

MIL-H-53063(ME)

14 April 1986

MILITARY SPECIFICATION

HOSE ASSEMBLY, ELASTOMER

LIGHTWEIGHT NONCOLLAPSIBLE, FUEL

This specification is approved for use within the USA Belvoir Research, Development, and Engineering Center, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

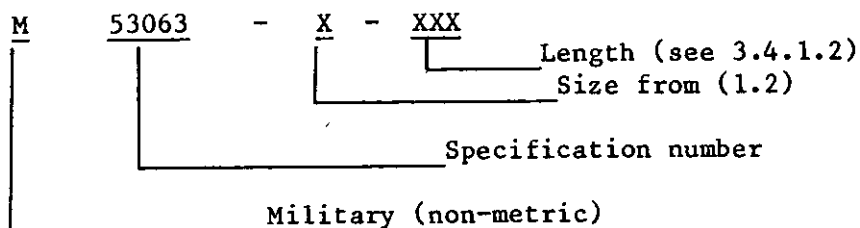
1. SCOPE

1.1 Scope. This specification covers lightweight, noncollapsible, elastomer fuel hose assemblies.

1.2 Classification. Hose assemblies shall be of the following sizes, as specified (see 6.2):

2-inch
3-inch

1.2.1 Part number. The military specification part number for the hose assemblies shall be as follows:



Example of part number: M53063-3-500 for a 3-inch hose assembly which is 500 feet long.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: USA Belvoir Research, Development, and Engineering Center, ATTN: STRBE-TSE, Fort Belvoir, VA 22060-5606 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 4720

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2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation.

SPECIFICATIONS

FEDERAL

- | | |
|----------|-------------------------------|
| VV-F-800 | - Fuel Oil, Diesel. |
| WW-C-440 | - Clamps, Hose, Low Pressure. |

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- | | |
|------------|---|
| MIL-P-775 | - Packaging of Hose, Hose Assemblies; Rubber, Plastic, Fabric, or Metal (Including Tubing) and Fittings, Nozzles and Strainers. |
| MIL-G-3056 | - Gasoline, Automotive, Combat. |
| MIL-G-5572 | - Gasoline, Aviation Grades 80/87, 100/130, 115/45. |
| MIL-T-5624 | - Turbine Fuel, Aviation, Grades JP-4 and JP-5. |

STANDARDS

MILITARY

- | | |
|-------------|--|
| MIL-STD-105 | - Sampling Procedures and Tables for Inspection by Attributes. |
| MIL-STD-129 | - Marking for Shipment and Storage. |
| MIL-STD-130 | - Identification Marking. |
| MIL-STD-889 | - Dissimilar Metals. |

(Copies of specifications and standards required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted shall be those listed in the issue of the DoDISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- | | |
|------|---|
| D380 | - Rubber Hose. |
| D381 | - Existent Gum in Fuels by Jet Evaporation. |

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- D412 - Rubber Properties in Tension.
- D413 - Rubber Property - Adhesion to Flexible Substrate.
- D471 - Rubber Property - Effect of Liquids.
- D518 - Surface Cracking Resistance of Stretched Rubber Compounds.
- D1149 - Rubber Deterioration - Surface Ozone Cracking in a Chamber (Flat Specimen).
- D3951 - Standard Practice for Commercial Packaging.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

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

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Description. The hose assembly shall consist of noncollapsible elastomer hose made up of a tube, two or more plies of reinforcement with a cover, and couplings on each end, for use with hydrocarbon fuels.

3.2 First article. Unless otherwise specified (see 6.2), a sample shall be subjected to first article inspection (see 4.3 and 6.3). Any changes or deviations of hose assembly from the approved first article during production will be subject to the approval of the contracting officer. Approval of the first article will not relieve the contractor of his obligation to furnish hose assembly conforming to this specification.

3.3 Materials. Materials shall be as specified herein. Materials not specified shall be selected by the contractor and shall be subject to all provisions of this specification.

3.3.1 Material deterioration, prevention and control. The hose assemblies shall be fabricated from compatible materials, inherently corrosion resistant or treated to provide protection against the various forms of corrosion and deterioration that may be encountered in any of the applicable operation and storage environments to which hose assemblies may be exposed.

3.3.1.1 Dissimilar metals. Dissimilar metals shall not be used in intimate contact with each other unless protected against galvanic corrosion. Dissimilar metals and methods of protection are defined and detailed in MIL-STD-889.

3.3.1.2 Identification of materials and finishes. The contractor shall identify the specific material, material finish, or treatment for use with component and subcomponent, and shall make information available upon request, to the contracting officer or designated representative.

