

MIL-H-26385D
 20 MARCH 1988
 SUPERSEDING
 MIL-H-26385C (USAF)
 21 MAY 1980

MILITARY SPECIFICATION

HOSE, OXYGEN AND PRESSURIZATION, OZONE RESISTANT

This specification is approved for use within the Department of the Air Force and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers crush resistant, nonkinking hose fabricated of ozone-resistant material suitable for use with air or breathing oxygen.

1.2 Sizes. This specification covers hoses of any length with the following internal diameters.

TABLE 1 Hose sizes.

Dash No.	Diameter
-2	0.125
-4	0.250
-6	0.375
-8	0.500
-10	0.625
-12	0.750

1.3 Specification part number. The specification part number is definitive and formatted to identify each item covered by this specification. The part number is formatted from the requirement options available in this specification (see 3.10.3 and 6.5).

2. APPLICABLE DOCUMENTS

2.1 Government documents.

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

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Oklahoma City Air Logistics Center/MMEDD, Tinker AFB OK 73145-5990 by using the self-address Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 4720

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SPECIFICATIONS

FEDERAL

BB-A-1034	Compressed Air, Breathing
BB-N-411	Nitrogen, Technical
CCC-C-419	Cloth, Duck, Cotton, Unbleached, Plied-Yarns (Army and Numbered)
PPP-B-636	Boxes, Shipping, Fiberboard

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MIL-P-116	Preservation, Methods of
MIL-O-27210	Oxygen, Aviator's Breathing, Liquid and Gas

STANDARDS

FEDERAL

FED-STD-191	Textile Test Methods
FED-STD-209	Clean Room and Work Station Requirements Controlled Environment
FED-STD-595	Colors

MILITARY

DoD-STD-100	Engineering Drawing Practices
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-143	Standards and Specification Order of Precedence for the Selection of
MIL-STD-831	Test Reports, Preparation of
MIL-STD-2073-1	Packaging Requirements; DoD Materials Procedures for Development and Application of
MS22057	Delamination Test Stand for Oxygen Hose
MS22064	Clamp; Hose
MS27797	Hose, Oxygen and Pressurization, Ozone Resistant
MS33658	Fitting End, Hose Connection, Standard Dimensions for

AIR FORCE-NAVY AERONAUTICAL

AN807	Adapter, Straight, Tube to Hose
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(Copies of specifications and standards, or other Government documents required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted shall be those listed in the issue of the DoDISS specified in the solicitation. Unless otherwise specified, the

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issues of documents not listed in the DoDISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

AMERICAN SOCIETY FOR TESTING MATERIALS (ASTM)

A313	Specification for Chromium-Nickel Stainless and Heat-Resisting Steel Spring Wire
D1149	Test Method for Rubber Deterioration-Surface Ozone Cracking in a Chamber

(Application for copies should be addressed to: ASTM, 1916 Race Street, Philadelphia, PA 19103.)

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

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets, or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article. When specified in the contract or purchase order, a sample or samples shall be subjected to first article inspection (see 4.4 and 6.2).

3.2 Selection of specifications and standards. Specifications and standards for the necessary commodities and services not specified herein shall be selected in accordance with MIL-STD-143.

3.3 Material.

3.3.1 Material conformance. Materials shall be ozone-resistant, that will not bloom and shall conform to applicable specifications and shall be as specified herein. Materials that are not covered by specifications, or that are not specifically described herein, shall be of the best quality, of the lightest practicable weight, and suitable for the purposes intended.

3.3.2 Age. Hose shall not be more than 12 months old from the cure date to the delivery date of hose to any Government service or to any airframe or accessory manufacturer.

3.3.3 Recovered-materials. Recovered materials shall be used to the maximum extent possible without jeopardizing the end use of the item.

3.4 Design. The design of the hose shall be in accordance with MS27797 and of the size and length specified by the procuring activity.

