INCH-POUND

MIL-DTL-3992E
22 October 2001
SUPERSEDING
MIL-H-3992D
3 November 1982

DETAIL SPECIFICATION

HOSE AND HOSE ASSEMBLY, RUBBER: AIR AND VACUUM BRAKE, SYSTEMS

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 construction, performance, and quality requirements of rubber air and vacuum hose and hose assemblies intended for use as flexible connections on automotive air and vacuum brake systems in a temperature range from -60°F to 200°F, inclusive (see 6.1).

1.2 Classification.

1.2.1 Types. The types of brake hoses are as follows:

Type I - Air brake hose.

Type II - Vacuum brake hose.

1.2.2 Classes. Type I hose to be furnished in the following classes (see 6.2):

Class 1 - Mandrel-built, reinforced with cotton or synthetic fiber yarn.

Class 2 - Non-mandrel-built, reinforced with cotton or synthetic fiber yarn.

Class 3 - Mandrel-built, reinforced with one braid of high tensile steel wire.

Class 4 - Mandrel-built, reinforced with two cotton or synthetic fiber yarn braids separated by a high tensile steel wire braid.

1.2.3 Styles. Type II hose to be furnished in the following styles (see 6.2):

Style A - Heavy duty.
Style B - Light duty.

AMSC N/A FSC 4720

2. APPLICABLE DOCUMENTS

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

2.2 Government documents.

2.2.1 Specifications and standards. The following specifications and standards form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

A-A-52484	-	Coupler, Automotive Air Brake Line: Quick Disconnect
QQ-P-416	-	Plating, Cadmium (Electrodeposited)

STANDARDS

DEPARTMENT OF DEFENSE

MIL-STD-130	-	Identification Marking of U.S. Military Property
MS39133	-	Adapter, Straight, Pipe to Hose, Automotive Air Brake Hose
MS39325	-	Hose Assemblies; Air Brake

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available 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 the documents that are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI/NCSL Z540-1	-	Calibration Laboratories and Measuring and Test Equipment, General Requirements

(Applications for copies should be addressed to the American National Standards Institute, 1430 Broadway, New York, NY 10018-3308.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B633	-	Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel
ASTM D380	-	Standard Test Methods for Rubber Hose (DOD Adopted)
ASTM D471	-	Standard Test Method for Rubber Property - Effect of Liquids
ASTM D622	-	Standard Test Methods for Rubber Hose for Automotive Air and Vacuum Brake System (DOD Adopted)
ASTM G21	-	Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

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

SOCIETY OF AUTOMOTIVE ENGINEERS INTERNATIONAL (SAE)

SAE J1402	-	Automotive Air Brake Hose and Hose Assemblies
SAE J1403	-	Vacuum Brake Hose
AMS-C-81562	-	Coating, Cadmium, Tin cadmium and Zinc (Mechanically Deposited)

(Application for copies should be addressed to the Society of Automotive Engineers International, 400 Commonwealth Avenue, Warrendale, PA 15096.)

2.4 Order of precedence. 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 Qualification. Type I hoses and hose assemblies furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable Qualified Products List before contract award (see 4.4 and 6.3). Hose assemblies shall be qualified as a combination of hose and fittings from specific sources. Any subsequent change to either the hose or fitting source in a qualified assembly requires documented approval of the qualifying activity.

3.2 First article. Type II hoses and hose assemblies furnished under this specification shall be subjected to first article inspection (see 4.5). Hose assemblies shall be tested as a combination of hose and fittings from specific sources. Any subsequent change to either the hose or fitting source in an approved assembly requires documented approval of the procuring activity.

3.3 Materials. Materials used shall be as identified herein or as approved by the procuring activity. However, materials not specified herein or approved by the procuring activity, shall be of a quality that will enable the hose or hose assembly to meet the requirements specified herein.

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

3.3.2 Hazardous substances. The use of toxic chemicals, hazardous substances, or ozone depleting chemicals (ODCs) shall be avoided whenever feasible.

3.4 Design and construction.

3.4.1 Bulk hose.

3.4.1.1 Inner tube. The inner tube shall consist of a synthetic rubber compound capable of meeting the requirements of this specification including exposure to hydrocarbon test fluid (see 3.7.5). The inner tube shall have a smooth bore; it shall be free of pitting, cracks and other recognizable defects. The bore shall be free of dirt and other foreign material and shall not contain residual mandrel lubricant to the extent that the requirements of this specification cannot be met.

