INCH-POUND

MIL-DTL-8790E
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SUPERSEDING
MIL-H-8790D
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# DETAIL SPECIFICATION

# HOSE ASSEMBLIES, RUBBER, HYDRAULIC, HIGH PRESSURE (3,000 PSI)

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

## 1. SCOPE

1.1 Scope. This specification covers the requirements for rubber hose assemblies for use in hydraulic systems with operating pressures of 3,000 psi maximum.

1.2 Classification. Hose assemblies should be furnished in the sizes listed on MS28759, MS28762, MS28920, MS28921, and MS28924 as specified (see 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, standards, and handbooks. The following specifications, standards, and handbooks 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).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Defense Supply Center, Columbus, DSCC-VAI, 3990 East Broad Street, 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 FSC 4720

SPECIFICATIONS

FEDERAL

| | | |
|---|---|---|
| MMM-A-1617 | - | Adhesive, Rubber Base, General Purpose |

DEPARTMENT OF DEFENSE

| | | |
|---|---|---|
| MIL-DTL-8788 | - | Hose, Rubber, Hydraulic, High Pressure (3,000 psi) |
| MIL-DTL-8789 | - | Fitting End, Attachable, Hydraulic, High Pressure (3,000 psi), General Specification for |
| MIL-H-5606 | - | Hydraulic Fluid, Petroleum Base, Aircraft, Missile and Ordnance Hydrocarbon Base, Aircraft and Missile |
| MIL-PRF-83282 | - | Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Metric, NATO Code Number H-537 |

STANDARDS

DEPARTMENT OF DEFENSE

| | | |
|---|---|---|
| MS28759 | - | Hose Assembly, Rubber, Hydraulic (3,000 psi), Flared Tube |
| MS28762 | - | Hose Assembly, Rubber, Hydraulic (3,000 psi), Flareless Tube |
| MS28920 | - | Hose Assembly, Rubber, Hydraulic (3,000 psi), Fitting End To Elbow 45°, Flared Tube |
| MS28921 | - | Hose Assembly, Rubber, Hydraulic (3,000 psi), Fitting End To Elbow 90°, Flared Tube |
| MS28924 | - | Hose Assembly, Rubber, Hydraulic (3,000 psi), Elbow 90° to Elbow 90°, Flared Tube |

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4/D, 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 which are Department of Defense (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) |

(Application for copies of ASTM publications should be addressed to the American Society for Test 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.)

SAE INTERNATIONAL

| | | |
|---|---|---|
| ARP603 | - | Impulse Testing of Hydraulic Hose, Tubing, and Fitting Assemblies (DoD adopted) |
| ARP908 | | Torque Requirements Installation and Qualification Test, Hose and Tube Fittings (DoD adopted) |
| AS1933 | - | Age Controls for Hose Containing Age-Sensitive Elastomeric Material (DoD adopted) |
| AS4395 | - | Fitting End - Flared Tube Connection, Design Standard (DoD Adopted) |
| AS33514 | - | Fitting End, Standard Dimensions for Flareless Tube Connection and Gasket Seal (DoD Adopted) |
| J1966 | - | Lubricating Oil, Aircraft Piston Engine (Nondispersant Mineral Oil), Standard (DoD adopted) |

(Application for copies should be addressed to the 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, specification sheets, or MS standards), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

## 3. REQUIREMENTS

3.1 Specification sheets. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheets (MSs). In the event of any conflict between the requirements of this specification and the specification sheet, the latter shall govern.

3.2 Qualification. The hose assemblies, consisting of MIL-DTL-8788 hose and MIL-DTL-8789 fittings, 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).

3.3 Materials. Materials shall be as specified in MIL-DTL-8788 and MIL-DTL-8789.

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 the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.4 Hazardous substances. The use of hazardous substances, toxic chemicals, or Ozone Depleting Chemicals (ODCs) shall be avoided, whenever feasible.