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3.3.2 Elastomer.

3.3.2.1 Tube. The tube shall be fabricated from an elastomer which is resistant to hydrocarbon fuels, and shall not have any deleterious effects upon any type and grade of fuel conforming to MIL-G-3056 (automotive gasoline) MIL-G-5572 (aviation gasoline), MIL-T-5624 (jet fuel), or VV-F-800 (diesel fuel).

3.3.2.2 Cover. The cover shall be an elastomer compounded for fuel, oil, and ozone resistance.

3.3.3 Reinforcement. The reinforcement shall be of a carcass of synthetic filament warp yarns interwoven with a helix or helixes of round, steel wire and fillers of synthetic filament yarns, alternately spaced. Alternately, the reinforcement shall be two or more plies of braided or spiralled synthetic fiber cord, evenly and firmly fabricated, and thoroughly impregnated with synthetic rubber compound, causing plies to adhere firmly to each other and to the tube and cover. The hose reinforcement shall have a helix or helixes of round steel wire between the fiber reinforcement. The reinforcing wire shall have the physical and dimensional characteristics required to enable the hose to conform to 3.5.7. The reinforcement material shall be free from dirt, knots, lump, irregularities of twist, or other defects.

3.4 Design and construction.

3.4.1 Hose. The hose shall be constructed of a compounded elastomer inner tube, a synthetic fiber reinforcement, and a compounded elastomer cover. All layers shall be bonded to their adjacent layers so as to produce a unified hose wall. The hose shall not leak. The color of the hose shall be black except for a distinctive color lay-line.

3.4.1.1 Color lay-line. A distinctive color lay-line shall be marked on the outer cover of the hose. It shall be not less than 0.25-inch wide and shall be continuous the full length of the hose. Handling, bending, fuel, or environmental effects shall not adversely affect the lay-line.

3.4.1.2 Dimensions and weight. Length shall be as specified (see 6.2e). Hose dimensions and weight shall be as specified in table I.

TABLE I. Dimensions and weight.

Hose Diameter (inner diameter) +0.10 inch -0.03 inch	Weight per linear foot
2 inches	1.0 lb (max)
3 inches	1.25 lb (max)

3.4.1.3 Tube. The tube shall be fabricated from the material as specified in 3.3.2.1. The inside wall of the tube shall be smooth and free from pits. The tube shall be of uniform thickness.

3.4.1.4 Cover. The cover shall be black, and shall be fabricated from materials as specified in 3.3.2.2, and shall be of uniform thickness.

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3.4.1.5 Static wire. The static wire shall be either stainless steel or coated copper. Not less than 0.50 inch of each wire shall be in intimate contact with the couplings such that the resistance between couplings does not exceed 1.5 ohms per linear foot of hose.

3.4.2 Fittings and couplings.

3.4.2.1 Ball valve/unisex coupling. Couplings shall be of a unisex configuration mounted on a 360 degree swivel to permit convenient positioning of the ball valve handles after construction. The valve shall be capable of being opened and closed without tools, when the system is pressurized up to 50 psi. The valve shall have a positive interlock with the disconnect mechanism, preventing disconnect when the valve is open. Ball size shall be the same as hose inside diameter. Valve controls shall be provided with double-ended arrows showing direction of operation and labeled at each end to indicate the functional result (i.e. open, close, etc.)

3.4.2.2 Band fittings. Each coupling shall be banded to the hose in conformance with WW-C-440. Bands shall be non-vivid and non-reflective.

3.5 Physical and chemical properties.

3.5.1 Hydrostatic pressure.

3.5.1.1 Hose assembly. When tested as specified in 4.5.2.1, at the appropriate proof pressure from table II, the hose assembly shall not leak. There shall be no evident imperfection in the hose, fittings, or couplings. There shall be no indication of slippage or pull-out of the fitting or coupling. The length of the hose shall not change more than plus or minus 2 percent.

TABLE II. Pressure for hose assembly.

Size I.D. (inches)	Operating pressure (psi)	Proof pressure (psi) minimum	Burst pressure (psi) minimum
2	75	200	300
3	75	200	300

3.5.2 Tensile strength. When tested as specified in 4.5.2.4, the tensile strength of the tube and cover shall be not less than 1250 psi. When tested as specified in 4.5.2.5, the tensile strength of the tube and cover after immersion shall be not less than 40 percent of the tensile strength before immersion or less than 600 psi (whichever is greater).

3.5.3 Ultimate elongation. When tested as specified in 4.5.2.4, the ultimate elongation of the tube and cover shall be not less than 200 percent, and when tested as specified in 4.5.2.5, the elongation after immersion shall be not less than 100 percent.