3.4.1.2 Reinforcement. The hose shall have a reinforcement of cotton or synthetic fiber yarn or fabric, steel wire, or a combination thereof.

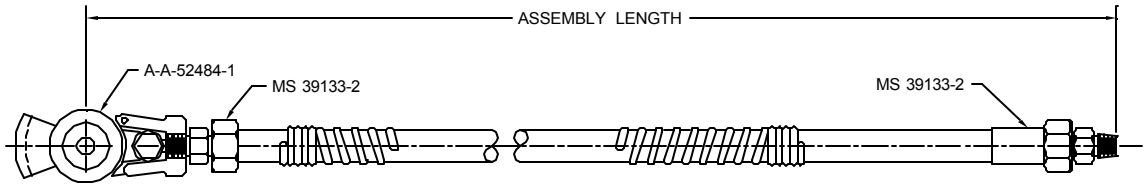
3.4.1.3 Outer cover. The outer cover shall consist of a synthetic rubber compound that meets the requirements of this specification. The outer cover shall be of uniform thickness and be free of cuts, breaks, blisters and other recognizable defects.

3.4.2 Hose assembly. Hose assemblies shall be constructed of hose (see 3.4.1) with fittings assembled on each end (see figure 1). The default configuration for the assemblies shall be one male fitting and one female fitting. An alternate configuration shall be two female fittings.

3.4.2.1 Fittings. Dimensions and materials shall conform to the requirements of A-A-52484 or MS39133. Fittings shall be corrosion resistant or shall be protected to resist corrosion during the length of the service. Steel fittings, except stainless steel fittings, shall be either cadmium plated in accordance with QQ-P-416, type II, class 2; or zinc plated in accordance with ASTM B633, type II, class 2 or SAE AMS-C-81562, type II, class 2 (see 6.2). Cadmium plating should only be used when other plating methods are unable to provide the necessary level of corrosion resistance.

3.4.2.2 Swivel fittings. Swivel fitting shall swivel freely with hand torque.

CONFIGURATION A



CONFIGURATION B

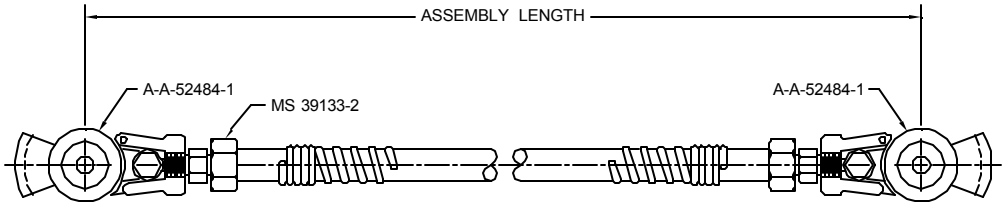


FIGURE 1. Hose assembly configurations.

3.5 Diameters. Available diameters and diameter tolerances shall be as shown in tables IA and IB.

3.6 Lengths. Hose and hose assemblies shall be furnished in lengths specified in the procurement documentation (see 6.2).

3.7 Performance.

3.7.1 Requirements applicable to both type I and II hoses and hose assemblies.

3.7.1.1 Proof pressure test. Hose assemblies shall show no leaks while being subjected to the proof pressure specified in the test method (see 4.7.1).

3.7.1.2 Burst pressure. The hose shall not burst or show signs of failure and the hose assemblies shall not leak at any hydrostatic pressure up to and including that shown in table II (see 4.7.2).

3.7.1.3 Ozone resistance. Hose outer cover specimens cut from untested hose shall exhibit no cracking after exposure to ozone (see 4.7.3).

3.7.1.4 Adhesion. Hose specimens shall show no separation of the plies, the tube from the plies or the cover from the plies upon application of a load of not less than 10 pounds per inch of hose width (see 4.7.4).

3.7.1.5 Fungus resistance. Hose and hose assemblies shall be fungus resistant. After being exposed to fungus, specimens shall meet the requirements of 3.7.1.2 (see 4.7.5 and 4.7.2).

3.7.2 Requirements applicable to type I hoses and hose assemblies.

3.7.2.1 Length change. Type I hoses or hose assemblies shall not contract in length more than 3 percent or elongate more than 5 percent (see 4.7.6).

