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ZZ-H-461E
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SUPERSEDING
ZZ-H-461D
5 Sep 1978

FEDERAL SPECIFICATION

HOSE AND HOSE ASSEMBLY, RUBBER, GAS (ACETYLENE-HYDROGEN, AIR AND OXYGEN)

This specification is approved by the Commissioner, Federal Supply Service, General Services and Administration, for the use of all Federal Agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers acetylene-hydrogen, air and oxygen hoses for cutting, welding and other oxygen and fuel gas uses.

1.2 Classification.

1.2.1 Styles. Gas hoses and hose assemblies covered by this specification shall be of the following styles, as specified (see 6.2):

Style A - Single line

Style B - Dual line

* 2. APPLICABLE DOCUMENTS

* 2.1 Government publications. The issues of the following documents, in effect on date of invitation for bids or solicitation for offers, form a part of this specification to the extent specified herein.

Federal Standards

FED-STD-123	Marking for Shipment (Civil Agencies).
FED-STD-162	Hose, Rubber, Visual Inspection Guide for.

(Activities outside the Federal Government may obtain copies of federal specifications, standards, and handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.)

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: the Engineering Division, San Antonio ALC/MMEDO, Kelly AFB, TX 78241 by using the self addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FSC 4720

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(Federal Government activities may obtain copies of federal specifications, standards, and handbooks, and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

Military Specifications

*	MIL-P-775	Packaging of Hose, Hose Assemblies; Rubber, Plastic, Fabric, or Metal (Including Tubing); and Fittings, Nozzles and Strainers.

Military Standards

MS15011	Fittings, Hose, Welding and Cutting, Oxygen and Acetylene.
MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-147	Palletized Unit Loads.
MIL-STD-794	Parts and Equipment, Procedures for Packaging and Packing of.

* (Copies of Military specifications and standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity was directed by the contracting officer.)

* 2.2 Other publications. The following document(s) form a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or requests for proposal shall apply.

American Society for Testing and Materials (ASTM) Standards.

	ASTM D-380	Hose, Rubber, Standard Method of Testing.
*	ASTM D-573	Rubber-Deterioration in an Air Oven.
	ASTM D-1149	Rubber-Deterioration - Surface Ozone Cracking in a Chamber (Flat Specimen).
	ASTM D-3951	Packaging, Commercial.

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

3. REQUIREMENTS

3.1 Components. The complete hose assembly shall consist of the basic hose, style A or style B, with couplings attached to hose ends. When specified, the hose shall be furnished without couplings (see 6.2).

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3.2 Design and construction.

3.2.1 Styles.

3.2.1.1 Style A. Single line hose or hose assembly conforming to this specification.

* 3.2.1.2 Style B. Dual line hose or hose assembly conforming to this specification, and connected continuously along one side so that hoses are one integral unit. The minimum pull to separate one inch length shall be 10 pounds for the 1/8 inch size, 15 pounds for the 3/16 inch size, 25 pounds for the 1/4 inch size, 30 pounds for the 5/16 inch size and 35 pounds for the 3/8 inch size. The lines must separate without exposing the outer reinforcing ply when tested in accordance with 4.4.4.1.

3.2.1.2.1 Split lead. Definite cut lengths and coupled lengths (hose assemblies) of dual line hose shall be separated for approximately 12 inches on one end and 30 inches on the other end, and at this juncture a figure 8 shaped brass ferrule shall be crimped to prevent further separation.

3.2.2 Couplings. Couplings shall be made from free machining brass and for acetylene-hydrogen and oxygen gases couplings shall comply with the requirements of MS15011, as specified by the procuring activity (see 6.2). Couplings shall be attached to the hose using ferrules.

3.2.3 Ferrules. Ferrules shall be a minimum of one inch in length, except that the 1/8-, 3/16- and 1/4 inch diameter hose ferrule shall be 11/16 inch minimum length with the inside diameter comparable to the outside diameter of the hose. Minimum thickness of ferrules shall be 0.024 inch. The ferrules shall be crimped in a manner to insure that the couplings will not leak, become loosened or detached from the hose ends when subjected to the hydrostatic test pressure of Table I and when tested in accordance with 4.4.2.

3.2.4 Hose. The hose furnished under this specification shall consist of a rubber tube, braid or braids or helically wound (in multiples of two) plies of cotton or synthetic fiber yarn or cord reinforcement and a rubber cover. The tube and cover shall be of natural rubber, synthetic rubber or mixture thereof, which will be referred to herein as rubber.

3.2.4.1 Inner tube. The inner tube shall be a seamless, continuous rubber extrusion extending the full length of the hose.