3.5 Construction. The hose shall be constructed in accordance with MS27797 and of smooth bore, nonkinking, flexible type, suitably reinforced with an integral corrosion resistant wire in accordance with ASTM A313. The hose shall have an

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outer covering of tubular polyamide or polyester, knitted or braided construction. The stockinet shall extend to within approximately 0.125 inch of the ends of the hose and shall be securely attached. A molded ozone-resistant cover approximately 0.750 inch long shall be applied to each end of the hose.

3.6 Performance.

3.6.1 Leakage. When the hose is horizontally submerged in water and internally pressurized to a pressure of 25 pounds per square inch for a 2-minute period, the hose shall not leak (see 4.6.2).

3.6.2 Delamination. After one end of the hose is capped and the other end of the hose is connected to a vacuum of 16 inches of mercury, the inner layer of the hose shall show no evidence of delamination (see 4.6.3).

3.6.3 Odor. The hose shall be free of objectionable odors (see 4.6.4).

3.6.4 Cleanliness. The hose shall show no evidence of uncleanness in excess of the limits specified in 4.6.5.

3.6.5 Flexibility. There shall be no noticeable permanent set of the hose after it has been tested for flexibility as specified herein (see 4.6.6).

3.6.6 Elongation. After the hose has been suspended by one end in a vertical position with a 60-pound weight attached to the other end for 10 minutes the increase in length shall not exceed 2 inches per foot of hose length. The permanent set, determined within 2 minutes after removal of the load, shall not exceed 2 percent of the hose length (see 4.6.7).

3.6.7 Static-load. After the application of a static load of 225 pounds has been applied normal to the longitudinal axis of the hose over a 4-inch section of the wire-reinforced portion of the hose for a 30-second period, the outside diameter of the hose shall not be decreased more than 10 percent of the original value. The outside diameter of the hose, with the load removed, shall be within 5 percent of the original value (see 4.6.8).

3.6.8 Flexibility endurance. After subjection to the tests specified in 4.6.9, the hose shall meet the requirements specified in 3.6.1 and 3.6.2.

3.6.9 Abrasion. The hose shall withstand the abrasion test without exposing the reinforcing wire, when tested as specified in 4.6.10.

3.7 Environmental requirements.

3.7.1 Low temperature. After a 48-hour period of conditioning at minus 65 degrees (plus or minus 2 degrees) Fahrenheit, the hose shall meet the requirements of 3.6.5. After meeting these requirements and returning to room temperature, the hose shall meet the requirements specified in 3.6.1, 3.6.2, and 3.6.3 (see 4.7.1).

3.7.2 High temperature. After a 48-hour period of conditioning at plus 160 degrees (plus or minus 2 degrees) Fahrenheit, the hose shall meet the requirements of 3.6.5. After meeting these requirements and returning to room temperature, the hose shall meet the requirements specified in 3.6.1, 3.6.2 and 3.6.3 (see 4.7.2).

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3.7.3 Ozone resistance. After the test slabs of hose materials required by ASTM D1149 have been subjected to test conditions specified for testing ozone resistance, there shall be no evidence of checking, cracking, or any other damage to the hose (see 4.7.3).

3.8 Weight. The weight of the hose shall not exceed 3.0 ounces per foot of nominal specified length.

3.9 Color. The color of the outer covering of the hose shall be green approximately matching color 34079 of FED-STD-595.

3.10 Product identification.

3.10.1 Marking of product. The hose shall be marked for identification in accordance with MIL-STD-130. The year and quarter of cure shall also be included in this marking.

3.10.2 Part numbering of interchangeable parts. All parts having the same manufacturer's part number shall be functionally and dimensionally interchangeable. The item identification and part number requirements of DoD-STD-100 shall govern the manufacturer's part numbers and changes thereto.