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3.5.4 Adhesion.

3.5.4.1 Original adhesion. When tested as specified in 4.5.2.6, the original adhesion between the tube and plies, between the plies and between the cover and plies shall be not less than 10 pounds force (lbf).

3.5.4.2 Adhesion after fuel immersion. Adhesion between the tube and plies, between the plies, and between the cover and plies shall be not less than 6 lbf after testing as specified in 4.5.2.7.

3.5.5 Low temperature flexibility. When the hose assembly is tested as specified in 4.5.2.8, there shall be no evidence of cracking, lack of flexibility, or other defects; and the hose shall not show any failure when tested at appropriate proof pressure as indicated in table II.

3.5.6 Existent gum content. When tested as specified in 4.5.2.9, the existent gum residue extracted with heptane shall be not more than 20 milligrams per 100 milligrams of test fluid.

3.5.7 Crush resistance. During crush resistance test as specified in 4.5.2.10, the smallest outside diameter of the hose shall be not less than 80 percent of the original outside diameter. After release of the load, the smallest outside diameter shall be not less than 90 percent of the original outside diameter.

3.5.8 Ozone resistance. Ozone resistance of the hose assembly shall comply with ASTM D 1149. At the end of the exposure time, there shall be no evidence of cracking, checking or irregularity in the cover when viewed with 7X magnification when tested in accordance with 4.5.2.11.

3.6 Identification marking. The hose assembly shall be identified in accordance with MIL-STD-130. Each hose assembly shall be marked with the following information:

- Date of manufacture (quarter and year).
- Contract or order number.
- Manufacturer's name and trademark.
- Hose Assembly, Elastomer, Lightweight, Noncollapsible, Fuel.
- Burst pressure 300 psi.
- Operating pressure 75 psi.

The letters used for marking shall be not less than 0.25 inch high, and such that handling, bending, water, oil, or environmental effects shall not affect the markings.

3.7 Workmanship. The hose assemblies shall conform to the quality specified herein with no cuts, nicks, bruises, blisters, sharp edges, or lumps, and shall be clean and smooth.

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4. QUALITY ASSURANCE PROVISIONS

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

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

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

- a. First article inspection (see 4.3).
- b. Quality conformance inspection (see 4.4).
- c. Inspection of packaging (see 4.6).

4.3 First article inspection.

4.3.1 First article examination. The first article shall be examined as specified in 4.5.1, in the order shown. The presence of one or more defects shall be cause for rejection.

4.3.2 First article tests. The first article shall be subjected to the tests marked "X" in column 1 of table III, in the order shown. Failure of any test shall be cause for rejection.

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TABLE III. Test schedule.

First article	Quality conformance		Test	Test paragraph	Requirements paragraph
	Individual	Sample			
X	X		Hydrostatic pressure.	4.5.2.3	3.5.1.1
X		X	Tensile strength.	4.5.2.4	3.5.2
X		X	Ultimate elongation.	4.5.2.4	3.5.3
X		X	Tensile strength after immersion.	4.5.2.5	3.5.2
X		X	Ultimate elongation after immersion.	4.5.2.5	3.5.3
X		X	Original adhesion.	4.5.2.6	3.5.4.1
X		X	Adhesion after fuel immersion.	4.5.2.7	3.5.4.2
X		X ^{1/}	Low temperature flexibility.	4.5.2.8	3.5.5
X		X	Existent gum content.	4.5.2.9	3.5.6
X		X	Crush resistance.	4.5.2.10	3.5.7
X		X	Ozone resistance.	4.5.2.11	3.5.8

^{1/} One lot testing required for each 10 lots submitted.

4.4 Quality conformance inspection.

4.4.1 Sampling. Sampling for examination shall be in accordance with MIL-STD-105.

4.4.2 Examination. Samples selected in accordance with 4.4.1 shall be examined as specified in 4.5.1. AQL shall be 1.0 percent defective for major defects.

4.4.3 Tests. Samples selected in accordance with 4.4.1 shall be tested as specified in 4.5.2. AQL shall be 1.0 percent defective. Test sections cut from hose shall be of sufficient length for the performance of required tests.

4.4.3.1 Elastomer. Four test slabs, each 6 inches by 6 inches by 0.075 inch, plus or minus 0.010 inch thick, for each elastomer used to fabricate the hose assemblies, shall be supplied with each lot.

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4.5 Examination procedure.