3.5 Design and construction. The hose assembly shall be formed from a hose (see 3.5.1) coupled with end fittings (see 3.5.2) to meet the requirements specified herein and in the applicable specification sheet.

3.5.1 Hose. The hose shall have been qualified to MIL-DTL-8788.

3.5.2 Fittings. The fittings shall have been qualified to MIL-DTL-8789.

3.5.3 Sealant. Prior to assembly, MMM-A-1617, type II sealant shall be applied to each end of the MIL-DTL-8788 hose. The sealant shall provide a moisture seal for the exposed wire braid and shall not be harmful to the hose or fitting material.

3.5.4 Loosening or changing end fitting position. After the end fittings have been installed on the hose, there shall be no loosening or changing of an end fitting position on the hose.

3.5.5 Length. Hose assembly tolerances shall be made only with the lengths specified in MS28759, MS28762, MS28920, MS28921, and MS28924.

3.5.6 Orientation angle of bent tube couplings. The orientation angle shall be as specified when hose assemblies, in accordance with MS28924, are required (see 6.2).

3.6 Examination of Product. The hose assembly shall conform to the materials (see 3.3), identification markings (see 3.8), and workmanship (see 3.11) specified herein, when examined as specified in 4.7.1.

3.7 Performance. Hose assemblies shall satisfy the following performance requirements.

3.7.1 Bulge resistance. The ball gage, used to determine the inner tube diameter at the bulge, shall fall freely through the hose assembly under its own weight through the section of the end-fitting insert in the hose, when tested as specified in 4.7.2.

3.7.2 Proof pressure. The hose assembly shall not leak or fail during or at the completion of the test, when tested as specified in 4.7.3, with the applicable proof pressure specified in table I. There shall be no visual evidence of damage or permanent deformation.

3.7.3 Leakage. The hose assembly shall not show any evidence of leakage during or at the completion of the test, when tested as specified in 4.7.4.

3.7.4 Burst resistance. There shall be no leakage in the hose assembly, when tested as specified in 4.7.5, below and including the minimum burst pressure specified in table I. The hose shall not burst or develop a permanent blister. The fittings shall not loosen or disconnect from the hose.

3.7.5 Impulse. The hose assembly shall not show any evidence of leakage, burst, or fitting loosening or fitting blow off, when tested as specified in 4.7.6.

3.7.6 Low temperature flexibility. The hose assembly shall leak or fail during or at the completion of the test, when tested as specified in 4.7.7. There shall be no visual evidence of damage or permanent deformation.

3.7.7 Over-tightening torque. The fittings shall not show any evidence of material failure, deformation of the assembly or difficulty in turning the swivel nut on the nipple by hand, when tested as specified in 4.7.8.

TABLE I. Performance characteristics.

| Hose size no. | Proof pressure, min (psi) | Burst pressure, min (psi) | Operating pressure (psi) | Bend radius inside, min (inch) | Assembly length of test samples (inch) |
|---|---|---|---|---|---|
| 4 | 8,000 | 16,000 | 3,000 | 3.00 | 16 |
| 5 | 7,000 | 14,000 | 3,000 | 3.38 | 18 |
| 6 | 7,000 | 14,000 | 3,000 | 5.00 | 21 |
| 8 | 7,000 | 14,000 | 3,000 | 5.75 | 24 |
| 10 | 6,000 | 12,000 | 3,000 | 6.50 | 30 |
| 12 | 6,000 | 12,000 | 3,000 | 7.75 | 33 |
| 16 | 5,000 | 10,000 | 3,000 | 9.63 | 24 |

3.8 Identification of product. Each hose assembly shall be identified with a durable permanently attached tag. This tag shall show the Part or Identifying Number (PIN), date of assembly, CAGE code, and manufacturer's name or trademark.

3.9 Age control. Hose assemblies shall meet the age limitation requirements specified in AS1933.

3.10 End fitting nut thread class. After proof pressure testing, class 2B threads are acceptable on end fitting nuts.

3.11 Workmanship. The hose assembly shall be uniform in quality and free from defects, irregularities and foreign matter. Assemblies shall be cleaned and dried by any process or combination of processes which will accomplish thorough cleaning and drying without damage to the assemblies.