3.2.4.2 Reinforcement. The ply or plies of reinforcement shall be braided or helically wound over the tube. Unless otherwise specified, the number of braided plies of reinforcement shall be two for style A except for 1/8 and 3/16 inch sizes, where one braided ply shall be used. One braided ply shall be used for all sizes of style B. The braided plies shall be thoroughly impregnated with a rubber compound which shall cause the plies to adhere firmly to each other and to the tube and cover. There shall be a distinct layer of rubber compound between the plies. In the case of helically wound reinforcement the plies shall always be in multiples of two, each wound in counter direction to the other. Two helically wound plies shall be considered equivalent to one braided ply and four helically wound plies equivalent to two braids. A distinct layer of rubber is therefore only required between the pairs of helically wound plies.

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Table I. Design and Construction

Size, inside diameter	inch	1/8	3/16	1/4	5/16	3/8
Number of braided plies						
Style A (single line)		1	1	2	2	2
Style B (dual line)		1	1	1	1	1
Tolerance, inside diameter (plus or minus)	inch	0.023	0.023	0.023	0.023	0.023
Size, outside diameter Style A (single line)	inch	0.344	0.437	0.594	0.656	0.719
Size, outside diameter Style B (dual line)	inch	-	0.437	0.531	0.593	0.656
Tolerance, outside diameter (plus or minus)	inch	0.031	0.031	0.031	0.031	0.031
Thickness, minimum, inch:						
Tube		0.03	0.055	0.055	0.055	0.055
Cover		0.015	0.023	0.023	0.023	0.023
Tensile strength, minimum, psi:						
Tube		-	700	700	700	700
Cover		-	1000	1000	1000	1000
Ultimate elongation, minimum percent:						
Tube		-	200	200	200	200
Cover		-	300	300	300	300
Friction, minimum, lbs:						
Between tube and plies		6	7	8	8	8
Between cover and plies		6	7	8	8	8
Between plies, Style A, single line		-	-	10	10	10
"Hydrostatic Characteristics"						
Working Pressure, Maximum, psi		150	150	150	150	150
Proof Pressure Test, psi (all hose)		300	300	300	300	300
Burst Test, Min., psi		800	800	800	800	800
Assembly Integrity Test, psi		300	300	300	300	300

* 3.2.4.3 Cover. The cover shall be a seamless, continuous rubber extrusion extending the full length of the hose and shall be free of holes, slits or other imperfections. Intentional pricking of a cover (for processing reliability) shall not be considered an imperfection. This requirement is not intended to exclude the use of a corrugated (fluted) cover.

3.2.5 Sizes. Hose covered by this specification shall be of the sizes shown in Table I (see 6.2).

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3.2.6 Diameter tolerances. Hose diameter tolerances shall be as shown in Table I.

3.2.7 Lengths. Length of hose shall be as specified (see 6.2). For hose assemblies, the length shall be the actual length of the hose exclusive of fittings (couplings). A tolerance of plus or minus two percent in the specific length shall be permitted.

3.2.8 Color. On both dual and single line hose, the cover shall be red for acetylene-hydrogen hose, green for oxygen hose and black for air hose (see 6.2).

3.2.9 Hydrostatic tests.

* 3.2.9.1 Proof Pressure Test . Hose shall be 100% proof tested by the hose manufacturer. It shall not leak, rupture or show other signs of weakness when subjected to the proof pressure shown in Table I and as described in 4.4.1.

* 3.2.9.2 Burst Test. The samples of hose selected for the purpose shall not burst below the minimum pressure stated in Table I and as described in 4.4.3.

* 3.2.9.3 Length Change. The length change between 10 psi and the maximum working pressure (150 psi recommended in Table I) shall be between +4 and -6% when tested in accordance with the procedure outlined in ASTM D-380.

* 3.2.9.4 Assembly Integrity Test. The samples of assemblies selected for the purpose shall not leak, rupture, or show movement of the coupling and/or ferrule as related to its installed position on the hose in excess of 1/16 inch when subjected to the pressure shown in Table I and as described in 4.4.2.

3.2.10 Low temperature test. When subjected to the test specified in 4.4.4.2, the hose shall not break or crack.

3.2.11 Ozone resistance. Specimens of the cover shall show no visible cracking, checking or any damage of the hose when examined under magnification following exposure as specified in 4.4.4.3.

* 3.2.12 Physical Properties After Air Heat Aging. After aging specimens of the tube and cover, the tensile strength and elongation of both tube and cover shall be at least 80% of the original value for tensile strength and 50% of the original value for elongation.

