MIL-H-22343A(AS)
16 January 1968
SUPERSEDING
MIL-H-22343(Wep)
5 February 1960

MILITARY SPECIFICATION

HOSE ASSEMBLIES, METAL, LIQUID OXYGEN

This specification has been approved by the
Naval Air Systems Command.

1. SCOPE

1.1 This specification covers metal hose assemblies suitable for use with liquid oxygen.

2. APPLICABLE DOCUMENTS

2.1 The following specifications, standards, drawings and publications form a part of this specification. Unless otherwise specified, the issue in effect on date of invitation for bids shall apply.

SPECIFICATIONS

Federal

O-T-236	Tetrachloroethylene (Perchloroethylene), Technical Grade
O-T-634	Trichloroethylene, Technical
BB-A-1034	Air, Compressed, For Breathing Purposes
BB-N-411	Nitrogen, Technical

Military

MIL-P-116	Preservation, Methods of
MIL-B-5087	Bonding, Electrical, and Lighting Protection, for Aerospace Systems
MIL-E-5272	Environmental Testing, Aeronautical and Associated Equipment, General Specification for

FSC 1660

Military (Continued)

MIL-O-27210	Oxygen, Aviator's Breathing, Liquid and Gas

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 of U.S. Military Property
MIL-STD-794	Parts and Equipment, Procedures for Packaging and Packing of
MS1247	Identification of Pipe, Hose, and Tube Lines for Aircraft, Missile, and Space Systems
MS33586	Metals, Definition of Dissimilar
MS90457	Hose Assemblies, Metal, Liquid Oxygen

(When requesting any of the applicable documents, refer to both title and number. All requests should be made via the cognizant Government quality control representative. Copies of this specification and other unclassified specifications and drawings required by contractors in connection with specific procurement functions should be obtained upon application to the Commanding Officer, Naval Supply Depot (Code 1051), 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120. All other documents should be obtained from the procuring activity or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 Preproduction - The hose assembly furnished under this specification shall be a product which has been inspected, and passed the preproduction inspections specified herein.

3.2 Materials - Materials shall conform to applicable specifications and shall be as specified herein and on applicable drawings. Materials which are not covered by specifications, or which are not specifically described herein, shall be of the best quality, of the lightest practicable weight, and suitable for the purpose intended.

3.2.1 Metal parts - All metal parts shall be of a corrosion resistant material or treated in a manner to render them adequately resistant to corrosion.

3.2.1.1 Dissimilar metals - Unless suitably protected against electrolytic corrosion, dissimilar metals shall not be used in intimate contact with each other. Dissimilar metals are defined in MS33586.

3.2.2 Protective treatment - When materials are used in the construction of the hose assemblies that are subject to deterioration when exposed to environmental conditions likely to occur during service usage, they shall be protected against such deterioration in a manner that will in no way prevent compliance with the performance requirements of this specification. Protective coating which might crack, chip, or scale during normal service life or under extremes of environmental conditions shall not be used.

3.2.3 Standard parts - MS and AN standard parts shall be used where they suit the purpose. They shall be identified on the manufacturer's drawings by their part numbers. Parts which are not covered by specifications or military standards, or which are not specifically described herein or on the drawings, shall be completely described on manufacturer's drawings.

3.3 Design and construction - The design and construction of the hose assembly shall be in accordance with MS90457 and the part number specified in the contract or order (see 6.2).

3.4 Performance -

3.4.1 Proof pressure - The hose assembly, when tested as specified in 4.6.2, shall not show any evidence of leakage 2 minutes after pressure has been applied.

3.4.2 Flexibility - The hose, when tested as specified in 4.6.3, shall not show any evidence of damage or leakage.

3.4.3 Obstruction test - The hose assembly, when tested as specified in 4.6.4, shall permit the ball to pass through the hose assembly without friction due to any foreign obstruction.

3.4.4 Endurance - The hose assembly, when tested as specified in 4.6.5, shall not show any evidence of damage.

3.4.5 Vibration - The hose assembly, when tested as specified in 4.6.6, shall not show any evidence of material failure.

3.4.6 Burst pressure - The hose assembly, when tested as specified in 4.6.7, shall not show any evidence of damage at any pressure below the following pressures:

Hose Size	Burst Pressure, psi
-4	4500
-5	3500
-6	3500
-8	3500

3.4.7 Disassembly and examination - The hose assembly, when tested as specified in 4.6.8, shall not show excessive evidence of deterioration or wear due to testing which might affect the hose assembly performance.

3.5 Interchangeability - All parts having the same manufacturer's part number shall be functionally and dimensionally interchangeable.