3.11.1 Cleanliness. The end fittings of the hose assembly shall be capped or plugged to prevent entrance of moisture and foreign matter. The caps or plugs shall be securely attached and shall withstand normal strains, jarring and vibrations encountered during shipping, storage and handling. Hose assembly with an uncovered fitting nipple end shall be rejected. The interior surface of the hose assembly shall be free from oil, grease, dirt, moisture, cleaning solvents and foreign materials when examined in accordance with 4.7.1.1.

## 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 used. 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 inspection. The inspection requirements specified herein are classified as follows:

a. Qualification inspection (see 4.4).

b. Quality conformance inspection (see 4.5).

1. Individual tests (see 4.5.1).

2. Sampling tests (see 4.5.2).

3. Periodic control tests (see 4.5.3).

4.3 Inspection conditions. Unless otherwise specified, all required inspections shall be preformed in accordance with the test conditions specified in 4.6.

4.4 Qualification inspection. Qualification inspection shall be performed at a laboratory acceptable to the qualifying activity (see 6.3) on sample units produced with equipment and procedures used in production.

4.4.1 Samples for qualification. Qualification samples shall be representative of the products proposed to be furnished to this specification. Samples consisting of 10 of each hose assembly size, with lengths as specified in table I, shall be subjected to qualification testing. Each sample shall consist of a hose, qualified to MIL-DTL-8788, and fittings, qualified to MIL-DTL-8789. Hose assemblies shall be qualified with fittings from a specific manufacturer(s) and bulk hose from a specific manufacturer(s). Any subsequent changes regarding the sources of a fitting or bulk hose used in a qualified assembly must be approved by the qualifying activity.

4.4.2 Qualification inspection routine. All hose assembly samples shall be subjected to qualification testing in accordance with table II and in the sequence specified in table III.

4.4.3 Acceptance of qualification data. For identical requirements and test procedures, using an identical fitting, qualification test data from MIL-DTL-8788 hose and from MIL-DTL-8789 fittings may be accepted as qualification test data for MIL-DTL-8790 providing that documented approval has been obtained from the qualifying activity. Unless otherwise approved by the qualifying activity, qualification test data from one manufacturer shall not be accepted for another.

TABLE II. Inspection requirements.

| Requirement | Requirement paragraph | Test method paragraph | Qualification inspection | Conformance inspection | | |
|---|---|---|---|---|---|---|
| | | | | Individual | Sampling | Periodic |
| Examination of product | 3.6 | 4.7.1 | X | X 1/ | | |
| Bulge resistance | 3.7.1 | 4.7.2 | X | | | |
| Proof pressure | 3.7.2 | 4.7.3 | X | X | | |
| Leakage 2/ | 3.7.3 | 4.7.4 | X | | X | |
| Burst pressure 2/ | 3.7.4 | 4.7.5 | X | | X | |
| Impulse 2/ 3/ | 3.7.5 | 4.7.6 | X | | | X |
| Low temperature flexibility 2/ | 3.7.6 | 4.7.7 | X | | | |
| Over-tightening torque 2/ | 3.7.7 | 4.7.8 | X | | | |

1/ 100% inspection required on all hose and hose assemblies supplied to this specification.
2/ These are destructive tests.
3/ Aging not required for periodic inspection.

4.4.4 Failures. One or more failures shall be cause for refusal to grant qualification approval.

4.4.5 Retention of qualification. To retain qualification, the contractor shall submit a report at 12-month intervals to the qualifying activity. The qualifying activity shall establish the initial reporting date. Each report shall contain a summary of the results obtained form both the sampling tests and the periodic control tests performed during the 12-month interval. The number of lots and quantities of hose assemblies that have passed and failed shall be included. All reworked sampling lots shall be accounted for and identified.

