose-to-tube 90° adapters only or MS24587 for selected tests. A manufacturer who has successfully completed these qualification testing requirements will also be considered qualified to supply adapters of other configurations (elbow and flange fittings) of any bend less than the tested article covered by this specification in that same size. Such qualification will be based on certification of similarity provided by the manufacturer. In the event that a manufacturer does not manufacture adapters conforming to either MS27224 or MS24587, the manufacturer will accomplish qualification testing on the style and size of adapter to be supplied and the similarity certification will apply to adapters of any bend less than the tested article.

6.4 Subject term (key word) listing.

Fitting
Hose assembly
Nipple
Socket

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 extent of the changes.

CONCLUDING MATERIAL

Custodians:

Army - AT
Navy - AS
Air Force - 99
DLA - CC

Preparing activity:

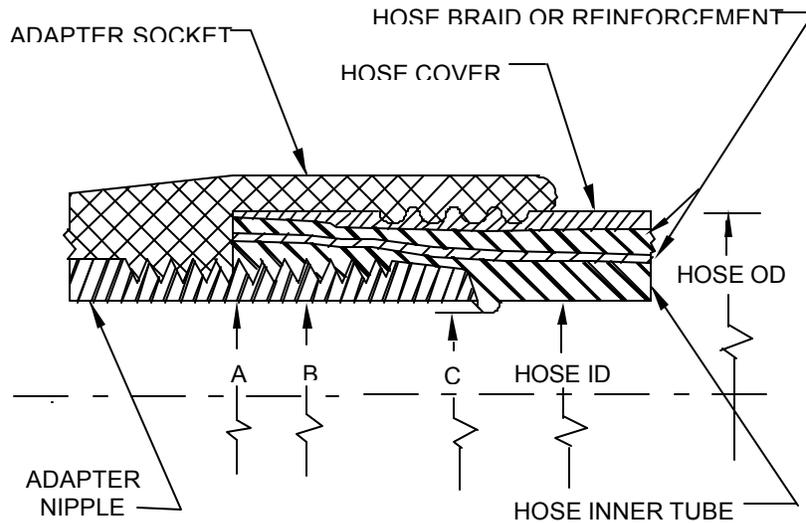
DLA - CC

(Project 4730-0690)

Review activities:

Army - AV, MI
Navy - MC, SA
Air Force - 11, 82

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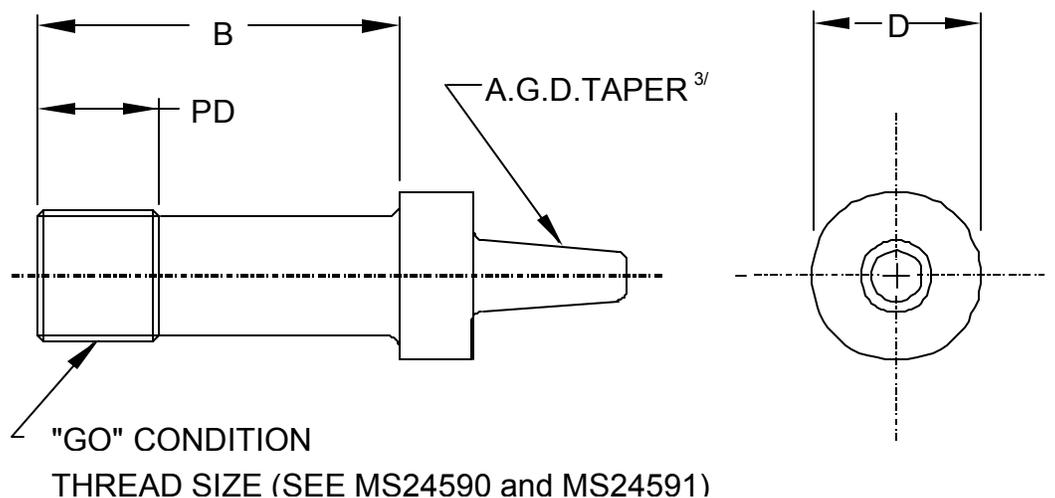
Adapter size number	Hose size number	A diameter (ref)	B ^{1/} diameter +.005, -.000	C ^{2/} diameter minimum
-3	-3	.123	.123	.080
-4	-4	.157	.170	.132
-5	-5	.219	.232	.200
-6	-6	.281	.295	.260
-8	-8	.383	.390	.350
-10	-10	.469	.484	.450
-12	-12	.578	.608	.575
-16	-16	.781	.813	.781
-20	-20	1.031	1.045	1.015
-24	-24	1.276	1.279	1.250
-32	-32	1.745	1.748	1.719
-40	-40	2.209	N/A	2.178
-48	-48	2.834	N/A	2.803

Notes:

- ^{1/} B diameter is applicable to an adapter that requires a mandrel for assembling adapters to the hose.
- ^{2/} C diameter indicates maximum permissible bulge of inner tube when hose is assembled with adapters.
- ^{3/} Dimensions are in inches.

