

INCH-POUND
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MIL-DTL-85061C  
 07 January 2009  
 SUPERSEDING  
 MIL-C-85061B  
 w/AMENDMENT 2  
 22 September 1986

## DETAIL SPECIFICATION

### COUPLING, FUEL LINE, FLEXIBLE, 125 PSI

Inactive for new design after 07 January 2009. For new design, use SAE-AS5356.
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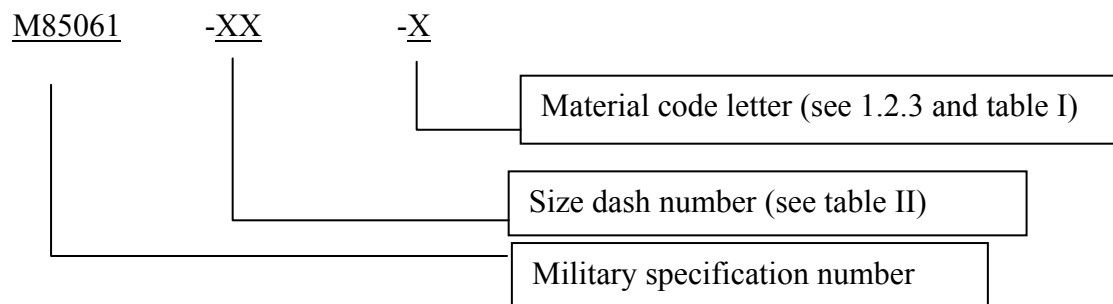
This specification is approved for use by all Departments and Agencies of the Department of Defense.

#### 1. SCOPE

1.1 Scope. This specification covers flexible couplings for joining tubing with SAE-AS5131 style A beaded ends for use in aircraft fuel and vent systems (see 6.1).

1.2 Classification. Coupling materials and sizes are as specified in table I and table II.

1.2.1 Part or Identifying number (PIN). The part or identifying number to be used for couplings acquired to this specification is identified as follows:



<p>Comments, suggestions, or questions on this document should be addressed to the Naval Air Systems Command, Attention: Code 4L8000B120-3, Highway 547, Lakehurst, NJ 08733-5100 or emailed to <a href="mailto:michael.sikora@navy.mil">michael.sikora@navy.mil</a>. Since contact information can change, you may want to verify the currency of this address information using the ASSIST online database at <a href="http://assist.daps.dla.mil">http://assist.daps.dla.mil</a>.</p>
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1.2.2 Size. The size of couplings in dash numbers are specified in table II.

1.2.3 Material. The basic material of the coupling is designated by the code letters as specified in table I.

## 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 of documents cited in sections 3 and 4 of this specification, whether or not they are listed.

### 2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbook form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

#### FEDERAL STANDARD

FED-STD-H28/2       -       Screw-Thread Standards for Federal Services Section 2  
Unified Inch Screw Threads- UN and UNR Thread Forms

#### DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-DTL-5624       -       Turbine Fuel, Aviation, Grades JP-4 and JP-5  
MIL-PRF-7024       -       Calibrating Fluids, Aircraft Fuel System Components  
MIL-A-8625       -       Anodic Coatings for Aluminum and Aluminum Alloys  
MIL-DTL-83133       -       Turbine Fuel, Aviation, Kerosene Type, JP-8 (NATO F-34)  
and NATO F-35 and JP-8+100 (NATO F-37)

#### DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-129       -       Military Marking for Shipment and Storage  
MIL-STD-130       -       Identification Marking of U.S. Military Property  
MIL-STD-810       -       Environmental Engineering Considerations and  
Laboratory Tests  
MIL-STD-889       -       Dissimilar Metals

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## DEPARTMENT OF DEFENSE HANDBOOK

MIL-HDBK-470 - Designing and Developing Maintainable Products  
And Systems, Volume 1

(Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch/> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, 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 these documents are those cited in the solicitation or contract.

## SAE INTERNATIONAL

SAE-AS5131 - Tubing End, Beaded, Design Standard (DoD Adopted)  
SAE-AS29512 - Packing, Preformed; Hydrocarbon Fuel Resistant,  
Tube Fittings, O-Ring (DoD Adopted)  
SAE-AS29513 - Packing, Preformed, Hydrocarbon Fuel Resistant,  
O-Ring (DoD Adopted)  
SAE-AMS-P-5315 - Butadiene-Acrylonitrile (NBR) Rubber for Fuel  
Resistant Seals 60 to 70 (DoD Adopted)

(Copies of these documents are available online at <http://www.sae.org> or from the SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001.)

## ASTM INTERNATIONAL

ASTM-D3951 - Standard Practice for Commercial Packaging  
(DoD Adopted)

(Copies of this document are available online at <http://www.astm.org> or from the ASTM International, P.O. Box C700, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

## AEROSPACE INDUSTRIES ASSOCIATION (AIA)

NASM 20995 - Wire, Safety or Lock (DoD Adopted)  
NASM 33540 - Safety Wiring, Safety Cabling, Cotter Pinning General  
Practices for (DoD Adopted)

(Copies of these documents are available on line at <http://www.aia-aerospace.org> or from the Aerospace Industries Association, 1000 Wilson Boulevard, Suite 1700, Arlington, VA 22209-3928.)

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AMERICAN SOCIETY FOR QUALITY (ASQ)

ANSI/ASQ Z1.4 - Sampling Procedures and Tables for Inspection by Attributes (DoD Adopted)

(Copies of this document are available from American Society for Quality, 600 North Plankinton Ave., Milwaukee, WI 53203.)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, 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 First article. When specified (see 6.2d), a sample shall be subjected to first article inspection (see 6.3) in accordance with 4.2.

3.2 Materials. Materials shall conform to applicable specifications and shall be as specified in table I. Materials which are not covered by applicable specifications or which are not specifically described herein shall be of the lightest practicable weight and compatible with aircraft fuel. All materials shall be resistant to fluids conforming to MIL-PRF-7024, MIL-DTL-5624, and MIL-DTL-83133 to ensure satisfactory operation.

3.2.1 Metals. Metals shall be of a corrosion resisting material or treated in a manner to render them adequately resistant to corrosion when exposed to climatic and environmental conditions encountered during the service life of the equipment. The use of any protective coating that will crack, chip, or scale with age or extremes of climatic and environmental conditions shall be avoided.

3.2.1.1 Aluminum alloy parts. All aluminum alloy parts shall be anodized in accordance with MIL-A-8625, type II, class 1 or class 2.

3.2.1.2 Steel parts. All steel parts shall be corrosion-resistant steel. Non-corrosion parts shall not be used.

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TABLE I. Coupling materials.