3.10.3 Specification part number. The definitive specification part number shall be as defined in 6.5 (see 1.3).

3.11 Workmanship. The hose shall be uniform in quality and shall be free from irregularities or defects that might adversely affect performance, reliability, or durability. The hose shall be free of oil, grease, fuel, water, dust, dirt, or other foreign matter (see 4.6.1).

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 this specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

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

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

- a. First article inspection (see 4.4)
- b. Quality conformance inspection (see 4.5)

4.3 Inspection conditions.

4.3.1 Atmospheric conditions. Unless otherwise specified, all inspections required by this specification shall be made at an atmospheric pressure of 28 to 32 inches of mercury, at a temperature of 77 degrees (plus or minus 18 degrees) Fahrenheit, and at a relative humidity of 80 percent or less.

4.3.2 Gas. The gas used in testing the hose shall be oxygen conforming to Type I of MIL-O-27210, water pumped nitrogen conforming to Grade A, Type I of BB-N-411, or compressed air conforming to Type II of BB-A-1034. If air or nitrogen is used, appropriate density correction factors shall be applied to the flowmeter, not only to correct the effect on the meter, but also on the performance of the hose with a lower density gas.

4.4 First article inspection. First article inspection shall consist of all the examinations and inspections described under test methods, 4.6.

4.4.1 Samples. First article inspection samples shall consist of two hoses representative of construction, workmanship, components, and materials used during production.

4.4.2 First article inspection report. A first article inspection report giving results of the first article inspection shall be prepared in accordance with the procedures outlined in MIL-STD-831 stating the results of the first article inspection, when required by appropriate acquisition documents (see 6.2).

4.5 Quality conformance inspection. Quality conformance inspection shall consist of:

- a. Individual inspection (see 4.5.1)
- b. Sample inspection (see 4.5.2)

4.5.1 Individual inspection. Each hose on the contract or order shall be subjected to and shall pass the following tests as described under inspection methods (see 4.6).

- a. Examination of product (see 4.6.1)
- b. Leakage (see 4.6.2)
- c. Delamination (see 4.6.3)

4.5.2 Sample inspection.

4.5.2.1 Inspection log. All hose offered for delivery at one time shall be considered a lot for purposes of inspection.

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4.5.2.2 Sampling inspection. Failure of any sample to pass the sampling inspection shall be cause for rejection of the lot. A random sample shall be selected from each inspection log in accordance with inspection level S-2, MIL-STD-105 and shall be subjected to the following inspections as described under Test Methods (see 4.6) and Preparation for Delivery (see 4.8).

<u>INSPECTION</u>	<u>INSPECTION PARAGRAPH</u>
Odor	(see 4.6.4)
Cleanliness	(see 4.6.5)
Flexibility	(see 4.6.6)
Elongation	(see 4.6.7)
Static load	(see 4.6.8)
Preparation for delivery	(see 4.8)

4.6 Inspection methods.

4.6.1 Examination of product. The hose shall be thoroughly examined to determine conformance with this specification with respect to configuration, weight, dimensions, color, proper attachment of parts and components, marking, and workmanship.

4.6.2 Leakage. The hose shall be horizontally submerged in water and internally pressurized to a pressure of 25 pounds per square inch for a 2-minute period. Any evidence of leakage from any part of the hose during this period shall be cause for rejection. To conduct this inspection, a fitting in accordance with ANB07 or having an end in accordance with MS33658 shall be installed in each end of the hose and secured by a clamp in accordance with MS22064 or equal (see 3.6.1).

4.6.3 Delamination. A test stand equivalent to or conforming to MS22057 shall be utilized in conducting the test for delamination. One end of the hose shall be capped with a cap containing an eye piece. The other end of the hose shall be connected to a vacuum source that contains a light. A vacuum of 16 inches of mercury shall be applied and, while in this condition, the interior of the hose shall be examined through the eyepiece. Any evidence of delamination of the inner layer of the hose shall be cause for rejection (see 3.6.2).