3.6 Cleaning procedure - To remove oil and grease from the hose assembly, the following cleaning method shall be used:

3.6.1 Degreasing - All internal parts of the hose assembly shall be degreased using a vapor phase degreaser in accordance with O-T-236 or O-T-634. Ultrasonics may be used in conjunction with vapor phase degreasing for the cleaning of components. After completion of the cleaning and when assembled, General Electric Type H Leak Detector or equivalent Halide testing apparatus shall be used to determine the absence of the cleaning compound.

3.6.2 Purging - The hose assembly shall be purged with hot dry oxygen, conforming to MIL-O-27210, type I or hot, dry, water-pumped nitrogen, conforming to BB-N-411, type I, class I, grade B. The temperature at the inlet to the system shall not exceed 250° F during purging.

3.7 Identification of product - The hose assembly shall be permanently marked for identification in accordance with MIL-STD-130 except that the Federal Stock Number shall be omitted from the nameplate. The hose shall also be marked in accordance with MS1247 and bonded in accordance with MIL-B-5087.

3.8 Workmanship - The hose assembly shall be uniform in quality and shall be free from irregularities, defects, or foreign matter which could adversely affect safety, performance, reliability, or durability.

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, the supplier may utilize his own facilities or any commercial laboratory acceptable to 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 Classification of inspection - The examination and testing of the hose assemblies shall be classified as follows:

a. Preproduction inspection - Preproduction inspections consist of examinations and tests performed on samples which are representative of the production item after award of a contract to determine that the production item meets the requirements of this specification.

b. Quality conformance inspection - Quality conformance inspection consists of examinations and tests performed on individual products or lots to determine conformance of the products or lots with the requirements set forth in this specification.

4.3 Preproduction inspection - Preproduction inspection shall consist of all the examinations and tests of this specification.

4.3.1 Preproduction samples - Unless otherwise specified, as soon as practicable after the award of the contract or order, the manufacturer shall submit four 18-inch length hose assemblies of each size for which preproduction inspection is required. The samples shall be representative of the construction, workmanship, and materials to be used during production. When a manufacturer is in continuous production of these units from contract to contract, submission of further preproduction samples on the new contract may be waived at the discretion of the procuring activity. Approval of the preproduction samples or the waiving of the preproduction inspection does not preclude the requirements of submitting to the quality conformance inspection. The preproduction samples shall be forwarded to the Supply Officer, Naval Air Engineering Center, Philadelphia, Pennsylvania 19112, Attention: Director, Aerospace Crew Equipment Laboratory; or a laboratory designated by the procuring activity (see 6.2). The samples shall be plainly identified by securely attached durable tags marked with the following information:

> Samples submitted by (name) (date) for preproduction inspection in accordance with the requirements of MIL-H-22343A(AS) under contract no.

4.3.1.1 Upon completion of the preproduction inspection, all the applicable inspection reports and when applicable, recommendations and comments pertinent for use in monitoring production shall be forwarded to the Government quality control representative. The samples shall be consumed or destroyed in the preproduction inspection and shall not be considered as part of the quantity to be delivered under contract.

4.4 Quality conformance inspection - Quality conformance inspection shall consist of the following examinations and tests:

Visual examination
Dimensions
Proof pressure
Flexibility (room temperature)
Obstruction test
Preparation for delivery

4.4.1 Sampling -

4.4.1.1 Inspection lot -

4.4.1.1.1 Hose assembly - An inspection lot size shall be expressed in units of hose assemblies, of one size, made under essentially the same conditions and from the same materials and components. The sample unit shall be one hose assembly.

4.4.1.1.2 Preparation for delivery - An inspection lot size shall be expressed in units of one fully prepared shipping container, containing hose assemblies of one size, fully prepared for delivery and made from essentially the same materials and components. The sample unit shall be one shipping container, containing hose assemblies of one size, fully prepared for delivery with the exception that it need not be sealed.

4.4.1.2 Sampling for tests and examinations of hose assemblies - The sample size, acceptance criteria, tests, and examinations required for the hose assemblies shall be as specified in Table I.

4.5 Test conditions -

4.5.1 Temperature and pressure - Unless otherwise specified, tests shall be conducted at local ambient temperature and barometric pressure. The temperature and barometric pressure shall be recorded at the time of inspection. This information shall be available for computation of test data, where required, to normal temperature pressure (NTP) conditions. NTP conditions are 29.92 inches of mercury and 70° F. Test instruments shall be calibrated or adjusted according to their required usage in conducting individual tests.