Material	Code
Aluminum	A
Corrosion Resistant Steel (CRES)	B

3.2.2 Fungus proof materials. Materials that are not nutrients for fungi shall be used to the greatest extent practicable. In cases where materials that are nutrients for fungi must be used, such materials shall be treated with fungicidal agent as approved by the contracting activity.

3.2.3 Dissimilar metals. Combinations of tubing and all contacting coupling parts shall be compatible in accordance with MIL-STD-889.

3.3 Design and construction. The coupling shall be designed for connection of AS5131 tubing style A beaded ends and shall meet the requirements of figure 1 and table II.

3.3.1 Threads. Screw threads shall conform to FED-STD-H28/2. All threaded parts shall be securely locked in such a manner as to prevent loosening under test conditions specified herein and under normal service usage. Safety wire per NASM 20995 shall be installed in accordance with NASM 33540. Wrenching features shall conform to figure 1. Pipe threads shall not be used.

3.3.2 Angular misalignment. The coupling shall be capable of being installed with a maximum tubing installation misalignment of 3 degrees in any direction.

3.3.3 Flexure. The coupling shall provide for 1 degree flexure in any direction from any installed position. The coupling shall provide for a variation in space between tubing ends of 0.062 to 0.188 inch.

3.3.4 Permanent deformation. Installation of the coupling on tubing ends under conditions specified herein shall not produce a permanent deformation of the coupling.

3.3.5 Tubing. The coupling shall be capable of connecting tubing having an outside diameter (OD) and wall thickness as specified in table III.

3.4 O-ring seal. The seal, which is used for testing purposes only and is not furnished as part of the flexible coupling, shall be in accordance with SAE-AMS-P-5315, and SAE-AS29512 or SAE-AS29513 of the applicable size specified in table II.

3.5 Configuration, dimensions, and weight. The configuration, dimensions and weight shall be in accordance with figure 1 and table II.

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3.6 Performance. The coupling when installed on tubing in any position (attitude) shall meet all the performance requirements when tested as specified in section 4 of this specification.

3.6.1 Visual examination. Each coupling shall be examined and inspected as specified in 4.5.1.1 and shall have no defects. All dimensions and weights shall conform to the requirements of this specification.

3.6.2 Proof pressure. The coupling assembly shall be designed to withstand a proof pressure of  $250 \pm 5$  psi. A decrease in pressure when pressurized to proof pressure as specified in 4.5.2 or any leakage (see 6.4.4) shall be cause for rejection of the coupling.

3.6.3 Leakage.

3.6.3.1 Vacuum leakage. The coupling assembly shall be subjected to the negative proof pressure specified in 4.5.3.1. A decrease in pressure exceeding 0.5 Hg shall be cause for rejection of the test sample.

3.6.3.2 Pneumatic leakage. The coupling assembly shall be tested with pneumatic pressure equal to proof pressure as specified in 4.5.3.2 for 3 minutes at room temperature. The test sample shall be rejected if there is any evidence of leakage during the test.

3.6.4 Fuel resistance. The coupling assembly shall not leak (sufficient to form a drop) nor show evidence of damage when subjected to high temperature fuel aging at 200 °F, low temperature fuel aging at -65 °F and air dry out at 200 °F when tested as specified in 4.5.4.

3.6.5 Vibration. The coupling assembly shall show no evidence of malfunction or structural failure (see 6.4.3) and shall pass the proof pressure test after exposure to vibration levels as specified in 4.5.5.

3.6.6 Repeated assembly. There shall be no evidence of deformation, damage or degradation in the connecting ability of the coupling after 25 repeated assembly and disassembly operations specified in 4.5.6. After repeated assembly and disassembly, the test coupling shall pass the proof pressure test without fuel leakage (see 6.4.3).

3.6.7 Salt fog. The coupling assembly shall pass the salt fog test specified in 4.5.7 without any evidence of excessive corrosion, peeling, blistering of the finish or exposure of base metal. Threads, connecting surfaces, and sealing surfaces shall be free of corrosion.

3.6.8 Flexure. The coupling assembly, when tested as specified in 4.5.8 with a 3 degree tubing misalignment and flexure at  $\pm 0.5$  degree for 28,800 cycles followed by the proof pressure test shall show no evidence of leakage, rupture, permanent set, permanent deformation or damage.

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3.6.9 Surge pressure. The coupling assembly shall withstand 50,000 pressure surge cycles without evidence of malfunction or leakage when tested at room temperature as specified in 4.5.9.

3.6.10 Burst pressure. The coupling assembly shall be designed to meet the burst pressure requirements at room and extreme temperatures and shall pass the tests specified in 4.5.10.1 and 4.5.10.2.

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TABLE II. Coupling dimensions and weights.

Dash No.	O.D. Tube (inch)	A	B (MIN)	D (MAX)	G (MIN)	L (MAX)	No. of lugs U	O-ring Seal <u>3/</u>
-04	.250	3.390	1.810	.890	1.220	1.794	--	-010
-06	.375	3.610	2.620	1.100	1.289	1.954	4	-110
-08	.500			1.230	1.291			-112
-10	.625			1.360				-114
-12	.750	3.840		1.480	1.300	2.230		-210
-16	1.000	4.010	2.840	1.730	1.430	2.350	8	-214
-20	1.250			1.980				-218
-24	1.500	4.500	3.130	2.470	1.580	2.600		-325
-28	1.750			2.720				-327
-32	2.000			2.970				-329
-40	2.500			3.470		12	-333	
-48	3.000			3.970			-337	
-56	3.500	4.610	3.190	4.600		2.650	16	-341
-64	4.000			5.100	-345			
-72	4.500	4.740		5.660	1.710			-349
-80	5.000	5.270	3.470	6.231	1.800	2.930		-429
-88	5.500			6.680				-433
-96	6.000	5.980	3.700	7.230	1.920	3.160		-437

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TABLE II. Coupling dimensions and weights- Continued.

Dash No.	W (min)	T ±.016	Weight lbs (max)	
			Aluminum	CRES
-04	---	----	0.030	0.106
-06	0.180	0.093	0.038	0.114
-08			0.046	0.138
-10			0.056	0.168
-12	0.187	0.135	0.078	0.265
-16			0.130	0.320
-20			0.142	0.334
-24	0.242		0.550	
-28	0.255		0.720	
-32	0.294		0.741	
-40	0.250	0.145	0.350	1.051
-48			0.438	1.310
-56		0.160	0.563	1.780
-64			0.782	2.030
-72		0.175	0.875	2.680
-80			1.140	3.200
-88			1.268	3.380
-96			1.900	3.600

## NOTES:

1/ Dimensions are in inches2/ Unless otherwise specified tolerances  $\pm .010$ 3/ See detail dimensions on SAE-AS29513 and SAE-AS29512 for O-ring dimensions4/ Dimensions W and T are for nut only

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TABLE III. Tubing size and wall thickness.