If the summary of test results indicates nonconformance with the requirements specified herein but the corrective measures acceptable to the qualifying activity has not been taken, action may be taken to remove the failing product from the QPL.

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 manufacturer shall immediately notify the qualifying activity at any time during the 12-month period that the inspection data indicates failure of the qualified product to meet the requirements specified herein. If there has been no production during the reporting period, a report shall be submitted certifying that the manufacturer still has the capabilities and the facilities necessary to produce the qualified product. If there has been no production during two consecutive reporting periods, the manufacturer may be required, at the discretion of the qualifying activity, to submit his qualified product for testing in accordance with the qualification inspection requirements.

TABLE III. Qualification inspection sequence.

| Required qualification test | Required test paragraph | Sample number | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Examination of product | 4.7.1 | X | X | X | X | X | X | X | X | X | X |
| Bulge resistance | 4.7.2 | X | X | X | X | | | | | | |
| Proof pressure | 4.7.3 | X | X | X | X | X | X | X | X | X | X |
| Leakage | 4.7.4 | | | | | X | X | | | | |
| Burst resistance | 4.7.5 | | | | | X | X | | | | |
| Impulse | 4.7.6 | X | X | X | X | | | | | | |
| Low temperature flexibility | 4.7.7 | | | | | | | X | X | | |
| Over-tightening torque | 4.7.8 | | | | | | | | | X | X |
| Proof Pressure | 4.7.3 | | | | | | | X | X | | |

4.5 Quality conformance inspection.

4.5.1 Individual tests. Inspection of the product for delivery shall consist of subjecting each hose assembly to the individual tests specified in table II. Any item failing to meet the requirements of the individual tests shall be immediately removed from the lot.

4.5.2 Sampling tests. Hose assemblies, selected to form an inspection sample (see 4.5.2.1), shall be subjected to the sampling tests specified in table II.

4.5.2.1 Inspection sample. An inspection sample shall consist of hose assemblies, of one inner diameter size, randomly selected without regard to quality. Eight samples from a lot size of 3,000 hose assemblies or one sample from each smaller lot size of 375 hose assemblies shall be subjected to the sampling tests. If there has been some production but the number of hose assemblies produced has not reached 375 for a specific size within three years, the manufacturer shall perform sampling tests on one hose assembly of that size unless documented approval to not perform the tests has been obtained from the qualifying activity.

4.5.2.2 Nonconformance of sampling tests. If one or more defects are found in the inspection sample, both the qualifying and inspection activities shall be immediately notified and the production lot shall be rejected and not be supplied to this specification. Acceptance and shipment of the product shall be discontinued until corrective action, acceptable to the qualifying activity, has been taken. The corrective measures shall be performed on the materials or processes, or both, as warranted, and on all products considered subjected to the same failure. Once the corrective action has been completed, either the specific sampling test in which the original sample failed or all sampling tests may be required to be repeated on additional samples, at the option of the qualifying activity. However, final acceptance shall be withheld until testing has shown that the corrective action was successful. In the event of a failure after re-inspection, information concerning the failure and the corrective action taken shall be furnished to both the qualifying and inspection activities.

4.5.3 Periodic control tests. For each size manufactured under essentially the same conditions, periodic control testing shall be performed on either four samples from every 10,000 hose assemblies produced or one sample from every 2,500 hose assemblies. If there has been some production but the number hose assemblies produced has not reached 2,500 for a specific size within three years, the manufacturer shall perform periodic control tests on one hose assembly of that size unless documented approval to not perform the tests has been obtained from the qualifying activity.

4.5.3.1 Periodic control test plan. Testing shall be in accordance with table II.

4.5.3.2 Nonconformance of periodic control tests. If a sample fails a periodic control test, both the qualifying and inspection activities shall be immediately notified of such failure. Acceptance and shipment of the product shall be discontinued until corrective action, acceptable to the qualifying activity, has been taken. The corrective measures shall be performed on the materials or processes, or both as warranted, and on all products considered subjected to the same failure. Once the corrective action has been completed, either the specific periodic control test in which the original sample failed or all periodic control tests may be required to be repeated on additional samples, at the option of the qualifying activity. Furthermore, the sampling tests may be reinstituted in addition to the periodic control tests if deemed applicable by the qualifying activity. However, final acceptance shall be withheld until testing has shown that the corrective action was successful. In the event of a failure after re-inspection, information concerning the failure and the corrective action taken shall be furnished to both the qualifying and inspection activities.