FIGURE 1. Minimum diameters of hose inner tube when adapters are assembled with hose conforming to MIL-DTL-8794.

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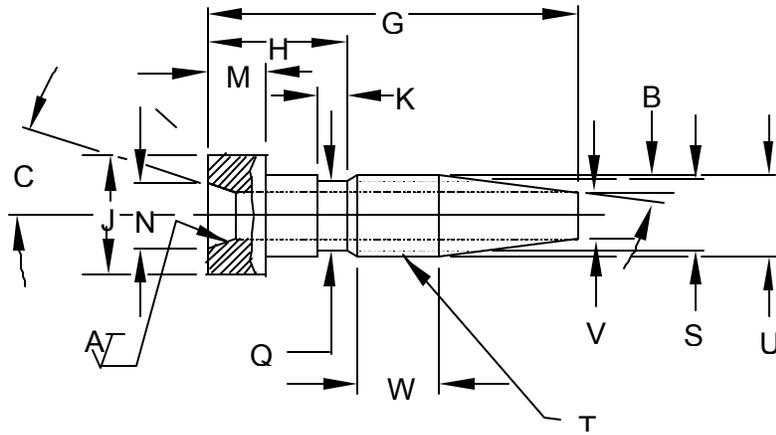
Size of socket to be inspected: ^{1/}	B ±.015	D +.0002 -.0000	PD ^{2/}
MS24591-3	.844	.4853	.2141
MS24591-4	.938	.5453	.2607
MS24591-5	1.000	.6253	.3418
MS24591-6	1.094	.7153	.3978
MS24591-8	1.500	.8053	.5354
MS24591-10	1.625	.9853	.6604
MS24591-12	1.969	1.1453	.7800
MS24590-16	1.625	1.2753	1.0264
MS24590-20	1.625	1.5403	1.2764

Notes:

- 1/ This gauge need not be used with sizes -24 and larger.
- 2/ PD is the depth of thread engagement for a "Go" condition.
- 3/ A.G.D. = American Gauge Design.
- 4/ Dimensions are in inches.

FIGURE 2. Socket concentricity gauge.

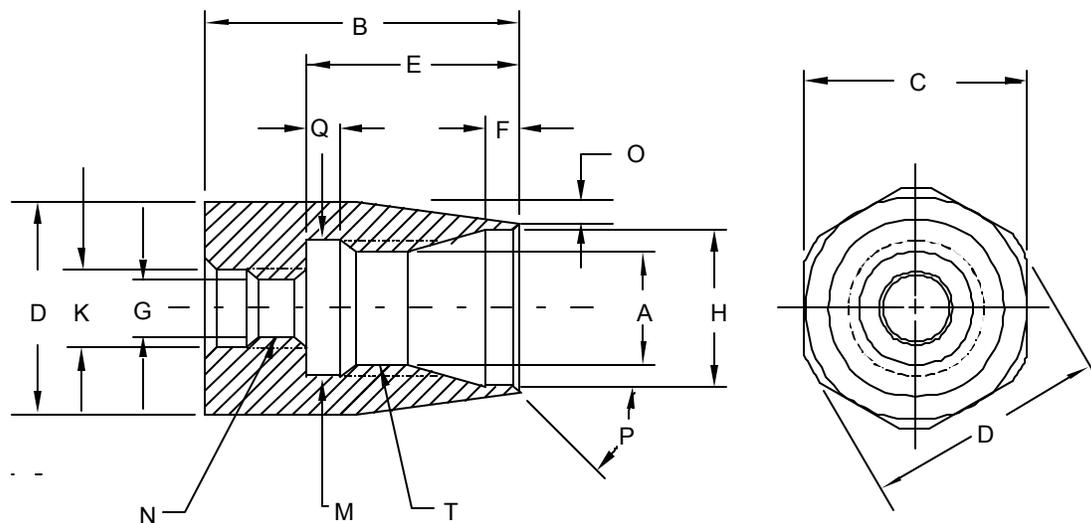
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A	Cone seat surface finish	N	Cone seat diameter
B	Nose angle	Q	Thread relief OD
C	Cone seat angle	S	Nose gauge point (thread ID)
G	Overall length	T	Thread size
H	Length from cone seat end to thread	U	Thread OD
J	Nipple head OD	V	Through ID
K	Width of thread relief	W	Minimum thread length
M	Width of nipple head		

FIGURE 3. Inspection characteristics for nipples.