3.7.2.2 High temperature resistance. The hose shall show no cracks, charring, or disintegration externally or internally when straightened after high temperature aging and flex tests (see 4.7.7).

3.7.2.3 Low temperature resistance. Hoses shall show no breaks or cracks after being conditioned at low temperature (see 4.7.8).

3.7.2.4 Assembly tensile strength. Hose assemblies shall withstand a minimum pull of 325 pounds without separation from the fittings or rupture of the hose structure (see 4.7.9).

3.7.2.5 Effect of petroleum based liquids. Hose specimens shall not demonstrate a volume increase greater than 100% after testing in accordance with see 4.7.10.

TABLE IA. Diameter tolerances for type I.

Nominal size I.D. (inches)	Inside				Outside			
	Class 1	Class 2	Class 3	Class 4	Classes 1 and 2 ± .031	Class 3 2/	Class 3 ± .031	Class 4
3/16	± .016	± .023		+0.016, -0.005	.531			.500 - .539
1/4	± .016	± .023	± .016	+0.020, -0.008	.625	.437 ± .023	.625	.562 - .602
5/16	± .016	± .023		+0.023, -0.008	.687			.656 - .699
3/8	± .016	± .023	± .016		.750	.594 ± .023	.781	
13/32				+0.023, -0.008				.742 - .789
7/16	± .016	± .031			.812			
1/2	± .016	± .031	± .023	+0.023, -0.008	.875	.718 ± .031	.906	.898 - .945
5/8	± .016	± .031		+0.023, -0.008	1.062			1.054 - 1.101
5/8 Special	± .016	± .031			1.375			

NOTES:
1/ Class 1 and 2 hose in the 3/16-inch size may be single ply reinforcement.
2/ Outside diameter over the wire reinforcement.

TABLE IB. Diameter tolerances for type II.

Nominal size I.D. (inches)	Inside		Outside	
	Style A	Style B	Style A ±. 031	Style B ±. 031
7/32	*	+0.028, -0.032	*	.437
1/4	+0.008, -0.020	*	.562	*
11/32	*	+0.028, -0.032	*	.687
3/8	+0.008, -0.020	*	.812	*
15/32	*	+0.028, -0.032	*	.812
1/2	+0.008, -0.020	*	.937	*
5/8	+0.008, -0.020	*	1.062	*
3/4	+0.008, -0.020	*	1.812	*
1	+0.010, -0.022	*	1.469	*

TABLE II. Burst pressure requirements.

Nominal Hose size (inches)	Burst pressure		
	Type I Classes 1 and 2 (psi)	Type I Classes 3 and 4 (psi)	Type II Styles A and B (psi)
3/16	900	10000	
7/32			350
1/4	900	10000	1200
5/16	900	9000	
11/32			350
3/8	900	8000	1200
13/32	900	8000	1200
7/16	900		
15/32			350
1/2	900	7000	1000
5/8	900	6000	1000
5/8 Special	900		
3/4			800
1			800

3.7.3 Requirements applicable to type II hoses and hose assemblies.

3.7.3.1 Collapse under vacuum. The outside diameter of a hose specimen shall not collapse more than 1/16 inch after being subjected to an internal vacuum (see 4.7.11).

3.7.3.2 Hot vacuum collapse and degradation. The outside diameter of a hose specimen shall not collapse in excess of 15% of the original OD for style L hose, and 10% of the original OD for style H hose after conditioning and application of an internal vacuum (see 4.7.12). There shall be no external or internal embrittlement or degradation. There shall be no leakage during a 1-min pressure hold.

3.7.3.3 Bend collapse. The outside diameter of a hose specimen shall not collapse in excess of the values shown in table 5 of ASTM D622 after being bent until the ends meet (see 4.7.13).

3.7.3.4 Resistance to aging. Hose or hose assemblies shall show no cracks, breaks, or other external visual disintegration after being bent against a form (see 4.7.14). The hose or hose assembly shall then be subjected to a proof pressure and examined for internal disintegration.