4.5.4 Disposition of test specimens. Samples that have been subjected to any sampling or periodic control tests are considered damaged and shall not be delivered as part of a contract or purchase order.

4.5.5 Discontinuation and resumption of production. If there has been no production of a specific size for a period of three years or more, 12 samples shall be randomly selected from the first lot produced when production of that size has been resumed. Eight of the samples shall be subjected to the sampling tests and the remaining four shall be subjected to the periodic control tests (see table II).

4.5.6 Acceptance of conformance inspection data. For identical requirements and test procedures, using an identical fitting, conformance inspection data from MIL-DTL-8788 or MIL-DTL-8789 may be accepted as conformance inspection data for MIL-DTL-8790 providing that documented approval has been obtained from the qualifying activity. When conformance inspection data from MIL-DTL-8788 is to be accepted as conformance inspection data for MIL-DTL-8790, two feet of bulk hose shall be considered to be the equivalent of one hose assembly.

4.6 Test conditions.

4.6.1 Preparation of specimens. Test samples shall be assembled with samples of hose and fittings of applicable size conforming to MIL-DTL-8788 and MIL-DTL-8789, respectively. Assembly lengths shall be as shown in table I.

4.6.2 Test fluid. Unless otherwise specified, the test fluid shall be lubricating oil conforming to grade 50 of J1966 or hydraulic fluid conforming to MIL-H-5606, MIL-PRF-83282 or water.

4.6.3 Aging of samples. When specified, specimens shall be either air aged (see 4.6.3.1) or oil aged (see 4.6.3.2) prior to testing.

4.6.3.1 Air aging. Samples shall be exposed to air at a temperature of 158 ±2°F for a minimum of 168 continuous hours.

4.6.3.2 Oil aging. Samples shall be completely immersed in fluid conforming to either MIL-H-5606 or MIL-PRF-83282 at a temperature of 158 ±2°F for a minimum of 168 continuous hours. Air shall not be trapped in the bore of the tube during this aging period. The volume of fluid used shall be sufficient to completely fill and cover the samples. Both the samples and the fluid shall be placed in a non-pressurized closed type container or in a reflux type condenser to prevent distillation of the volatile matter in the fluid. For qualification tests, a new batch of oil shall be used for each group of test samples. For quality conformance tests, a new batch of oil shall be used for each 10 or fewer tests.

4.7 Test methods.

4.7.1 Examination of product. Each hose assembly shall be carefully examined visually to determine conformance to this specification with respect to materials (see 3.3), identification marking (see 3.8), and workmanship (see 3.11).

4.7.1.1 Cleanliness inspection. Both ends of the hose assembly shall be visually inspected to determine if caps or plugs are installed at the fittings. The caps or plugs shall then be removed and a light source shall be placed at one end of the hose assembly. The interior of the hose shall be visually examined, without magnification, from the opposite end of the light source. If the length of the hose assembly precludes this, then examination shall be from one end of the hose assembly.

4.7.2 Bulge resistance test. The four samples prepared for the impulse test (see 4.7.6) shall be checked for bulging of the inner tube and reduction of fitting nipple inner diameter caused by the attachment of end fittings. Measurements shall be taken on assemblies using a ball-end type gage. The diameter of the ball shall not be less than 0.002 but no greater than 0.001 inch smaller than the bulge diameter specified in table IV. The weight of the ball, in ounces, shall be no more than the dash size of the hose tested. Without using force or lubrication, the ball shall be placed inside the end of the assembly at the bulge gage inspection point shown in figure 1. Conformance shall be as specified in 3.7.1.