Tube O.D (inches)	Nominal Wall Thickness Minimum (inches)		Tube O.D (inches)	Nominal Wall Thickness Minimum (inches)	
	AL	CRES		AL	CRES
.250	.028	.020	2.000	.035	.035
.375	.028	.020	2.500	.042	.035
.500	.035	.020	3.000	.042	.035
.625	.035	.020	3.500	.049	.049
.750	.035	.020	4.000	.049	.049
1.000	.035	.020	4.500	.065	.049
1.250	.035	.025	5.000	.065	.049
1.500	.035	.025	5.500	.065	.049
1.750	.035	.035	6.000	.065	.049

3.6.10.1 Burst pressure at temperature extremes. The coupling assembly shall not rupture nor show evidence of leakage at any pressure when tested as specified in 4.5.10.1.

3.6.10.2 Burst pressure at room temperature. The coupling assembly shall not rupture nor show evidence of leakage at any pressure when tested as specified in 4.5.10.2.

3.7 Maintainability. The coupling assembly when installed in aircraft shall not require periodic maintenance. The seals installed in the coupling shall be easily replaceable with no damage to other parts and shall be able to be removed with a minimum of disturbance or displacement of the installed coupling and tubing. The coupling system maintainability requirements shall be integrated with the overall aircraft system maintainability programs and shall comply with the requirements of MIL-HDBK-470.

3.8 Reliability. The coupling assembly shall be designed to withstand the strains, vibrations, temperature environment incident to aircraft installation and services usage. The reliability of the coupling assembly shall be an integral part of reliability requirements of the total aircraft systems.

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3.9 Interchangeability of parts. All parts having the same design activity, Commercial and Government Entity (CAGE) code and manufacturer's part number shall be interchangeable. Each lot (see 6.4.5) shall be manufactured by the same manufacturer, have the same manufacturer's part number, and shall be made out of the same material and process at the same time.

3.10 Identification marking of product. The coupling assemblies shall be marked for identification in accordance with MIL-STD-130. In addition, the coupling assembly shall have the following markings (see 1.2.1):

M85061-XX-X (basic specification, size dash number, and material code)  
Manufacturer's name and part number

3.11 Workmanship. The coupling shall be fabricated and finished with no defects, cracks, burrs, tool marks, or sharp edges. Where dimensions are critical and affect the interchangeability of parts, they shall be within the tolerances specified.

3.12 Inspection for delivery. The coupling and its container shall be inspected in accordance with 4.5.1.2 to make sure the parts are correct and marked properly before delivery.

#### 4. VERIFICATION

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

- a. First article inspection (see 4.2).
- b. Conformance inspection (see 4.3).

4.2 First article inspection. First article inspection shall consist of all examinations and tests specified in table IV.

4.2.1 First article samples. Unless otherwise specified in the contract or order, as soon as practicable after the award of the contract or order, the manufacturer shall submit two couplings of each size and material specified in the contract or order and two complete sets of detail and assembly drawings. The samples shall be representative of the construction, workmanship, internal components, and materials used during production. When a manufacturer is in continuous production of these units from contract to contract, submission of further first article samples on a new contract may be waived at the discretion of the acquiring activity (see 6.2c). Approval of the first article samples or the waiving of the first article inspection does not waive the requirements of submitting to the conformance inspection. The first article inspection samples shall be furnished to the Government as directed by the contracting activity (see 6.2e).

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4.3 Conformance inspection. Conformance inspection shall consist of:

- a. Individual inspection (see 4.3.1).
- b. Sampling inspection (see 4.3.2).

4.3.1 Individual inspection. Each coupling shall be visually examined to determine that the coupling complies with the requirements specified in 4.5.1. Any coupling failing to pass the examination shall be rejected.

TABLE IV. First article inspection.

Item	Test description	Requirement paragraphs	Test paragraphs
1	Visual examination	3.6.1	4.5.1
2	Proof pressure	3.6.2	4.5.2
3	Leakage	3.6.3	4.5.3
4	Fuel resistance	3.6.4	4.5.4
5	Vibration	3.6.5	4.5.5
6	Repeated assembly	3.6.6	4.5.6
7	Salt fog	3.6.7	4.5.7
8	Flexure	3.6.8	4.5.8
9	Surge pressure	3.6.9	4.5.9
10	Burst pressure	3.6.10	4.5.10
11	Workmanship	3.11	--
12	Inspection for delivery	3.12	4.5.1.2

4.3.2 Sampling inspection. The sample size shall be selected in accordance with ANSI/ASQ Z1.4 inspection level I, acceptable quality level (AQL) as specified in the contract and shall pass the tests listed in table V except tests shall be performed at room temperature. If the sample fails to pass this test, the lot represented by this sample shall be rejected. The tested coupling shall be discarded.

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TABLE V. Sampling inspection.

Test description	Requirement paragraphs	Test paragraphs
Proof pressure	3.6.2	4.4.2
Repeated assembly	3.6.6	4.5.6

4.3.3 Rejection and retest. When a sample from a lot fails the first article tests, acceptance of couplings in the lot shall be withheld until the extent and cause of failure are determined. When corrections have been made, the first article tests shall be repeated.

4.3.3.1 Resubmitted lot. Where a lot has been rejected by the procuring activity or contracting activity and before it can be resubmitted for first article test, the cause of rejection and the action taken shall be furnished in writing by the contractor and submitted to the contracting or procuring activity.

#### 4.4 Test conditions.

4.4.1 Test fluid. Unless otherwise specified, the test fluid shall be in accordance with MIL-PRF-7024.

4.4.2 Pressure and temperature. The pressure and temperatures specified in table VI shall apply to all tests required by this specification.

4.4.3 Test assembly. Each test coupling assembly shall consist of two tubes, between 12-20 inches long, with SAE-AS5131 beaded ends at the end of each tube. The two tubes shall be joined by the test coupling as shown on figure 1 to make up the test assembly. For the fuel resistance test, each test assembly shall be closed on one end to accommodate the test as specified in 4.5.4. Unless otherwise specified, O-ring seals shall conform to SAE-AMS-P-5315, SAE-AS29512, and SAE-AS29513. If seal leakage occurs during the test, the test coupling shall not re-torque (see 6.4.6). Record the cause of leakage, the name of the test, and when leakage occurred. Install a new seal or seals and continue the test (see 6.3).