3.7 Marking. Marking shall be in accordance with MIL-STD-130.

3.7.1 Hose cover. The hose cover material shall have the following information legibly marked on the lay line of the hose at intervals of not more than 15 inches:

Specification number.
Type.
Class (type I only) or Style (type II only). (As applicable)
Nominal size
Date of manufacture (quarter and year)
Manufacturer's CAGE

3.7.2 Hose assemblies. Each hose assembly shall be identified by means of a band around the hose. The band may move freely along the length of the assembly. The band shall be permanently embossed, etched or stamped with the following information:

Military part number
Date of assembly (quarter and year)
Manufacturer's CAGE

3.8 Workmanship. Workmanship shall be in accordance with the best current manufacturing practice and of such quality as to produce hose or hose assemblies free of defects that will affect their strength, assembly, serviceability, or durability.

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 (Type I only) (see 4.4).
b. First Article Inspection (Type II only) (see 4.5)
c. Quality conformance inspection (see 4.6).
    1. Individual tests (see 4.6.1)
    2. Sampling tests (see 4.6.2)
    3. Periodic control tests (see 4.6.3)

4.3 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the applicable test method referenced in the test procedures. Unless otherwise specified, room temperature shall be defined as 60°F to 90°F.

4.4 Qualification inspection. Qualification inspection shall be performed at a laboratory acceptable to the qualifying activity on sample units produced with equipment and procedures used in production. Qualification inspection shall be performed on type I hose and hose assemblies.

4.4.1 Samples for qualification. Samples for qualification shall be representative of the products proposed to be furnished to this specification. Samples shall be of one type, one class and one nominal size. A 55-foot sample of hose shall be provided for qualification tests. Samples shall be of the quantity and length specified in the applicable test method. When a hose assembly is specified in the test method, a hose assembly shall consist of the hose as specified herein, coupled with fittings as specified in 3.4.2.1. Five hose assemblies are required for qualification of type I hose and hose assemblies. 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 samples shall be subjected to qualification testing in accordance with table III and in the sequence specified in accordance with table IV.

4.4.3 Acceptance of qualification inspection data. Required qualification tests at the hose assembly level that were already performed at the bulk hose level may be eliminated if documented approval has been obtained from the qualifying activity.

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

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

4.4.5.1 Removal from QPL. If the summary of test results indicates nonconformance with requirements specified herein but the corrective measures acceptable to the qualifying activity have not been taken, action may be taken to remove the failing product from the qualified products list. Failure to submit the report within 30 days after the end of each 12-month period may result in loss of qualification for the product. In addition to the periodic submission of inspection data, the contractor shall immediately notify the qualifying activity at any time during the 12-month period that the inspection data indicates failure of the qualified product to meet the requirements of this specification. In the event that no production occurred during the reporting period, a report shall be submitted certifying that the company still has the capabilities and facilities necessary to produce the item. If during two consecutive reporting periods there has been no production, the manufacturer may be required, at the discretion of the qualifying activity, to submit his qualified products to testing in accordance with the qualification inspection requirements.

4.5 First article inspection. First article inspection shall be performed at a laboratory acceptable to the procuring activity on sample units produced with equipment and procedures used in production. First article inspection shall be performed on type II hoses and hose assemblies.

4.5.1 Samples for first article. Samples for first article shall be representative of the products proposed to be furnished to this specification. Samples shall be of one type, one style and one nominal size. A 55-foot sample of bulk hose shall be provided for first article tests. Samples shall be of the quantity and length specified in the applicable test method. When a hose assembly is specified in the test method, a hose assembly shall consist of the hose as specified herein, coupled with fittings as specified in 3.4.2.1. Three (3) hose assemblies are required for first article inspection of type II hose and hose assemblies. 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 an approved assembly must be approved by the procuring activity.

4.5.2 First article inspection routine. All samples shall be subjected to first article testing in accordance with table III and in the sequence specified in accordance with table V.

4.5.3 Acceptance of first article inspection data. Required first article tests at the hose assembly level that were already performed at the bulk hose level may be eliminated if documented approval has been obtained from the procuring activity.

4.5.4 Failures. One or more failures shall be cause for refusal to grant first article approval.

4.6 Quality conformance inspection (Both types I and II).

4.6.1 Individual tests. Each hose length or hose assembly shall have been subjected to and passed all the individual tests specified in table III. Any item failing to meet the requirements of the individual tests shall be immediately removed from the lot.

TABLE III. Inspection requirements.

