

MIL-H-13524B(AT)  
12 June 1974  
SUPERSEDING  
MIL-H-13524A(Ord)  
9 October 1958

## MILITARY SPECIFICATION

### HOSE ASSEMBLIES, METAL: FLEXIBLE, FUEL AND OIL

#### 1. SCOPE

1.1 Scope. This specification covers two types of flexible hose assemblies for the conveyance of gasoline or oil or for other applications for low pressure automotive use.

1.2 Classification. Hose assemblies, metal; flexible, fuel and oil shall be of the following types as specified (see 6.2):

- |         |                              |
|---------|------------------------------|
| Type I  | - Corrosion resistant steel. |
| Type II | - Bronze or brass.           |

#### 2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids form a part of this specification.

##### STANDARDS

###### Federal

FED. TEST METHOD STD. NO. 151 - Metals; Methods.

###### Military

MIL-STD-105 - Sampling Procedures and Tables for Inspection  
by Attributes.

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

FSC-4720

MIL-H-13524B(AT)

### 3. REQUIREMENTS

3.1 First article. The hose assemblies furnished under this specification shall be products which have been represented by a first article sample that has been inspected and has passed the first article inspection specified herein (see 4.2 and 6.2).

3.2 Materials. Materials used in the hose assemblies shall be as specified herein and on applicable drawings (see 6.2).

3.2.1 Construction. Hose shall consist of corrugated or convoluted tubing, of seamless, welded or brazed design, protected with a cover of one or more beamed wire braids.

3.2.2 Fittings. Each length of hose shall be fitted with a set of couplings as specified on applicable drawings (see 6.2), each permanently attached to hose.

3.3 Dimensions. Hose assemblies shall be of the dimensions specified in procurement documents and applicable drawings.

3.4 Hose assembly interchangeability. Unless otherwise specified, hose assemblies for each particular size (inside diameter) shall be interchangeable with all other assemblies intended for the same use.

3.5 Flexibility and leakproofness. The hose assembly shall show no evidence of leakage, deformation, permanent set, or interior obstruction after being subjected to the test specified in 4.5.1.

3.6 Vibration. Hose assemblies shall withstand the vibration test specified in 4.5.2 with no evidence of leakage visible at conclusion of the test.

3.7 Resistance to corrosion. When hose fittings are made of ferrous alloys either in whole or in part, they shall withstand the corrosion test specified in 4.5.3 without showing evidence of damaging corrosion.

3.8 Identification. Unless otherwise specified, each hose assembly shall be identified by information marked or stamped on, or affixed to, each assembly as follows:

- (a) Military part number.
- (b) Hose size (inside diameter).
- (c) Manufacturer's name or trademark.

MIL-H-13524B(AT)

#### 4. QUALITY ASSURANCE PROVISIONS

**4.1 Responsibility for inspection.** Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier 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.

**4.2 First article inspection.** A first article sample, consisting of four (4) metal hose assemblies of the size and type proposed to be furnished under the contract, shall be submitted for first article inspection. Samples submitted shall be representative of the units proposed to be furnished under the contract. The hose assemblies shall be examined for defects listed in 4.3.2.2.3 and then subjected to the tests specified in 4.5.1 through 4.5.3. Unless otherwise specified, all examinations and tests shall be done by the manufacturer under Government surveillance.

**4.2.1 Failure.** Failure of the first article sample to pass the specified tests may be cause for refusal by the Government to conduct additional tests until it has been proven to the satisfaction of the procuring activity that the faults revealed by the tests have been corrected.

#### **4.3 Quality conformance inspection.**

**4.3.1 Lot formation.** Unless otherwise specified by the procuring activity, a lot shall consist of all hose assemblies of 1 size and 1 type from an identifiable production period, from 1 manufacturer, submitted at 1 time for acceptance.

#### **4.3.2 Examination inspection.**

**4.3.2.1 Sampling for examination inspection.** For the purpose of examination inspection a representative sample shall be selected from each lot in accordance with Standard MIL-STD-105.

**4.3.2.2 Acceptance and rejection criteria.** Unless otherwise specified, the acceptance and rejection criteria shall be as specified in the applicable tables of Standard MIL-STD-105 for the acceptable quality level listed in 4.3.2.2.2.

**4.3.2.2.1 Examination inspection.** Each hose or hose assembly selected in accordance with 4.3.2.1 shall be examined for the characteristics listed in the classification of defects contained in 4.3.2.2.3.