4.5.1 Examination. The hose assembly shall be examined as specified herein for the following defects:

101. Materials not as specified.
102. Materials are not resistant to corrosion and deterioration or treated to be resistant to corrosion and deterioration for the applicable and operating environments.
103. Dissimilar metals as defined in MIL-STD-889 are not effectively insulated from each other.
104. Contractor does not have documentation available for identification of material, material finishes, or treatment.
105. Hose not as specified.
106. Dimensions and weight not as specified.
107. Fittings and couplings not as specified.
108. Hose cover scuffed or bruised, so that carcass is exposed.
109. Hose cover not clean and smooth.
110. Hose lay-line not as specified.
111. Identification marking missing, incomplete, illegible, or not as specified.
112. Color not as specified.
113. Weight not as specified.
114. Workmanship not as specified.

4.5.2 Test.

4.5.2.1 Individual tests. Each hose assembly shall be subjected to the test marked "X" in column 2 of table III. Failure of the test shall be cause for rejection.

4.5.2.2 Sample tests. Samples selected in accordance with 4.4.3 and 4.4.3.1 shall be subjected to the tests marked "X" in column 3 of table III. Failure of any test shall be cause for rejection of the hose assemblies represented by the samples.

4.5.2.3 Hydrostatic. Each length of hose shall be subjected to the hydrostatic tests of ASTM D 380 for elongation, twist, and proof pressure, using water as a test fluid. The test pressure shall be as specified in table II. The electric bond shall be determined while full test pressure is applied. Nonconformance to 3.5.1.1 shall constitute failure of this test.

4.5.2.4 Tensile strength and ultimate elongation. The tensile strength and ultimate elongation of the hose cover and tube shall be determined in accordance with ASTM D 412. Nonconformance to 3.5.2 or 3.5.3 shall constitute failure of this test.

4.5.2.5 Tensile strength and ultimate elongation after immersion. The tensile strength and ultimate elongation of cover and tube after immersion shall be determined in accordance with ASTM D 471. Test temperature shall be 23 ± 2 °C; immersion period shall be 70 hours; immersion fluid shall be reference fuel D. Nonconformance to 3.5.2 or 3.5.3 shall constitute failure of this test.

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4.5.2.6 Original adhesion. Adhesion shall be determined in accordance with the machine method of ASTM D 413. Nonconformance to 3.5.4.1 shall constitute a failure of this test.

4.5.2.7 Adhesion after fuel immersion. Adhesion after fuel immersion shall be determined in accordance with ASTM D 413 - machine method. Test specimens shall have been immersed in reference fuel D of ASTM D 471 for 70 hours at 23 ± 2 °C. Adhesion shall be determined within 15 minutes after removal of specimens from test fluid. Nonconformance to 3.5.4.2 shall constitute failure of this test.

4.5.2.8 Low temperature flexibility. Low temperature flexibility shall be determined in accordance with the Mandrel Bend test procedure of ASTM D 380. Temperature shall be -25 ± 2 °F. Nonconformance to 3.5.5 shall constitute failure of this test.

4.5.2.9 Existent gum content. A test specimen of hose not less than 14 inches long shall be stoppered with a 2-inch, noncorrosive plug, and clamped to prevent fluid loss. The sample shall then be filled to 2 inches from the top with reference fuel D of ASTM D 471, and the top shall be stoppered and clamped as above the specimen shall be stored in a vertical position for 7 days at an ambient temperature of 100 °F. At the end of each 24 hour period, the fuel shall be agitated for 5 minutes by moving the hose back and forth from vertical to horizontal at a rate of 2 cycles per minute. At the end of the seven day storage period, the fuel shall be agitated in the same manner as indicated above for 5 minutes and then immediately removed from the hose. The removed fuel shall be tested for existent gum content in accordance with the air-jet solvent wash method of ASTM D 381. A control sample of reference fuel D shall also be tested for existent gum content in accordance with the air-jet method of ASTM D 381. The value of existent gum of the control shall be subtracted from that of the test fluid to give existent gum content. Nonconformance to 3.5.6 shall constitute a failure of this test.

4.5.2.10 Crush resistance. Crush resistance shall be determined by centering a 12-inch length of hose between 3-inch wide, parallel metal plates in such a way that a 3-inch length of the hose is put under compression. The plates shall be brought together at a rate of 2 inches per minute until 325 pounds of load is applied. The distance between inner surface of plates shall be measured with a steel rule and expressed in percent of the original hose outside diameter. The load shall be released and the minimum outside diameter of the hose at the center of the previously compressed area shall be measured and reported in percent of original outside diameter. Nonconformance to 3.5 shall constitute failure of this test.