Title	Requirement paragraph	Inspection paragraph	Qualification inspection (Type I)	First Article inspection (Type II)	Conformance Inspection		
					Individual	Sampling	Periodic
Examination of product	3.4, 3.5, 3.7, 3.8	4.7.15	X	X	X		
Proof pressure	3.7.1.1	4.7.1	X		X		
Burst pressure 1/	3.7.1.2	4.7.2	X	X		X	
Ozone resistance 1/	3.7.1.3	4.7.3	X	X			
Adhesion 1/ 2/	3.7.1.4	4.7.4	X	X			X
Fungus resistance	3.7.1.5	4.7.5	X	X			
Length change 2/	3.7.2.1	4.7.6	X			X	
High temperature resistance 1/	3.7.2.2	4.7.7	X				
Low temperature resistance 1/	3.7.2.3	4.7.8	X				
Assembly tensile strength 1/	3.7.2.4	4.7.9	X				x
Oil immersion 1/	3.7.2.5	4.7.10	X				
Collapse under vacuum 2/	3.7.3.1	4.7.11		X			X
Hot vacuum collapse and degradation 1/	3.7.3.2	4.7.12		X			
Bend collapse 2/	3.7.3.3	4.7.13		X			
Resistance to aging 1/	3.7.3.4	4.7.14		X			

Notes:
1/ These are destructive tests.
2/ Hose only.

4.6.2 Sampling tests.

4.6.2.1 Bulk hose sampling tests. Hose lengths, randomly selected from a production lot to form an inspection sample (see 4.6.2.1.2), shall be subjected to the sampling tests specified in table III.

4.6.2.1.1 Production lot. A production lot shall consist of all hose of one size manufactured on the same production line(s) by means of the same production technique, materials, controls, and design during the same continuous production run.

4.6.2.1.2 Inspection sample. An inspection sample shall consist of hose lengths randomly selected from the production lot without regard to quality. Samples shall be selected at the rate of one sample for each full or partial increment of 750 feet of bulk hose produced in the continuous run, up to a maximum of 10 samples. For continuous runs greater than 7500 feet, 10 samples will be selected, but they must be representative of the entire production lot. Sampling tests for type I hose will be tested in order for length change and burst pressure for all samples. Sampling tests for type II hose will be tested in order for bend collapse and burst pressure for all samples.

4.6.2.2 Hose assemblies sampling tests. Hose assemblies, selected to form an inspection sample (see 4.6.2.2.1), shall be subjected to the sampling tests specified in table III.

4.6.2.2.1 Inspection sample. An inspection sample shall consist of hose assemblies, of one inner diameter size, randomly selected without regard to quality. Eight (8) samples from a lot size of 3000 hose assemblies or one (1) 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 hose assemblies produced has not reached 375 for a specific size within three years, the manufacturer shall perform sampling tests on one (1) hose assembly of that size unless documented approval has been obtained from the qualifying activity. Sampling tests for type I hose will be tested in order for length change and burst pressure for all samples. Sampling tests for type II hose will be tested in order for bend collapse and burst pressure for all samples.

4.6.2.3 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.

4.6.3 Periodic control tests.

4.6.3.1 Sampling for periodic control tests.

4.6.3.1.1 Bulk hose samples. For each size manufactured under essentially the same conditions, periodic control testing shall be performed on either four (4) samples for each test for every 20000 feet or fraction thereof of bulk hose produced (large lot option) or one (1) sample for each test for every 5000 of bulk hose produced (small lot option). If there has been some production but the total number of footage produced has not reached 5000 feet for a specific size within three years, the manufacturer shall perform periodic control tests on one (1) sample of that size unless documented approval has been obtained from the qualifying activity. Periodic samples may be subjected to more than one periodic test at the discretion of the manufacturer. However, the manufacturer assumes the risk that the effect of one test will not have a detrimental impact on the following test.

4.6.3.1.2 Hose assembly samples. For each size manufactured under essentially the same conditions, periodic control testing shall be performed on either four (4) samples from every 10000 hose assemblies produced (large lot option) or one (1) sample from every 2500 hose assemblies. If there has been some production but the number hose assemblies produced has not reached 2500 for a specific size within three years, the manufacturer shall perform periodic control tests on one (1) hose assemblies of that size unless documented approval has been obtained from the qualifying activity. Required periodic control tests at the hose assembly or fitting level that were already performed at the bulk hose level may be eliminated if documented approval has been obtained from the qualifying activity. Periodic samples may be subjected to more than one periodic test at the discretion of the manufacturer. However, the manufacturer assumes the risk that the effect of one test will not have a detrimental impact on the following test.