4.4.4 Tubing wall thickness. The tubing used in testing the coupling shall have a minimum wall thickness as specified in table III.

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TABLE VI. Temperature and pressure requirements.

Fluid	Temperature ( $\pm 5$ °F) Fluid and Ambient	Pressure ( $\pm 5$ psi)		
		Operating	Proof	Burst
MIL-PRF-7024	-65 °F to +200 °F	125	250	375

4.5 Inspection methods.4.5.1 Visual examination.

4.5.1.1 Coupling. The coupling shall be visually examined to determine conformance to this specification with respect to configuration, dimensions, weight and all the requirements not covered by tests specified herein.

4.5.1.2 Inspection for delivery. The fully prepared shipping container containing couplings shall be visually examined to determine that the packaging, packing and marking conform to section 5 of this specification.

4.5.2 Proof pressure. The coupling test assembly shall be subjected to a proof pressure of 250 PSIG at +200 °F for 5 minutes using MIL-PRF-7024 test fluid. After completion of this test, drain the test assembly and refill with MIL-PRF-7024 test fluid and repeat proof pressure test at 250 PSIG and -65 °F for 5 minutes. Any leakage, rupture, permanent set, permanent deformation, or damage of any part of the test coupling shall be cause for rejection.

4.5.3 Leakage.

4.5.3.1 Vacuum leakage. The test coupling shall be free of fuel, oil, and vapor. The coupling shall be connected with a vacuum pump to a 0.5 inch x10 ft hose or tube. A stop valve shall be installed adjacent to the pressure gauge in line with the pump. Pressure shall be measured within 6 inches of the coupling. A negative proof pressure of 28 inches of Hg for -4 thru -32 and 12 inches of Hg for -36 thru -96 shall be subjected to the coupling and maintained for 15 minutes. A stop valve shall be closed and the pressure shall be monitored for 5 minutes for leakage. The leakage shall meet the requirements specified in 3.6.3.1.

4.5.3.2 Pneumatic leakage. The test coupling shall be placed in a protective closure and shall be proof pressure tested at room temperature for 3 minutes. The test fluid shall be dry air or nitrogen. The test coupling shall be thoroughly clean, with no external oil or lubricant. The coupling shall meet the requirements specified in 3.6.3.2.

4.5.4 Fuel resistance test.

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4.5.4.1 High temperature fuel aging. MIL-PRF-7024 test fluid shall be circulated in a coupling test assembly for 72 hours at 200°F and 250 PSIG. During the final 8 hours of this test, the assembly shall be vibrated in accordance with 4.5.5. Upon completion and while still mounted, the coupling test assembly shall be proof tested at 250 PSIG and +200°F and held at that pressure and temperature for not less than 1 minute. There shall be no evidence of leakage or deformation of the coupling. Any leakage or damage to the coupling shall be cause for rejection.

4.5.4.2 Low temperature fuel aging. MIL-PRF-7024 test fluid shall be circulated in a coupling test assembly for 72 hours with the fluid at 250 PSIG and -65°F. During the final 8 hours of this test, the coupling assembly shall be vibrated in accordance with 4.5.5. Upon completion of the vibration test, and while still mounted in accordance with 4.5.5, the assembly shall be proof tested at 250 PSIG and at -65°F with the pressure and temperature held for not less than 1 minute. There shall be no evidence of leakage or deformation of the coupling. Any leakage or damage to the coupling shall be cause for rejection.

4.5.4.3 Air dry out. Upon completion of the low temperature fuel aging test, the coupling test assembly shall be drained and all caps removed. The coupling test assembly with both ends open shall be placed in an air oven for 168 hours at +200°F. The low temperature fuel aging test of 4.5.4.2 shall be repeated upon completion of the air dry out test.

4.5.5 Vibration test.

4.5.5.1 Vibration test setup. The coupling assembly shall be mounted on a vibration test fixture as shown on figure 2 with an angular displacement of 3 degrees between tube centerline. The distance between test assembly table supports, with the coupling located in the center of the assembly, shall be 20 inches for all sizes. The X and Y axes of the test assembly shall be parallel to the vibration table and the direction of vibration Z shall be perpendicular to the vibration table.

4.5.5.2 Vibration test. Unless otherwise specified in the contract, the vibration test shall be conducted in accordance with MIL-STD-810 method 514.6 and the applicable test procedures and categories specified in table VII herein.

4.5.6 Repeated assembly. The coupling assembly shall be tested with repeated assembly and disassembly for 25 operations. There shall be no evidence of damage or degradation in the connecting ability of the coupling. After the repeated assembly test, the coupling assembly shall be subjected to the proof pressure test as specified in 4.5.2. Any leakage or malfunction shall be cause for rejection of the coupling assembly.

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TABLE VII. Vibration tests.

Type of Equipment	MIL-STD-810		
	Test procedure	Test category	Vibration exposure
Jet aircraft	I	12	Figure 514.6D-1
Propeller aircraft	I	13	Figure 514.6D-2
Helicopter	I	14	Figure 514.6D-3
Ground vehicles	I	20	Figure 514.6D-8
Marine vehicles	I	21	Figure 514.6D-9

4.5.7 Salt fog. Unless otherwise specified in the contract, the coupling assembly shall be exposed to salt fog for 146 hours in accordance with MIL-STD-810, method 509.5. After 168 hours of exposure, the test specimen shall be examined for evidence of corrosion or other damage of the finish. The proof pressure test shall be performed in accordance with 4.5.2. Any leakage or failure shall cause for rejection of the coupling test assembly.

4.5.8 Flexure. The tubing on one side of the coupling test assembly shall be rigidly fixed while the other tube shall be mounted eccentrically on a power driven spindle (see figure 3). The test setup shall provide 0.5 degree flexure in any direction with an initial 3 degrees misalignment between the tubing centerlines. MIL-PRF-7024 test fluid shall be introduced into the coupling test assembly at a pressure of 12 PSIG. The test fluid temperature shall be maintained at +200°F for the first 4 hour test period and -65°F during the second 4 hour period. The test assembly shall be flexed for 8 hours at a minimum frequency of 60 cycles per minute. At the completion of the test, a proof pressure test shall be conducted at a pressure of 250 PSIG and -65°F for 3 minutes. There shall be no evidence of leakage, rupture, permanent set, permanent deformation or damage of any part of the coupling. Any leakage or damage of the coupling during the test shall be cause for rejection of the test coupling.