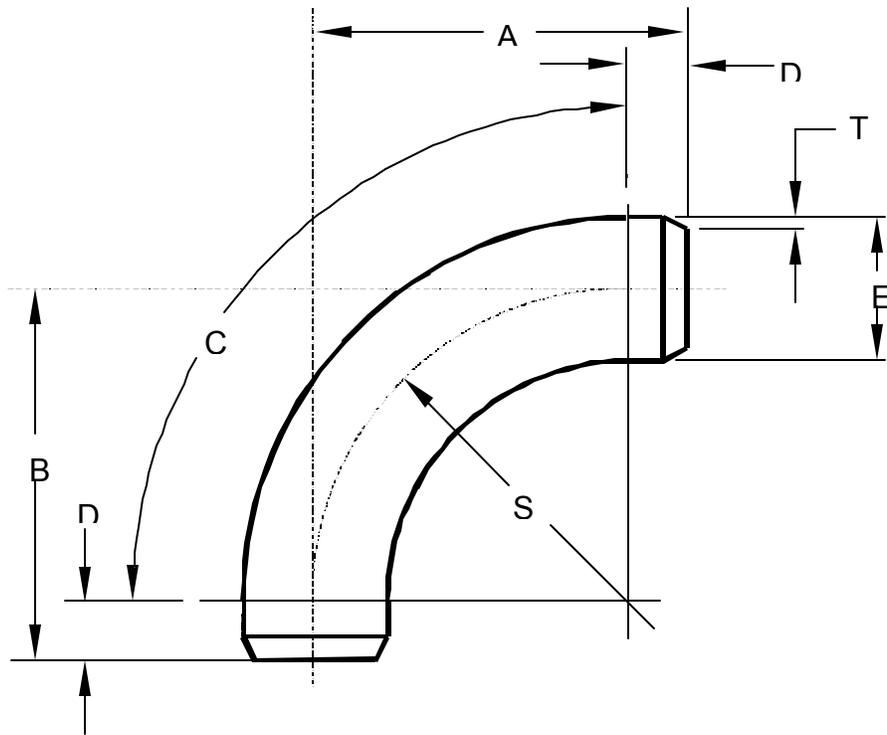
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A	Left-hand thread ID	K	Counterbore ID
B	Overall length	M	Recess diameter
C	Hex size	N	Right-hand thread size
D	Machined OD of hex	O	Linear difference of OD taper angle
E	Location of recess	P	Internal taper angle at hose end
F	Counterbore depth	Q	Width of recess
G	Right-hand thread ID	T	Left-hand thread size and form
H	Skirt ID		

FIGURE 4. Inspection characteristics for sockets.

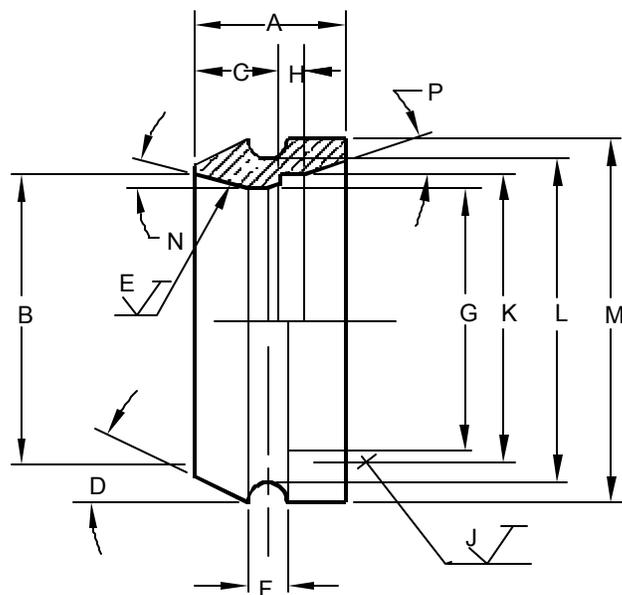
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- A Length of leg
- B Length of leg
- C Degree of bend
- D Length of straight portion (both ends)
- E OD of tube
- S Radius of bend
- T Wall thickness

FIGURE 5. Inspection characteristics for MS27234 and MS27235 tubes.