4.6.3.2 Periodic control test plan. Testing shall be in accordance with table III.

TABLE IV. Qualification inspection sequence for Type I (Air brake) hose and hose assembly.

Required Qualification Test	Test Paragraph	Sample number											
		Hose assemblies			Hose								
		1-3	4	5	6	7	8	9	10-11	12	13	14-16	17-19
Examination of product	4.7.15	X	X	X	X	X	X	X	X	X	X	X	X
Fungus resistance	4.7.5	X											
Burst pressure	4.7.2	X											
Ozone resistance	4.7.3								X	X			
Length change	4.7.6			X			X	X					
High temperature resistance	4.7.7											X	
Low temperature resistance	4.7.8												X
Proof pressure	4.7.1		X		X	X							
Adhesion	4.7.4				X		X						
Assembly tensile strength	4.7.9		X	X									
Oil immersion	4.7.10					X		X		X	X		

TABLE V. First article inspection sequence for Type II (Vacuum brake) hose and hose assembly.

Required First Article Test	Test Paragraph	Sample number								
		Hose assemblies	Hose							
		1-3	4	5-6	7-9	10	11	12	13-14	15
Examination of product	4.7.15	X	X	X	X	X	X	X	X	X
Fungus resistance	4.7.5	X								
Proof pressure	4.7.1			X						X
Burst pressure	4.7.2	X								
Ozone resistance	4.7.3					X	X	X		
Vacuum collapse	4.7.11			X						X
Hot vacuum collapse	4.7.12		X	X						
Adhesion	4.7.4		X			X				X
Bend Collapse	4.7.13				X					
Resistance to aging	4.7.14							X	X	

4.6.3.3 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.

4.6.4 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.

4.6.5 Discontinuation and resumption of production.

4.6.5.1 Discontinuation and resumption of production of bulk hose. If there has been no production of a specific size for a period of three years or more, eight (8) samples for each test shall be randomly selected from the first lot produced when production of that size has been resumed. All of the samples shall be subjected to the sampling tests and four (4) samples for each test shall be subjected to the periodic control tests (see table III).

4.6.5.2 Discontinuation and resumption of production of hose assemblies. If there has been no production of a specific size for a period of three years or more, eight (8) samples for each test shall be randomly selected from the first lot produced when production of that size has been resumed. All of the samples shall be subjected to the sampling tests and four (4) samples for each test shall be subjected to the periodic control tests (see table III).

4.6.6 Acceptance of conformance inspection data. Required conformance tests at the hose assembly level that were already performed at the bulk hose level may be eliminated if documented approval has been obtained from the qualifying activity.

4.7 Test methods.

4.7.1 Proof pressure test. Test specimens in accordance with ASTM D622.

4.7.2 Burst pressure. Test 18-inch long specimens in accordance with ASTM D380, Straight Bursting Test. ASTM Oil No. 3, as described in ASTM D471, may be used in lieu of water as the burst medium.

4.7.3 Ozone resistance. Test specimens in accordance with ASTM D622.

4.7.4 Adhesion. Specimens shall be tested in accordance with ASTM D622. When testing fiber reinforced hose, the entire specimen should be separated to establish the average load required for separation of the plies. Sharp abrupt changes in load for a short duration of time should be discounted in establishing the average load value for a given specimen.

4.7.5 Fungus resistance. Specimens 36 inches in length shall be subjected to the fungus resistance test of ASTM G21 except the test shall be continuous for 90 days. After 90 days, the hose shall be subjected to the burst pressure test specified in 4.7.1.

4.7.6 L ength change. Test specimens 18-inch in length in accordance with ASTM D622.

4.7.7 High temperature resistance. Test specimens in accordance with the High Temperature Resistance test of SAE J1402.

4.7.8 Low temperature resistance. Condition the specimens at -65°± 2°F for 70 ± 2 hours, then test each in accordance with ASTM D622.

4.7.9 Assembly tensile strength. Test specimens in accordance with ASTM D622.

4.7.10 Oil immersion test. Test specimens in accordance with ASTM D622.

4.7.11 Collapse under vacuum. Test specimens in accordance with ASTM D622.

4.7.12 Hot vacuum collapse and degradation. Test specimens in accordance with the High Temperature Exposure test of SAE J1403.