TABLE I

SAMPLE SIZE, ACCEPTANCE CRITERIA, TESTS AND EXAMINATIONS OF THE HOSE ASSEMBLIES

INSPECTION	METHOD	SAMPLE SIZE	ACCEPTANCE CRITERIA
Visual examination (see classification of defects)	4.6.1.1	Every hose assembly for critical defects. Inspection Level II 1/ for minor defects	Reject all units with any critical defects. An acceptable quality level of 2.5 defects per hundred units for minor defects.
Dimensions	4.6.1.1.1	Inspection Level S-2 1/	An acceptable quality level of 1.0 percent defective.
Proof pressure	4.6.2	Every hose assembly	Reject all defective units.
Flexibility (room temperature)	4.6.3.1	Inspection Level S-2 1/	Acceptance number zero, rejection number 1.
Obstruction test	4.6.4	Every hose assembly	Reject all defective units.
Preparation for delivery	4.6.1.2	Inspection Level S-2 1/	Total acceptable quality level of 4.0 percent defective.

1/ The sample size shall be based only on the applicable sample size code letter corresponding to the specified inspection level of MIL-STD-105.

4.5.2 Gas - Unless otherwise specified, the gas used in testing the hose assemblies shall be oxygen conforming to MIL-O-27210, type I. When specified, nitrogen conforming to BB-N-411, type I, class I, grade B, or air conforming to BB-A-1034 may be used.

4.6 Inspection methods -

4.6.1 Visual examination -

4.6.1.1 Hose assembly - Every hose assembly shall be examined visually (for critical defects) to determine conformance to this specification. The classification of defects, Table II, shall be used to classify the defects found.

TABLE II

CLASSIFICATION OF DEFECTS FOR VISUAL EXAMINATION OF THE HOSE ASSEMBLIES

CRITICAL	MINOR
1. Material imperfections - foreign matter embedded.	201. Marking - missing, insufficient, incorrect, illegible, or not permanent.
2. Surface - unclean, rough, misaligned, or containing cracks, nicks, or other flaws.	
3. Any component missing, malformed, fractured, or otherwise damaged.	
4. Any component loose or otherwise not securely retained.	
5. Incorrect assemblying or improper positioning of components.	
6. Any functioning part that works with difficulty.	
7. Faulty workmanship or other irregularities.	

4.6.1.1.1 Dimensions - The hose assembly shall be checked dimensionally to determine conformance to the dimensions specified in MS90457.

4.6.1.2 Preparation for delivery - Each of the fully prepared shipping containers, containing hose assemblies selected as a sample unit from the lot, shall be examined to determine that the packaging, packing, and marking conform to this specification. The classification of defects, Table III, shall be used to classify the defects found.

4.6.2 Proof pressure - The hose assembly shall be submerged in water and a gaseous pressure of 450 psi shall be applied internally to the hose for a period of 5 minutes. The hose assembly shall pass the requirements specified in 3.4.1.

TABLE III

LIST OF DEFECTS FOR PREPARATION FOR DELIVERY

ITEM	DEFECTS
Exterior and interior markings	Missing, incorrect, incomplete, illegible; of improper size, location, sequence; or method of application; markings not the same on the interior and exterior containers.
Packaging and Packing materials	Any non-conforming component; any component missing, damaged, or otherwise defective. Improper preservation, packaging or packing.
Workmanship	Inadequate application of the components such as incomplete closure of the unit package, intermediate package, case liners, container flaps, loose strappings, etc.; bulging or distortion of the containers.
Exterior and interior weight or content	Number per container is more or less than required; gross or net weight exceeds the requirements; more than one size in the same container.

4.6.3 Flexibility - The hose shall be subjected to the following flexibility tests and shall pass the requirements specified in 3.4.2.

4.6.3.1 Room temperature - The hose shall be coiled around a mandrel with a radius as follows:

Hose Size	Bend Radius (Inside of Bend)
-4	2"
-5	2-1/2"
-6	3"
-8	4"

The coil shall be rolled the entire length of the hose. The bend shall then be reversed and returned to the straight position. This cycle shall be conducted a total of 5 times allowing at least 4 seconds per cycle. The hose assembly shall then be subjected to and pass the test specified in 4.6.2.

4.6.3.2 High temperature - The hose shall be conditioned at 160 ±5°F for 3 hours. After the conditioning period and while still at this temperature, the hose shall be subjected to the test specified in 4.6.3.1.

4.6.4 Obstruction test - A steel ball, of a diameter as specified below, shall be dropped through the internal passage of the hose assembly. The assembly shall pass the requirements specified in 3.4.3.

Hose Size	Ball Size (inches)
-4	.146
-5	.208
-6	.267
-8	.382

4.6.5 Endurance - The hose shall be subjected to the test specified in 4.6.3.1, except that 250 cycles of flexibility shall be conducted at room temperature, and 250 cycles at -297 ±5°F. The hose assembly shall pass the requirements specified in 3.4.4. The hose assembly shall then be subjected to and pass the test specified in 4.6.2.