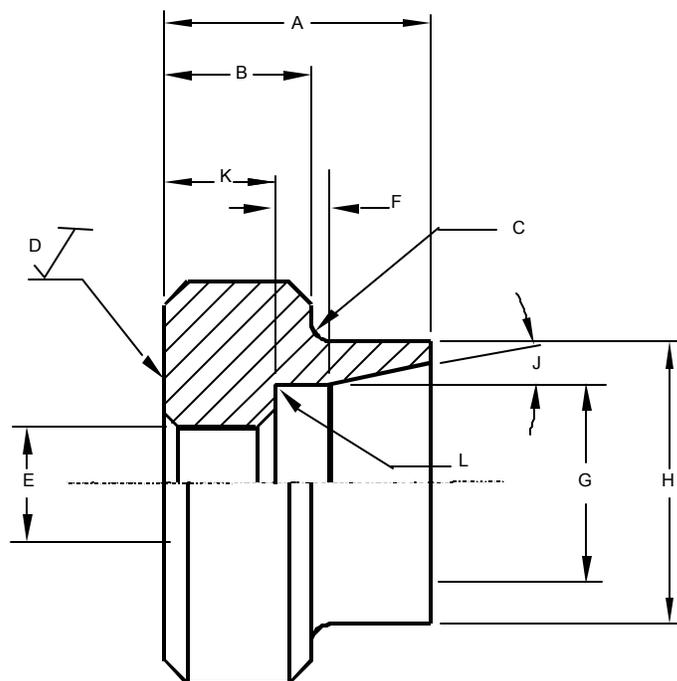
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A	Overall length	H	Tube support length
B	Maximum ID at cone seat	J	Surface finish for K ID
C	Depth of shoulder extending from end of tube	K	Tube accommodating ID
D	Relief angle	L	Wire relief groove ID
E	Seat surface	M	Outside diameter
F	Width of wire relief	N	Seat angle
G	Minimum ID	P	Brazing accommodation angle

FIGURE 6. Inspection characteristics for MS27236 shoulder.

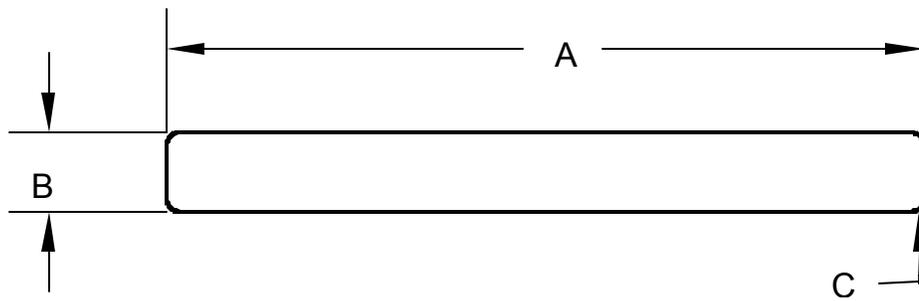
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- A Overall length
- B Flange shoulder height
- C Radius
- D Surface finish
- E Inside diameter
- F Tube support length
- G Diameter for OD of tube
- H OD of shank portion
- J Brazing accommodation angle
- K Depth of ID E
- L Inside radius

FIGURE 7. Inspection characteristics for MS27237 shoulder.

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A	Wire length
B	Wire diameter
C	Radius

FIGURE 8. Inspection characteristics for MS27238 wire.

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7, and send to preparing activity.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-DTL-5070E	2. DOCUMENT DATE (YYYYMMDD) 20000922
3. DOCUMENT TITLE Adapter, Hose to Tube, Pipe, and Flange, Reusable - Hydraulic, Fuel, and Oil Lines, General Specification for		
4. NATURE OF CHANGE <i>(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)</i>		
5. REASON FOR RECOMMENDATION		
6. SUBMITTER		
a. NAME <i>(Last, First, Middle Initial)</i>		b. ORGANIZATION
c. ADDRESS <i>(Include zip code)</i>	d. TELEPHONE <i>(Include Area Code)</i> (1) Commercial (2) DSN <i>(if applicable)</i>	7. DATE SUBMITTED <i>(YYYYMMDD)</i>
8. PREPARING ACTIVITY		
a. NAME Defense Logistics Agency Defense Supply Center, Columbus		b. TELEPHONE <i>(Include Area Code)</i> (1) Commercial (614) 692-0538 (2) DSN 850-0538
c. ADDRESS <i>(Include Zip Code)</i> DSCC-VAI P.O. Box 3990 Columbus, Ohio 43216-5000		IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Standardization Program Office (DLSC-LM) 8725 John J. Kingman Road, Suite 2533 Fort Belvoir, Virginia 22060-6621 Telephone (703) 767-6888 DSN 427-6888