4.5.8.1 Disassembly and inspection. Upon completion of the flexure test, the coupling shall be disassembled and each part and tubing end examined. Any evidence of cracks, ruptures, or any other structural deformation or failures of any coupling part shall be cause for rejection of the test coupling.

#### 4.5.9 Surge pressure.

4.5.9.1 Test setup. Two 2-inch couplings shall be assembled with three lengths of 2 inch O.D. x 0.035 inch wall thickness (see table III) to make up a pressure surge cycle test assembly (see figure 4). Two test assemblies shall be used as shown on figure 5.

a. The middle section of the tube assemblies shall be in the form of a capped or plugged tee. One end of the assembly shall be capped and ported through the cap for connection of an adapter to provide for filling of fluid and pressurization. The other end shall be capped and

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ported to accept a pressure transducer with a response in the order of 30 milliseconds (see figure 5).

b. Each tube assembly shall be filled with MIL-PRF-7024 test fluid and mounted so that movement of the tube assemblies is not restricted.

4.5.9.2 Pressurization source. The pressurization source shall be designed to impose a pressure of 0 to 180 PSIG and back to 0 PSIG in a time period of 60 milliseconds with a rate of cycling of one cycle every two seconds. Means shall be provided to vary this pressure to each assembly in alternate operations.

a. The pressurizing system shall provide a pressure regulator to ensure a constant pressure being applied to the assembly at each cycle.

4.5.9.3 Instrumentation. Each coupling test assembly shall have its pressure transducer connected to a pressure recorder equipped with a galvanometer and electronic counter to record the cycling pressure of each assembly (see figure 5).

4.5.9.4 Test procedure. Coupling test assemblies shall be pressurized by starting the pump in the system. The accumulator gate valve, the pump pressure regulator and the nitrogen charge accumulator shall be adjusted to control the pressure and pressure rise time during the test.

a. The timer or the electrically operated multi port valve shall be adjusted to produce a pressure surge of 0 to 180 PSIG to 0 PSIG in two second intervals with the pressure surge peaks to be measured in seconds or fraction of a second (see figure 6).

b. The coupling test assemblies shall be subjected to 50,000 pressure surge cycles. There shall be no evidence of leakage or malfunction from any coupling during the pressure surge cycling.

#### 4.5.10 Burst pressure test.

4.5.10.1 Burst pressure tests at temperature extremes. The coupling test assembly shall be subjected to a pressure of  $375 \pm 5$  PSIG, with the test fluid at a temperature of  $-65^{\circ}\text{F}$  for 5 minutes. The pressure test shall then be repeated using test fluid at a temperature of  $200^{\circ}\text{F}$  and a pressure of  $375 \pm 5$  PSIG for 5 minutes. The test fluid shall be in accordance with MIL-PRF-7024 for both tests.

4.5.10.2 Burst pressure test at room temperature. The coupling test assembly shall be subjected to a pressure of  $375 \pm 5$  PSIG for 5 minutes with the test fluid at a temperature of  $75^{\circ}\text{F}$ . The test fluid shall be in accordance with MIL-PRF-7024.

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4.5.10.3 Disassembly and inspection. Upon completion of the burst pressure test, the coupling shall be disassembled and each part and tubing end examined. Any evidence of cracks, ruptures, or any other structural deformation or failures of any coupling part shall be cause for rejection of the test coupling.

## 5. PACKAGING

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

5.2 Cleaning and drying. Prior to packing, internal and external surfaces of the coupling and coupling parts shall be cleaned and dried.

5.3 Marking. In addition to any special or other identification marking required by the contract, each container shall be marked in accordance with MIL-STD-129 and unless otherwise specified shall include bar code markings. Marking for commercial packages and interior and exterior packs shall be in accordance with ASTM-D3951. The complete military and contractor's part number as applicable including the CAGE code shall be marked on all units.

## 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 flexible couplings covered by this specification are intended for connecting two SAE-AS5131 style A beaded tube ends used in aircraft fuel and vent systems. Variable ferrule type couplings are specified in MIL-C-22263, associated specification sheets, SAE-AS1710 and SAE-AS1720.

6.1.1 Military application. This specification is maintained to support C-130 series military aircraft which has beaded tubing end and is available for use other military aircraft with similar design. Beaded tubing ends have no known commercial application.

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6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number and date of this specification.
- b. Part number (PIN) of coupling required (see 1.2.1).
- c. Whether first article inspection is waived (see 4.2.1).
- d. First article inspection report.
- e. Name and address of the first article inspection laboratory and the name of the Government activity responsible for conducting the first article inspection program (see 6.3).
- f. Applicable levels of preservation, packaging, and packing (see 5.1 and 5.2) including marking requirements (see 5.3).

6.3 First article. When first article inspection is required, the contracting officer should provide specific guidance to offerors whether the item(s) should be a preproduction sample, a first article sample, a first production item, a sample selected from the first production items, a standard production item from the contractor's current inventory, and the number of items to be tested as specified in 4.2.1. The contracting officer should also include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results, and disposition of first articles. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract. Bidders should not submit alternate bids unless specifically requested to do so in the solicitation.

6.4 Definitions.

6.4.1 Connector. Connector as used herein is defined as a replaceable component which connects one coupling half to another coupling half.

6.4.2 Failure. Failure as used herein is defined as any deformation that would contribute to seal leakage or would promote premature fatigue breakage, unless otherwise determined to be due to a tubing defect.

6.4.3 Leakage. Leakage as used herein is defined as the escape of fluid (gaseous or liquid) from any point of the coupling assembly including the coupling tube junction.

6.4.4 Lot. A lot is defined as products consisting of all parts of a given part number made from the same batch of material and processed at the same time.

6.4.5 Torque. Torque as used in this specification is defined as the necessary loads (or assembly stresses) to assure the sealing of fluid at the coupling tube junction without causing damage.

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6.5 Subject term (key word) listing.

Adapter fluid  
Connector fluid  
Flexible joint  
Fluid delivery  
Tube connector

6.6 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.