4.7.13 Bend collapse. Test specimens in accordance with ASTM D622.

4.7.14 Resistance to aging. Test specimens in accordance with ASTM D622.

4.7.15 Examination of product. Each hose shall be visually examined for marking, configuration and workmanship.

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 material 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.

6. NOTES

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

6.1 Intended use. Hose and hose assemblies covered by this specification are intended for use as flexible connections in air or vacuum brake systems on automotive vehicles. They are to be used for applications operating in a temperature range not exceeding 200°F and not below -60°F. The extreme operational temperature range is beyond the temperature range of similar commercial products.

6.1.1 Vacuum Hose. Type II hose is intended for, but not limited to, two different specific uses as follows:

Style A	-	Heavy-duty hose for service on truck-trailer combinations and similar applications.
Style B	-	Light-duty hose for service in conjunction with the power braking system on passenger cars and light trucks, where hose is used in a protected location.

6.2 Acquisition requirements. Acquisition documents must specify the following:

a. Title, number, and date of the specification.

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

c. Hose or hose assembly type, class or style (as applicable), and nominal size (see 1.2.1, 1.2.2 and tables IA and IB).

d. Length of hose or hose assembly (see 3.6).

e. Packaging requirements (see 5.1).

f. Fitting description where applicable (see 3.4 and 3.4.4):
   Male or female.
   Fixed or swivel.
   Thread size.
   Type of plating on fittings.
   Whether outside cover to be other than as specified (see 3.4.3)

g. PIN (see 6.4)

6.3 Qualification of Type I hoses and hose assemblies. With respect to products requiring qualification, awards will be made only for products that are, at the time of award of contract, qualified for inclusion in Qualified Products List QPL-3992, whether or not such products have actually been so listed by that date. The attention of contractors is called to these requirements and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from the Commander, Defense Supply Center, Columbus, DSCC-VQP, 3990 East Broad Street, Columbus, Ohio 43216-5000.

6.4 Part or Identification Number (PIN). The PIN for 3/8-inch ID hose assemblies is contained in MS39325. The PIN for bulk hose and hose assemblies of all other sizes acquired to this specification all to composed as follows:

M3992 -	A	01	16 -	A	B	XXX
Military Specification	A= Hose Assembly B= Bulk Hose	Type/ Class/Style (see table V)	Inside diameter in 1/32-inch increments	End configuration (see Figure 1) A=one male/one female fitting B=both ends female fittings	Fitting material S=ferrous material (e.g. steel) B=non--ferrous material (e.g. brass)	Length in 1/8-inch increments

Examples:

M3992-A0116-AB096 defines a MIL-DTL-3992 Type I, Class 1 hose assembly with a 1/2-inch ID that has brass male/female fittings and is 12 inches in length.

M3992-B0108 defines a MIL-DTL-3992 Type I, Class 1 bulk hose with a 1/4-inch ID.

TABLE V. Type/Class/Style codes for PIN.

CODE	TYPE	CLASS	STYLE
01	I	1	
02	I	2	
03	I	3	
04	I	4	
05	II		A
06	II		B

6.5 Supersession information. The fittings referenced in MS39325 are now described by Commercial Item Description A-A-52484, Coupler, Automotive Air Brake Line; Quick Disconnect, and MS39133, Adapter, Straight, Pipe to Hose, Automotive Air Brake Hose.

6.6 Subject term (keyword) listing.
Automotive
Bulk
Trailer
Truck
Truck-Tractor
Vacuum

6.7 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 - AT
Navy - MC
DLA - CC

Review activities:
Air Force - 71
Army – MI
Navy - SA

Preparing activity
DLA - CC

(Project 4720-0147)

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** MIL-DTL-3992E	**2. DOCUMENT DATE (*YYYYMMDD*)** 20010706

3. DOCUMENT TITLE
HOSE AND HOSE ASSEMBLY, RUBBER: AIR AND VACUUM BRAKE, SYSTEMS

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*)** **(1) Commercial:** **(2) DSN:** (*If Applicable*)	**7. DATE SUBMITTED (*YYYYMMDD*)**

8. PREPARING ACTIVITY DLA-CC

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