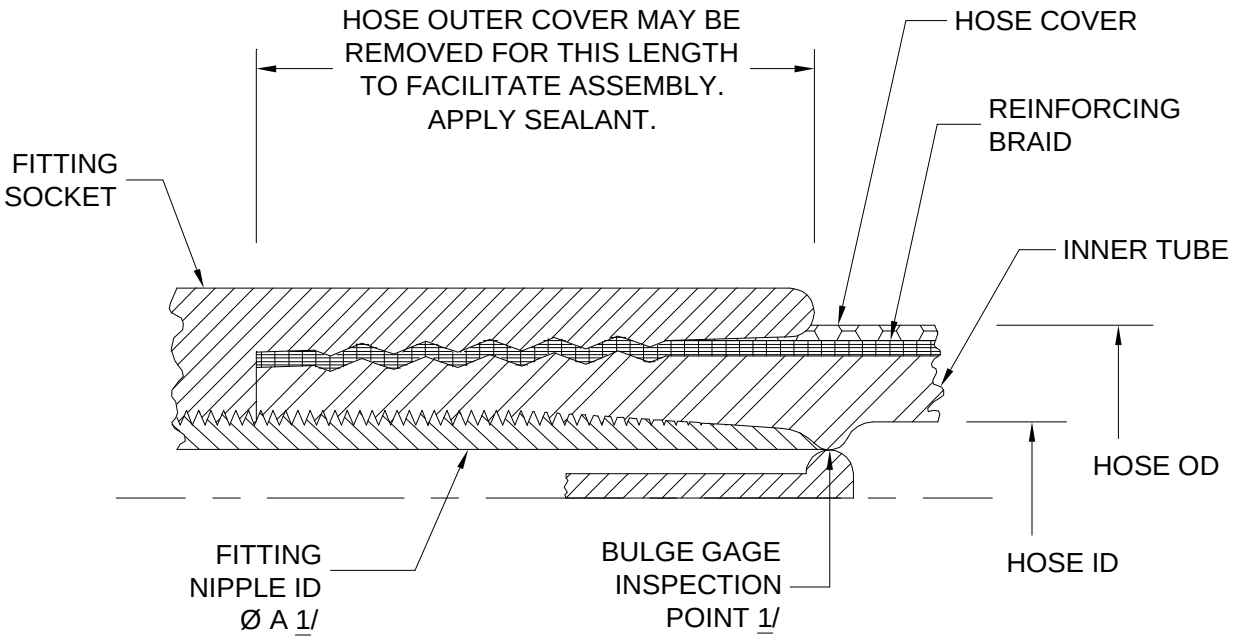


FIGURE 1. Minimum diameter of the hose inner tube at the bulge.

TABLE IV. Hose inner tube diameter at the bulge.

| Fitting size no. | A diameter, min (inch) 1/ |
|---|---|
| 4 | .146 |
| 5 | .177 |
| 6 | .271 |
| 8 | .365 |
| 10 | .455 |
| 12 | .568 |
| 16 | .778 |

1/ Diameter A, indicates both the minimum permissible diameter of the inner tube at the bulge, and the minimum nipple ID of the fitting, when the fitting is assembled with the hose.

4.7.3 Proof pressure test. Each hose assembly shall be tested as specified in ASTM D380 when subjected to the applicable proof pressure listed in table I. Test fluid shall be water or hydraulic fluid conforming to either MIL-H-5606 or MIL-PRF-83282. Conformance shall be as specified in 3.7.2.

4.7.4 Leakage test. Two unaged hose assembly samples shall be tested as specified in ASTM D380. The assemblies shall be a minimum of 12 inches in length. Test fluid shall be water or hydraulic fluid conforming to MIL-H-5606 or MIL-PRF-83282. Samples shall be subjected to 70% of the minimum burst value shown in table I and held for 5 minutes. After 5 minutes, the pressure shall be released and reduced

to zero. Then the pressure shall be raised again to 70% of the minimum burst pressure and held for another 5 minutes. The adjacent outer cover shall be carefully checked during this period for any wicking or leakage of the test fluid which might indicate leakage of the hose. After completion of the leakage test on these samples, they shall be subjected to the burst pressure test specified in 4.7.5. Conformance shall be as specified in 3.7.3.