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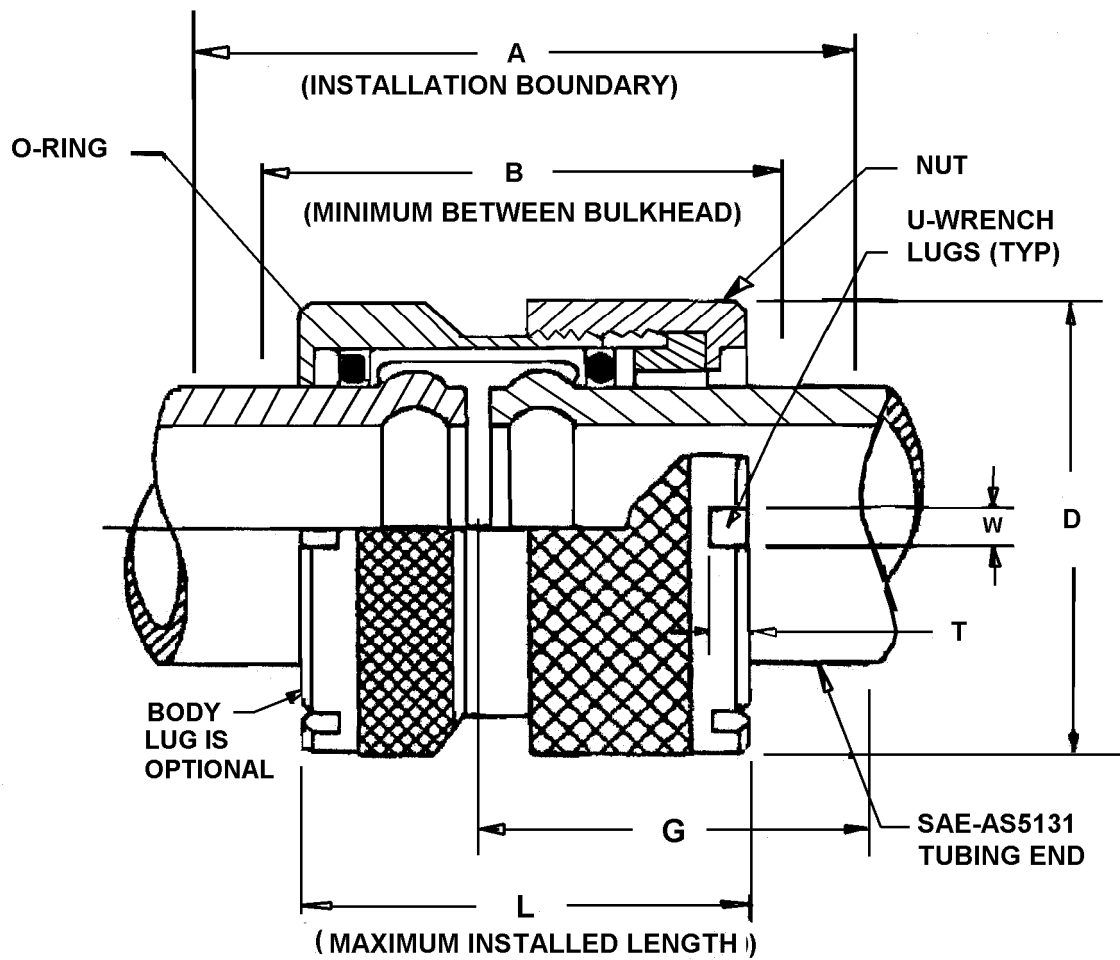
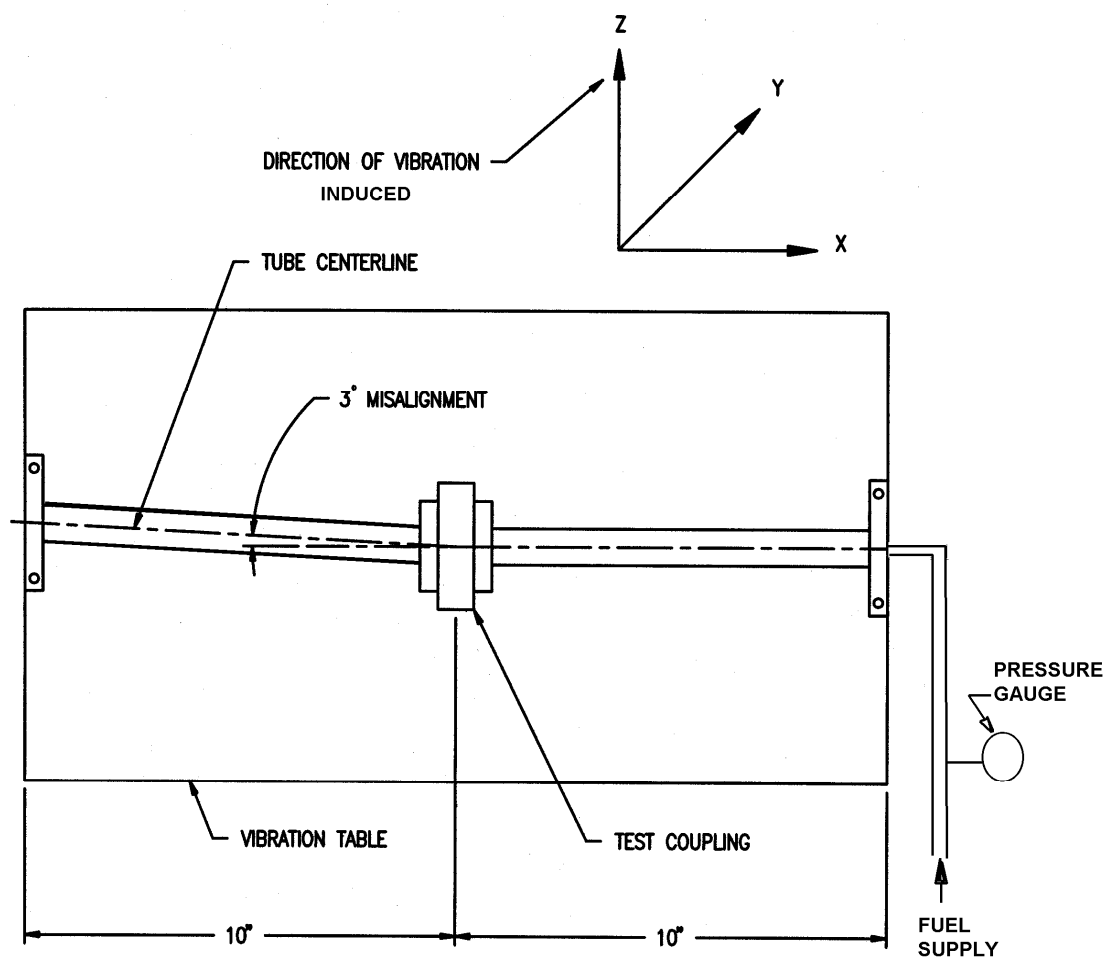


FIGURE 1. Wrenching features typical installation of fuel coupling two SAE-AS5131 beaded tubing ends.

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FIGURE 2. Vibration and fuel resistance test setup.