MIL-H-13524B(AT)

4.3.2.2.2 Acceptable quality levels. The following acceptable quality levels shall be used on the basis of percent defective:

<u>Classification</u>	<u>AQL</u>
Major	1.0
Minor	2.5

4.3.2.2.3 Classification of defects. For examination inspection purposes, defects shall be classified as follows:

Major defects (1.0 AQL)

1. Dimensional nonconformance (see 3.3).
2. Split coupling or damage beyond repair.
3. Stripped coupling threads (see 3.2.2).
4. Wire braid broken (see 3.2.1).
5. Wire braid and coupling welding or brazing breaking loose (see 3.2.1).

Minor defects (2.5 AQL)

51. Illegible or omitted branding (see 3.8).
52. Loose wires in wire braid (see 3.2.1).
53. Thread coupling binds on companion sleeve (see 3.4).

4.3.3 Testing inspection.

4.3.3.1 Sampling for testing. From each lot which has passed the inspection specified in 4.3.2.2.1 a sample shall be selected in accordance with inspection level S-2 of normal sampling to Standard MIL-STD-105.

4.3.3.2 Tests. For acceptance, the sample selected in accordance with 4.3.3.1 shall be subjected to the flexibility and leakproof test specified in 4.5.1 using and AQL of 6.5 percent defective.

4.4 Control tests.

4.4.1 Frequency for hose assemblies. Specimens of flexible metal hose shall be selected at a rate of 2 per month or 4 in each 500 produced, whichever occurs first, except that not more than 8 shall be selected in any given 30 day period. The specimens shall be identified as to a production period and subjected to the test specified in 4.5.1.

4.4.2 Test failure. If a specimen fails to pass the test specified herein, the Government inspector may stop acceptance of subsequent lots until objective evidence has been provided by the manufacturer that corrective action has been taken.

MIL-H-13524B(AT)

**4.5 Test procedures.****4.5.1 Flexibility and leakproofness test.**

**4.5.1.1 Procedure.** Each specimen shall be bent around a mandrel and while thus bent shall be subjected to internal hydrostatic pressure for a period of five minutes. Mandrel diameters, hydrostatic pressures and temperature shall be as shown in table II. At the end of this test, the specimen shall be examined for conformance to 3.5.

Table II - Mandrel diameters and hydrostatic pressures for flexibility test

Size (I.D.)	Mandrel diameter	Hydrostatic pressure	High temperature test 300°F.
Inches	Inches	P.s.i.	
3/16	5-1/2	1,830	300
1/4	7	1,470	300
5/16	8	1,160	300
3/8	11	890	300
1/2	14	820	300
5/8	18	750	300
3/4	20	660	300
1	24	440	300

**4.5.2 Vibration test.**

**4.5.2.1 Procedure.** To determine conformance to 3.6 each specimen shall withstand the following vibration test:

- (a) Initial vibration phase: (may be performed continuously or intermittently).
  - (1) 500 hour duration.
  - (2) SAE # 30 oil circulating at a temperature of 300°F.
  - (3) 175 p.s.i. pressure.
  - (4) .052 total displacement (double amplitude).
  - (5) Ambient air temperature of 116°F.
  - (6) The specimen shall be arranged to provide an initial slack of 3/16 inch, and an offset of 1-1/2 inches at an angle of 90 degrees to the direction of stroke. It shall then be vibrated in a machine at 30 cycles per second.
- (b) Low temperature phase:
  - (1) Refrigerate assemblies 24 hours at -65°F.
  - (2) Flex through a 90 degree bend in four directions.
- (c) Final vibration phase: Repeat phase (a) except that (a) (1) shall be of 24 hour duration.

MIL-H-13524B(AT)

**4.5.3 Corrosion test.**

**4.5.3.1 Procedure.** The specimen shall be subjected to the salt spray test specified in method 811.1 of Standard FED. TEST METHOD STD. NO. 151 for a period of 100 hours. At the conclusion of this test the specimen shall be examined to determine conformance to 3.7.

**5. PREPARATION FOR DELIVERY**

**5.1 Preservation, packaging, packing and marking.** Preservation, packaging, packing and marking shall be in accordance with the applicable packaging Standard of packaging data sheet for the specified level of protection.

**6. NOTES**

**6.1 Intended use.** Hose assemblies covered by this specification are intended for the conveyance of gasoline or oil or for other applications when installed in military vehicles or other U. S. Army equipment with the exception of use with aircraft engine fluid lines.

**6.2 Ordering data.** Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Type, size, and length of hose assemblies required (see 3.2 and 3.2.2).
- (c) Title, number and date of applicable drawings (see 3.2 and 3.2.2).
- (d) When and where preproduction sample will be forwarded (see 4.2).

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