4.7.5 Burst resistance test. Two unaged hose assembly samples shall be subjected to the burst pressure specified in table I within 24 hours after assembly of the end fittings to the hose. The assemblies shall be a minimum of 12 inches in length. Test fluid shall be water or hydraulic fluid conforming to MIL-H-5606 or MIL-PRF-83282. The rate of pressure rise shall be 25,000 + 0/-10,000 psi per minute. Pressure shall be applied until failure occurs. During this test, the hose assembly shall be fastened at one end to the source of pressure, the hose shall be extended straight, and the free end shall not be restrained or fastened in any way. The actual pressure at which the samples burst or otherwise fail shall be recorded. Conformance shall be as specified in 3.7.4.

4.7.6 Impulse test. Four samples of the length specified in table I shall be subjected to the proof pressure test (see 4.7.3), prior to impulsing. Two of the four samples shall be air aged and the other two shall be oil aged. The samples shall be tested in accordance with ARP603, table I, and table V. Only size 16 shall be tested without surge peaks and in a straight position with one end free. Test fluid shall conform to MIL-H-5606 or MIL-PRF-83282, except that up to 25% of the total volume may be fluid conforming to SAE J1966, grade 50. The fluid temperature, measured in the manifold, shall be held at 120 ± 20° F. Conformance shall be as specified in 3.7.5.

TABLE V. Impulse cycles.

| Size dash no. | Minimum impulse cycles | Minimum average impulse cycles 1/ | Maximum impulse cycles that can be used to compute average 2/ |
|---|---|---|---|
| 4 | 100,000 | — | — |
| 5 | 100,000 | — | — |
| 6 | 100,000 | — | — |
| 8 | 75,000 | 100,000 | 150,000 |
| 10 | 50,000 | 75,000 | 100,000 |
| 12 | 35,000 | 50,000 | 70,000 |
| 16 | 45,000 | 55,000 | 75,000 |

1/ The average of the test assemblies shall not be below the values listed in this column.
2/ When test assemblies impulse cycles are averaged, the maximum cycles that can be used to compute the average shall not exceed the figures given in this column.

4.7.7 Low temperature flexibility test. Testing shall consist of two samples of the lengths specified in table I. One sample shall be unaged, while the other shall be oil aged prior to testing. Samples shall be filled with fluid conforming to MIL-H-5606 or MIL-PRF-83282 and then exposed for 24 hours in a chamber at a temperature of -65 ±2°F. Size 16 hose may be exposed to a temperature of -40 ± 2°F. After the 24 hour exposure and while still at the specified temperature, the samples shall be flexed through 180° at each extreme travel, considered as one cycle, to the applicable inside bend radius specified in table I. Each sample shall be subjected to one cycle only, the duration of which shall be no greater than four seconds. After the flexing cycle (see figure 2), samples shall be removed from the cold chamber and then subjected to the proof pressure test (see 4.7.3). Conformance shall be as specified in 3.7.6.

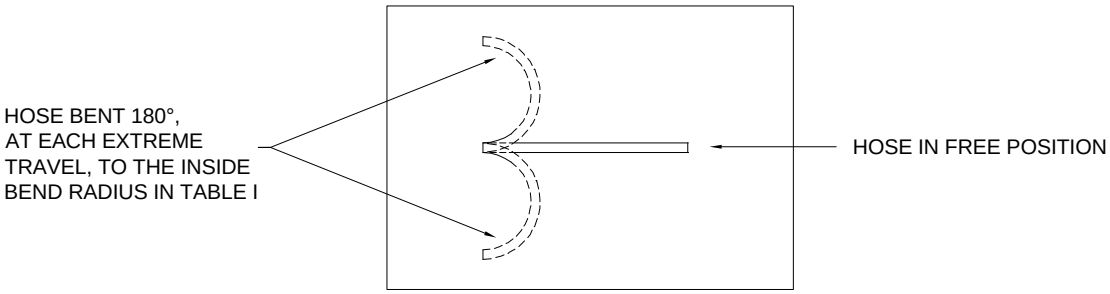


FIGURE 2. Flexibility test set up.