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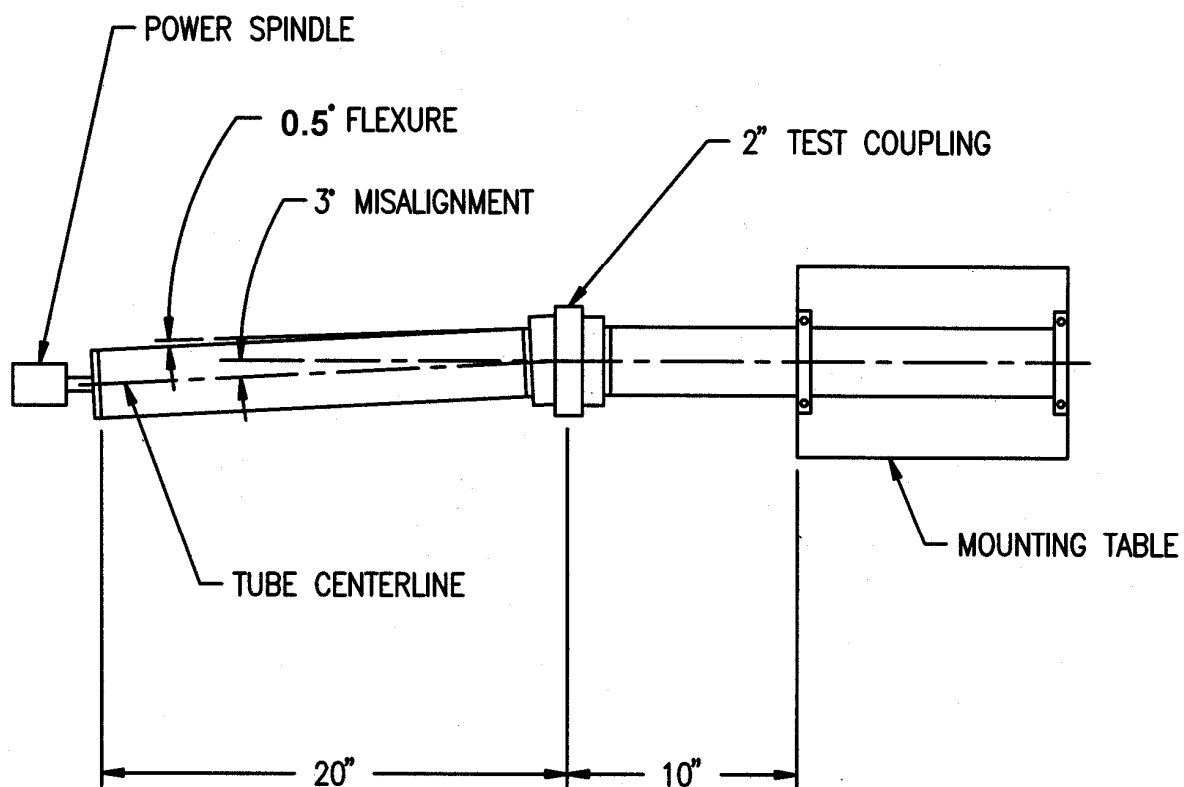


FIGURE 3. Flexure test setup.

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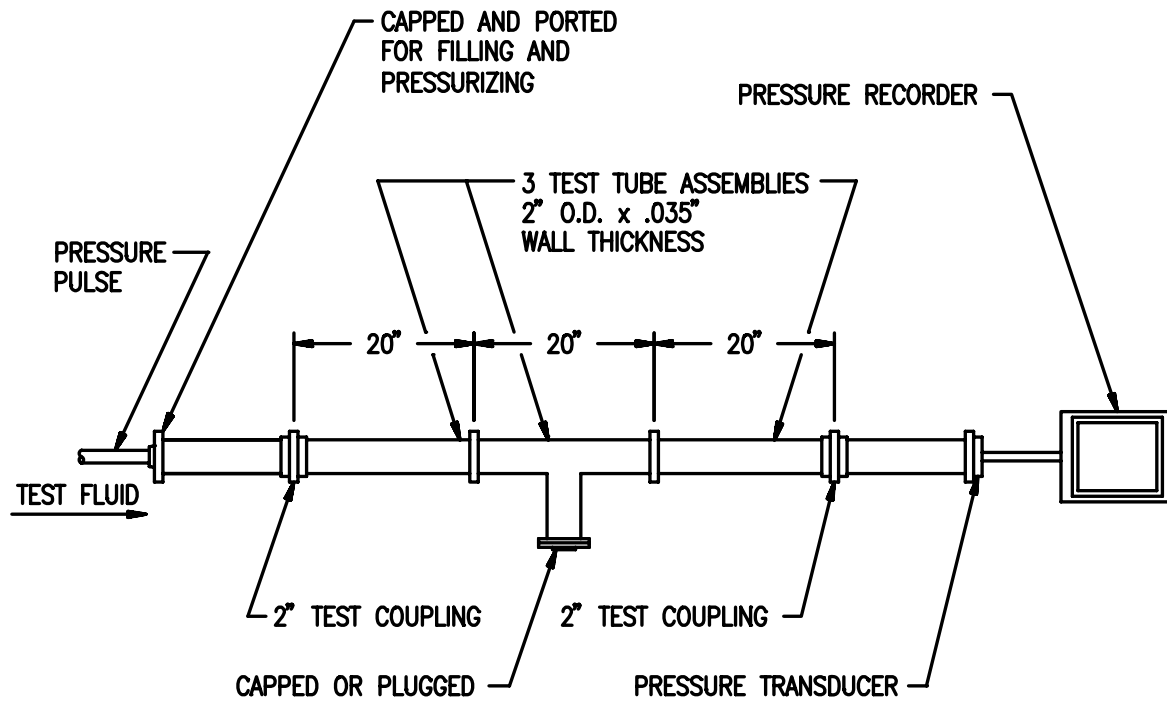
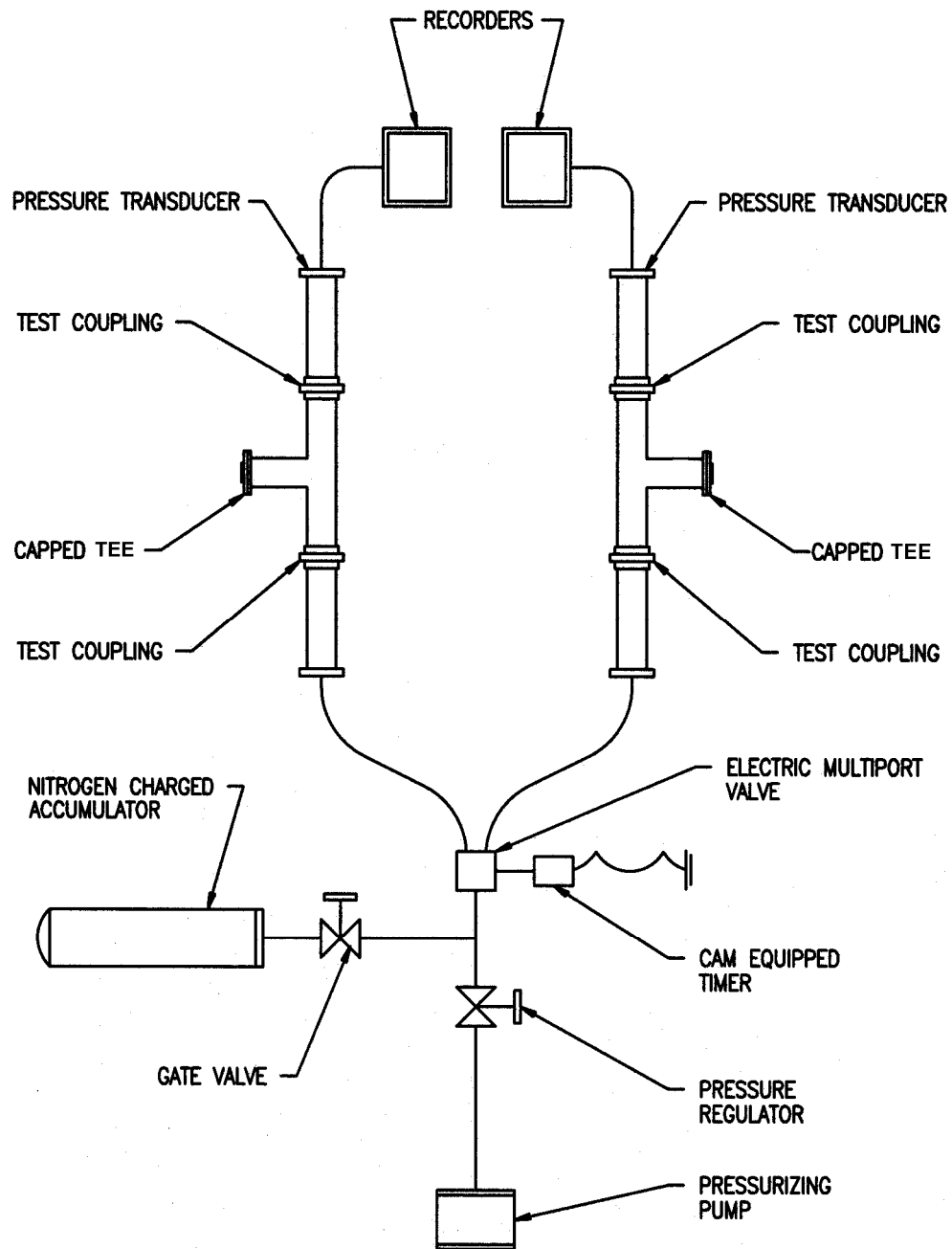