3.2.13 Identification of product. The hose shall be branded with the manufacturer's name and trademark, quarter and year of manufacture with the words "ACET-HYD" for acetylene-hydrogen hose, "OXYGEN" for oxygen hose, "AIR" for air hose and with "MAX. WP-150 PSI." Hose less than 25 feet long shall have one brand per length. Hose of 25 feet or more in length shall be branded at intervals of 25 feet. In lieu of branding at distinct locations, the hose may be continuously and permanently imprinted along the length in a distinctly different color than that of the cover with the indicated legend repeated at intervals not exceeding 36 inches.

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3.2.14 Workmanship. Workmanship shall be of the quality necessary to produce hose and couplings free from defects that would adversely affect service performance

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, 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 that supplies and services conform to prescribed requirements.

4.2 Sampling for lot inspection.

* 4.2.1 Inspection lots.

a. Inspection lot = hose. A lot shall consist of not more than 5000 feet of hose of the same style and size offered for delivery at one time.

b. Inspection lot - hose assemblies. Not more than 200 hose assemblies of the same style, size and length offered for delivery at one time shall constitute a lot.

* 4.2.2 Sampling for inspection and assembly integrity test. From each lot of hose assemblies, a random sample shall be selected in accordance with MIL-STD-105, general inspection level II, to be subjected to inspection as specified in 4.3 and the assembly integrity test specified in 4.4.2. The AQL shall be 1.5 percent defective for major defects and for assembly integrity test and 6.5 percent defective for minor defects.

4.2.3 Sampling for hydrostatic burst test. From each lot of hose, random samples shall be selected in accordance with MIL-STD-105, special inspection level S-3. From each length of hose so selected, an 18 inch section shall be cut off for the hydrostatic burst test specified in 4.4.3. The contractor shall refit couplings to said lengths. AQL shall be 1.5 percent defective.

* 4.2.4 Sampling for physical tests. One 36 inch length of hose, selected at random from each lot, shall be subjected to the physical tests of 4.4.4.

4.3 Visual and dimensional inspection. Each of the sample lengths of hose selected in accordance with 4.2.2 shall be inspected to verify conformance to all of the requirements of this specification regarding both hose and couplings which do not involve tests. The classification of defects listed in FED-STD-162 shall be used.

4.3.1 Visual examination. Each sample hose or hose assembly shall be visually examined for finish, quality, construction, workmanship and marking. Defects shall be determined and evaluated by visual methods in accordance with FED-STD-162.

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4.3.2 Dimensional examination. Each sample hose or hose assembly shall be examined to determine compliance with the dimensional requirements specified herein. Any dimension not within the specified tolerance shall be classified as a major defect.

4.3.3 If, in any sample, the number of defective lengths as defined above exceeds the acceptance number of either AQL for that sample, the lot represented by the sample shall be rejected.

4.4 Test procedures.

* Note: Dual line hose shall be separated into single lines before conducting any test except that of the web.

* 4.4.1 Proof pressure test-hose. All lengths of hose shall be proof tested by the hose manufacturer at proof pressure specified in Table I in accordance with ASTM D380, proof pressure test.

* 4.4.2 Assembly integrity test. Each sample hose assembly selected per 4.2.2 shall be subjected to assembly integrity test pressure specified in Table I by applying either hydrostatic or aerostatic pressure for 1 minute. The test pressure shall not reduce to less than 95% of original value during the 1 minute interval.

* 4.4.3 Hydrostatic burst tests. Each of the sample sections selected in accordance with 4.2.3 shall be subjected to a hydrostatic burst test to the pressures specified in Table I in accordance with ASTM D 380 method "Straight bursting test." (See 3.2.9.2)

* 4.4.4 Physical tests. The sample hose selected in accordance with 4.2.4 shall be subjected to the tests specified in 4.4.4.1 through 4.4.4.4. If it is found to be nonconforming to one or more of these tests, the lot shall be rejected.

* 4.4.4.1 Web test. Compliance with 3.2.1.2 shall be determined as follows: With a joined sample one inch long, a rod shall inserted through the bore of each of the two hoses and the rod suitably fixed in a tensile machine. The jaws shall move at a rate of one inch per minute. The load required to separate the two hoses shall be measured in pounds.

* 4.4.4.2 Low temperature test. A straight piece of hose at least 18 inches long, shall be tested at -40°F(-40°C), per ASTM D 380 method "Low-temperature test on complete hose." (See 3.2.10).