4.6.6 Vibration - The hose assembly shall be bent 180 degrees to a radius specified in 4.6.3.1 and installed on a suitable vibration machine. The bend shall be in the plane of vibration. One end of the assembly shall be fixed and the other end shall be subjected to the vibration test specified in MIL-E-5272, Procedure XII. The hose assembly shall pass the requirements specified in 3.4.5. The hose assembly shall then be subjected to and pass the test specified in 4.6.2.

4.6.7 Burst pressure - The hose assembly shall be subjected to a hydrostatic pressure with a rate of pressure rise equal to 200,000 ±5,000 psi/min. Sufficient pressure shall be applied to burst the hose assembly. The hose assembly shall be observed throughout the test and the type of failure and the pressure required for failure shall be recorded. The hose assembly shall pass the requirements specified in 3.4.6.

4.6.8 Disassembly and examination - At the conclusion of all the inspections, the hose assembly shall be disassembled and examined. The hose assembly shall be disassembled and examined after any test in which hose assembly failure indicates faulty construction. The hose assembly shall pass the requirements specified in 3.4.7.

5. PREPARATION FOR DELIVERY

5.1 Packaging - Packaging shall be Level A or C of MIL-STD-794 as specified in the contract or order (see 6.2).

5.1.1 Level A - Unless otherwise specified by the contract or order (see 6.2), the hose assemblies shall be preserved in accordance with MIL-P-116, Method III, without cleaning by immersion in solvent. To prevent entry of foreign matter into the hoses, the ends of the assemblies shall be wrapped with a chemically neutral wrap, secured with pressure sensitive tape.

5.1.2 Level C - Each hose assembly shall be packaged in a manner that will afford adequate protection against contamination and physical damage during shipment from supply source to the first receiving activity for immediate use.

5.2 Packing - The hose assembly shall be packed in accordance with MIL-STD-794, Level A, B, or C, as specified in the contract or order (see 6.2). As far as practical, containers shall be of minimum tare and cube consistent with the protection required and contain identical quantities.

5.3 Marking - Unless otherwise specified in the contract or order, marking shall be in accordance with MIL-STD-129.

5.3.1 Precautionary marking - The following precautionary marking shall appear on each unit package:

"CAUTION: DO NOT ALLOW CONTAMINANTS
OF ANY KIND TO BE USED ON OR ABOUT
HOSE ASSEMBLIES."

5.3.1.1 Additional precautionary marking - The hose assembly shall have a detachable marking tag wired to the hose assembly advising users of mainte-

nance and safety precautions. The following items shall be included:

a. Cleaned for oxygen service

b. Do not twist metal hose

6. NOTES

6.1 Intended use - The hose assemblies covered by this specification are intended for use in supplying breathing oxygen for aircrewmen.

6.2 Ordering data - Procurement documents should specify the following:

a. Title, number, and data of this specification.

b. Applicable part number required (see 3.3).

c. Whether preproduction inspection is required and where the samples should be delivered (see 4.3.1.1).

d. Selection of applicable levels of preservation, packaging, and packing.

e. Applicable methods of cleaning and preservation.

f. Items of data required (see 6.3).

6.3 Data - For the information of Contractors and Contracting Officers, any of the data specified in applicable documents listed in Section 2 of this specification, or referenced lower-tier documents need not be prepared for the Government and shall not be furnished to the Government unless specified in the contract or order. The data to be furnished shall be listed on DD Form 1423 (Contractor Data Requirements List), which shall be attached to and made a part of the contract or order. NavWeps Form 4200/15 (Drawings, Lists and Specifications Required) shall be attached where applicable.

FOLD

DEPARTMENT OF THE NAVY
Naval Air Systems Command
Washington, D.C. 20360

POSTAGE AND FEES PAID
NAVY DEPARTMENT

OFFICIAL BUSINESS

NAVAL AIR SYSTEMS COMMAND (AIR-52021)
DEPARTMENT OF THE NAVY
WASHINGTON, D. C. 20360

FOLD

SPECIFICATION ANALYSIS SHEET

Form Approved
Budget Bureau No. 119-R004

INSTRUCTIONS

This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity *(as indicated on reverse hereof)*.

SPECIFICATION
MIL-H-22343A(AS) HOSE ASSEMBLIES, METAL, LIQUID OXYGEN

ORGANIZATION *(Of submitter)*	CITY AND STATE

CONTRACT NO.	QUANTITY OF ITEMS PROCURED	DOLLAR AMOUNT
		$

MATERIAL PROCURED UNDER A

☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

A. GIVE PARAGRAPH NUMBER AND WORDING.

B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES.

2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID

3. IS THE SPECIFICATION RESTRICTIVE?

☐ YES ☐ NO IF "YES", IN WHAT WAY?

4. REMARKS *(Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)*

SUBMITTED BY *(Printed or typed name and activity)*	DATE

DD, FORM 1 APR 63 1426

C-8978