FIGURE 4. Surge pressure test system.

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FIGURE 5. Surge pressure test setup.

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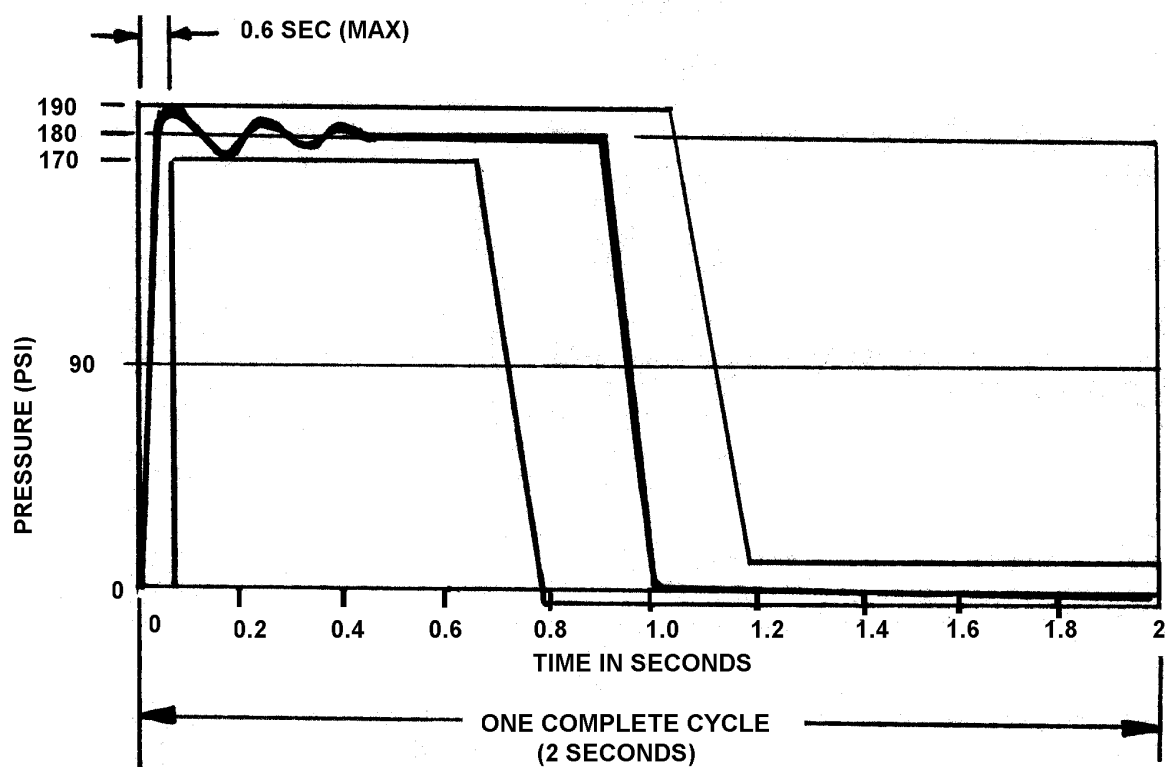


FIGURE 6. Surge pressure curve.

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## CONCLUDING MATERIAL

Custodians:

Army - AV

Navy - AS

Air Force - 99

Preparing activity:

Navy-AS

(Project 4730-2008-117)

Review activities:

Army - AT

Navy - MC, SA, SH

Air Force - 11, 71

DLA - CC

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <http://assist.daps.dla.mil>.