* 4.4.4.3 Ozone resistance test. A sample of the cover stock shall be tested for ozone resistance in accordance with ASTM D 380 "Ozone test," using an ozone concentration of 50 pphm. (See 3.2.11) (Ref ASTM D1149)

* 4.4.4.4 Aging test. Specimens of the hose tube and cover shall be subjected to the air heat aging test of ASTM D 380 except test for 70 hrs at 212° ± 3.6°F (100° ±2°C). (See 3.2.12) (Ref ASTM D573)

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4.5 Packaging inspection. The preservation, packaging, packing and marking of the hose and fittings shall be examined to determine compliance with the requirements of section 5 of this specification.

5. PREPARATION FOR DELIVERY

5.1 Preservation. Preservation shall be level A, C, or Commercial as specified (see 6.2).

5.1.1 Level A. The hose shall be preserved in accordance with MIL-P-775.

5.1.2 Level C. The level C preservation for the hose shall conform to the MIL-STD-794 requirements for this level.

5.1.3 Commercial. The commercial preservation of the hose shall be in accordance with the requirements of ASTM D-3951.

5.2 Packing. Packing shall be level A, B, C or Commercial, as specified (see 6.2).

5.2.1 Level A and B. The hose shall be packed for shipment in accordance with MIL-P-775 except fiberboard boxes shall not be used for level A packing.

5.2.2 Level C. The level C packing for the hose shall conform to the MIL-STD-794 requirements for this level.

5.2.3 Commercial. The preserved hose shall be packed in accordance with the requirements of ASTM D-3951.

5.2.4 Civil agencies. When specified (see 6.2), requirements for marking for shipment for civil agencies shall be in accordance with FED-STD-143.

5.2.5 Palletization. When specified (see 6.2) unitized loads, commensurate with the level of packing specified in the contract or order, shall be palletized in accordance with MIL-STD-147. Unitized loads shall be uniform in size and quantities to the greatest extent possible. If the container is of a size which does not conform to any of the pallet patterns specified in MIL-STD-147, the pallet pattern used shall first be approved by the contracting officer.

5.3 Marking.

5.3.1 Levels A, B and C. In addition to any special or other identification marking required by the contract (see 6.2), each unit pack, intermediate and exterior container and unitized load shall be marked in accordance with MIL-STD-129.

5.3.2 Commercial. Commercial markings shall be in accordance with the requirements of ASTM D-3951.

5.4. General.

5.4.1 Exterior containers. Exterior containers (see 5.2.1, 5.2.2, 5.2.3 and 5.2.4) shall be of minimum tare and cube consistent with the protection required and shall contain equal quantities of identical stock numbered items to the greatest extent practicable.

5.4.2 Packaging inspection. The inspection of these packaging requirements shall be in accordance with 4.7.

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6. NOTES

* 6.1 Intended use. The hose covered by this specification is to be used with oxy-fuel gas equipment for welding, cutting, or other allied processes.

* 6.2 Ordering data. Purchasers should exercise any desired options offered herein and procurement documents should specify the following:

a. Title, number and date of this specification.

b. Style (see 1.2), size (see 3.2.5), length (see 3.2.7), hose color and purpose for which intended (see 3.2.8), whether hose assembly or hose (without couplings) is required (see 3.1).

c. When hose assembly is required, hose and fittings required (see 3.2.2).

d. That the lengths of hose from which 18 and 36 inch sections are taken will be accepted as full lengths provided the 18 and 36 inch sections meet the tests and the lengths from which they are teken meet the other requirements of this specification (see 4.2.3 and 4.2.4).

e. Selection of applicable levels of preservation, packaging, packing, marking and commercial/industrial (see 5.1, 5.2 and 5.3).

f. When palletized loads are required (see 5.2.5).

6.3 Hose should be ordered in lengths not exceeding 50 feet, unless longer lengths are required for a specific purpose (see 3.2.7). In such cases, hose may be obtained in longer lengths as specified, not to exceed 500 feet.

6.4 Supersession data. This specification includes the requirements of MIL-H-1142A dated 19 Apr 1961.

MILITARY INTERESTS:

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Navy - YD

Review Activities

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Army - GL, AR
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CIVIL AGENCY COORDINATING ACTIVITIES:

COMMERCE - NBS
GSA -FSS

PREPARING ACTIVITY:
Air Force - 82

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE
ZZ-H-461E	Hose and Hose Assembly, Rubber, Gas (Acetylene-Hydrogen, Air & Oxygen

3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION *(Mark one)*
	☐ VENDOR
b. ADDRESS *(Street, City, State, ZIP Code)*	☐ USER
	☐ MANUFACTURER
	☐ 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	b. WORK TELEPHONE NUMBER *(Include Area Code)* – Optional
c. MAILING ADDRESS *(Street, City, State, ZIP Code)* – Optional	8. DATE OF SUBMISSION *(YYMMDD)*

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