4.7.8 Over-tightening torque test. Hose assemblies shall be attached to mating adapter ends (AS4395 or AS33514) and tested in accordance with ARP908. Conformance shall be as specified in 3.7.7.

## 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's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. 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.

5.1.1 Assembly caps. Hose assemblies shall be sealed, prior to shipping, conforming to NAS847.

## 6. NOTES

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

6.1 Intended use. The hose assemblies covered by this specification are military unique hose assemblies intended to be used in high pressure hydraulic systems requiring interoperability and compatibility with associated components and equipment. The hose assemblies are required to withstand an operating pressure of 3,000 psi. The interoperability and compatibility has been assured through strict adherence to the military detail specification requirements. Manufacturers of these items and users place great reliance on the detailed technical requirements to ensure the products meet the interoperability and compatibility requirements while encountering rapid ambient temperature fluctuations.

6.2 Acquisition requirements. Acquisition documents must specify the following:

a. Title, number, and date of this specification, including any amendments.

b. Issue of DoDISS to be cited in the solicitation, and if required, the specified issue of individual documents referenced (see 2.2 and 2.3).

c. PIN of hose assemblies to be furnished in accordance with the applicable hose assembly detail specification sheet (see 1.2).

d. Bent tube orientation angles.

e. Packaging requirements (see section 5.1).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Products List QPL-8790 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements. Manufacturers are urged to arrange to have the products they propose to offer to the Federal Government tested for qualification so that they may be eligible for contract awards or purchase orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from the Commander, Defense Supply Center, Columbus, DSCC-VQP, 3990 East Broad Street, Columbus, OH 43216-5000.

6.4 Subject term (key words) listing.

Ball gage
Fitting
Tube

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.

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

Review activities:
Air Force - 71
Army - AT, MI
Navy - SA

Preparing activity:
DLA - CC

(Project 4720-0161)

# 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.

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<br>MIL-DTL-8790E | 2. DOCUMENT DATE (*YYYYMMDD*)<br>20010406 |
|---|---|---|

**3. DOCUMENT TITLE**

**HOSE ASSEMBLIES, RUBBER, HYDRAULIC, HIGH PRESSURE (3,000 PSI)**

**4. NATURE OF CHANGE (*Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.*)**

**5. REASON FOR RECOMMENDATION**

**6. SUBMITTER**

| a. NAME (*Last, First, Middle Initial*) | b. ORGANIZATION | |
|---|---|---|
| c. ADDRESS (*Include Zip Code*) | d. TELEPHONE (*Include Area Code*)<br>(1) Commercial:<br>(2) DSN:<br>(*If Applicable*) | 7. DATE SUBMITTED<br>(*YYYYMMDD*) |

**8. PREPARING ACTIVITY** DLA-CC

| a. NAME<br>COMMANDER<br>DEFENSE SUPPLY CENTER<br>COLUMBUS | b. TELEPHONE NUMBER (*Include Area Code*)<br>(1) Commercial: (614) 692-0538<br>(2) DSN: 850-0538<br>Fax: (614) 692-6939 |
|---|---|
| c. ADDRESS (*Include Zip Code*)<br>CODE DSCC-VAI<br>3990 EAST BROAD STREET<br>COLUMBUS, OH 43216-5000 | IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:<br>Defense Standardization Program Office DLSC-LM<br>8725 John J. Kingman Road, Suite 2533 Fort Belvoir, VA 22060-6221<br>Telephone (703) 767-6888 DSN 427-6888 |