4.6.4 Odor. The test hoses shall be coupled together with suitable adapters for this test. Gaseous oxygen shall be allowed to pass through the hose at a rate not greater than 10 liters per minute for 2 minutes. After both ends of the hose have been opened to the atmosphere for a 5-minute period, six subjects shall smell the hose in a manner that will prevent exterior odors from influencing the test. A hose judged to have an objectionable odor by two or more of the six subjects shall be rejected (see 3.6.3).

4.6.5 Cleanliness. The hose shall be 75 percent filled with distilled water having a temperature of plus 160 degrees Fahrenheit, and then both ends of the hose shall be sealed. The hose shall be shaken for a minimum period of 2 minutes, and the contents shall then be poured into a 100-milliliter clean glass cylinder. The

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contents shall not contain precipitates and shall not be more turbid than a standard suspension of 5-milligrams of fullers earth in 100 milliliters of distilled water. The hose shall then be dried by passing 160 degrees Fahrenheit gas through its length (see 3.6.4).

4.6.6 Flexibility. The hose shall be closely coiled around a 1.500 inch diameter rod. There shall be no unraveling of any wire used in the hose assembly nor any other damage. After release, there shall be no noticeable permanent set of the hose. This test shall be repeated four times, except that for each successive test the hose shall be turned 90 degrees about its longitudinal axis and recoiled onto the rod (see 3.6.5).

4.6.7 Elongation. The hose shall be suspended by one end in a vertical positioning and a 60-pound dead weight shall be attached to the other end for a period of 10 minutes. The increase in length shall be measured and any increase in excess of 2 inches per lineal foot of test hose shall be cause for rejection. Two minutes after removal of the load, the permanent set shall be determined. Permanent set in excess of 2 percent of the hose length shall be cause for rejection (see 3.6.6).

4.6.8 Static load. A static load of 225 pounds shall be applied normal to the longitudinal axis of the hose over a 4-inch section of the wire reinforced portion of the hose. A measured reduction in outside diameter of more than 10 percent of the original value shall be cause for rejections. Two minutes after removal of the load, the outside diameter shall be measured at its smallest dimension. An outside diameter reduction of more than 5 percent shall be cause for rejection (see 3.6.7).

4.6.9 Flexibility endurance. The hose shall be closely coiled around a 1.500 inch diameter rod and released for 500 cycles. The hose shall then be twisted 180 degrees in both directions on its longitudinal axis over a 12-inch section and released, for 500 cycles, using a 12-inch section of the hose. A proportionate angle of twist shall be used for short hoses. The hose shall then be subjected to and shall pass the tests specified in 4.6.2 and 4.6.3 (see 3.6.8).

4.6.10 Abrasion. A 2-inch section of hose, which shall be obtained by cutting through the hose perpendicular to the longitudinal axis of the hose, shall be subjected to the abrasion test in accordance with FED-STD-191, Method 5308, dry condition. The abradant shall conform to CCC-C-419, Type I, hard texture duck No. 10. A 1-pound weight shall be placed upon the upper end of the shaft to produce a constant pressure between the abradant and specimen throughout the test. The jaws of the Schiefer machine shall be modified to retain a 2-inch section of hose. The hose shall be subjected to 10,000 revolutions of abrasion. The hose shall then be examined, and any exposure of the hose reinforcing wire shall be cause for rejection (see 3.6.9).

4.7 Environmental inspection.

4.7.1 Low temperature. The hose shall be conditioned at minus 65 degrees (plus or minus 2 degrees) Fahrenheit for 48 hours. After the conditioning period and while still at this temperature, the hose shall be subjected to tests specified in 4.6.6. The hose shall then be returned to room temperature and shall be subjected to and shall pass the tests specified in 4.6.2, 4.6.3, and 4.6.4 (see 3.7.1).