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4.5.2.11 Ozone resistance. Specimens of the cover material used for the hose, prepared in accordance with ASTM D 518, procedure A, shall be mounted in a 20 percent elongated position and tested in accordance with ASTM D 1149. After conditioning for 24 hours in an ozone - free atmosphere, the mounted specimens shall be exposed for 72 hours at 40 ± 1 °C, to an atmosphere containing 50 ± 10 parts per hundred million (pphm) of ozone. Upon completion of the test, the specimens shall be examined. Nonconformance to 3.5.8 shall constitute failure of this test.

4.6 Inspection of packaging. The preservation, packing, and marking of the hose assembly shall be examined to determine compliance with the requirements of section 5 and of the quality assurance provisions of the referenced packaging document.

5. PACKAGING

5.1 Prservation. The degree of preservation shall be level A or commercial, as specified (see 6.2).

5.1.1 Level A. Each hose assembly shall be preserved in accordance with the level A preservation requirements of MIL-P-775.

5.1.2 Commercial. Commercial preservation shall be in accordance with ASTM D 3951.

5.2 Packing. The degree of packing shall be level A, level B or commercial, as specified (see 6.2).

5.2.1 Level A. The hose assembly shall be packed in accordance with level A packing requirements of MIL-P-775.

5.2.2 Level B. The hose assemblies shall be packed in accordance with the level B packing requirements of MIL-P-775.

5.2.3 Commercial. Commercial packing shall be in accordance with ASTM D 3951.

5.3 Marking. Marking for military levels of protection shall be in accordance with MIL-STD-129. Commercial marking shall be in accordance with ASTM D 3951. Weight and cube shall be marked on the shipping container.

6. NOTES

6.1 Intended use. This lightweight, noncollapsible hose is intended for use with forward area refueling systems for suction of liquid fuels such as gasoline, aviation fuel, and diesel fuel.

6.2 Ordering data. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Definitive military specification part number required (see 1.2).
- c. Size of hose assembly required (see 1.2).

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- d. When a first article is required for inspection and approval, the number of units required (see 3.2).
- e. Length of hose required (see 3.4.1.2).
- f. Degree of preservation and packing required (see 5.1 and 5.2).

6.3 First article. When a first article inspection is required, the items should be an initial production model. The first article should consist of one or more units. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, tests, and approval of the first article test results and disposition of the first article.

Custodian:
Army - ME

Preparing activity:
Army - ME

Review activity:
DLA - CS

Project 4720-A714

INSTRUCTIONS: In a continuing effort to make our standardization documents better, the DoD provides this form for use in submitting comments and suggestions for improvements. All users of military standardization documents are invited to provide suggestions. This form may be detached, folded along the lines indicated, taped along the loose edge (*DO NOT STAPLE*), and mailed. In block 5, be as specific as possible about particular problem areas such as wording which required interpretation, was too rigid, restrictive, loose, ambiguous, or was incompatible, and give proposed wording changes which would alleviate the problems. Enter in block 6 any remarks not related to a specific paragraph of the document. If block 7 is filled out, an acknowledgement will be mailed to you within 30 days to let you know that your comments were received and are being considered.

NOTE: This form may not be used to request copies of documents, nor to request waivers, deviations, or clarification of specification 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.

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DEPARTMENT OF THE ARMY

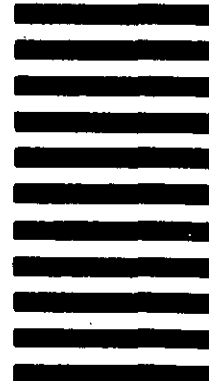


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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL*(See Instructions - Reverse Side)*

1. DOCUMENT NUMBER MIL-H-53063 (ME)		2. DOCUMENT TITLE Hose Assembly, Elastomer Lightweight Noncollapsible, Fuel	
3a. NAME OF SUBMITTING ORGANIZATION		4. TYPE OF ORGANIZATION (Mark one)	
b. ADDRESS (Street, City, State, ZIP Code)		<input type="checkbox"/> VENDOR	
		<input type="checkbox"/> USER	
		<input type="checkbox"/> MANUFACTURER	
		<input type="checkbox"/> OTHER (Specify): _____	
5. PROBLEM AREAS			
a. Paragraph Number and Wording:			
b. Recommended Wording:			
c. Reason/Rationale for Recommendation:			
6. REMARKS			
7a. NAME OF SUBMITTER (Last, First, MI) - Optional		8. WORK TELEPHONE NUMBER (Include Area Code) - Optional	
c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional		8. DATE OF SUBMISSION (YYMMDD)	