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4.7.2 High temperature. The hose shall be conditioned at plus 160 degrees (plus or minus 2 degrees) Fahrenheit for 48 hours. After the conditioning period and while still at this temperature, the hose shall be subjected to the tests specified in 4.6.6. The hose shall then be returned to room temperature and shall be subjected to and shall pass the tests specified in 4.6.2, 4.6.3, and 4.6.4 (see 3.7.2).

4.7.3 Ozone resistance. The two test slabs of hose material shall be tested for ozone resistance. The test apparatus shall conform to ASTM D1149. The test slabs shall be elongated 20 percent, shall be placed in an ozone-free atmosphere for 24 hours, and shall then be placed in the ozone chamber. The chamber shall be adjusted to plus 100 degrees (plus or minus 2 degrees) Fahrenheit and to give an exposure of ozone concentration of 120 parts (plus or minus 10 parts) by volume of ozone per million parts by volume of air. The air-ozone velocity in the chamber shall be at least 2 feet per second. The test slabs shall be exposed to these conditions for 60 minutes. The test slabs shall then be examined under a 10x magnification, and any evidence of checking, cracking, or any other damage shall be cause for rejection (see 3.7.3).

4.8 Preparation for delivery. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspections required, as listed in MIL-P-116, Table III, for the method of preservation being accomplished.

5. PACKAGING

5.1 Preservation-packaging. Preservation and packaging shall be Level A, all preservation and packaging shall be accomplished per MIL-STD-2073-1.

5.1.1 Level A. Unless otherwise specified, each hose shall be preserved per MIL-P-116, Method ICI.

5.1.1.1 Cleaning and drying. Each hose shall be cleaned and dried for oxygen service per current industry practice according to the applicable processes of MIL-P-116, Method C7. Petroleum and other flammable solvents shall not be used.

5.1.1.2 Preservation application. No preservatives shall be applied.

5.1.1.3 Unit packaging. Unless otherwise specified by the contracting activity, hoses shall be individually packaged per MIL-P-116, Method ICI, insuring compliance with the applicable requirements of that specification.

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

5.2.1 Level A. Unless otherwise specified by the contracting activity, hoses packaged as specified in 5.1 shall be packed in shipping containers conforming to the requirements of MIL-STD-2073-1. Insofar as practical, exterior containers shall be uniform in shape, size, minimum tear and cube consistent with the required protection.

5.2.2 Level B. Unless otherwise specified by the contracting activity, hoses shall be packed in shipping containers conforming to PPP-B-636, Style RSC, Type CF, Class WR, Grade V3C. Other requirements as specified in 5.2.1 are applicable.

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5.2.3 Level C. Unless otherwise specified by the contracting activity, hoses shall be packed in shipping containers conforming to PPP-B-636, Style RSC, Type CF, Class DOM, Grade 275. Other requirements as specified in 5.2.1 are applicable.

5.3 Marking. In addition to any other markings required by the contract or order (see 6.2), interior and exterior containers shall be marked in accordance with MIL-STD-129.

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

LIFE SUPPORT ITEM
ALL OIL, GREASE, SHOP RESIDUE, OR OTHER
CONTAMINANTS HAVE BEEN REMOVED.
DO NOT OPEN UNTIL READY FOR USE

6. NOTES

6.1 Intended Use. The hose covered by this specification is intended for use in breathing oxygen and pressurizing systems installed in aircraft to supply air or oxygen for breathing or pressurizing purposes when used on or with altitude suits, anti-G suits, and ejection seat or escape capsule equipment.

6.2 Ordering data. Procurement documents should specify the following:

- a. Title, number, and date of this specification.
- b. Sizes and lengths required (see 1.2 and 3.4).
- c. First article inspection requirements (see 3.1 and 4.4).
- d. Selection of applicable levels of preservation, packaging, and packing (see Section 5).

6.3 First article. When a first article inspection is required, the items should be a first article sample as specified in 4.4.2. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results and disposition of the first articles. Invitations for bids should provide that the Government reserves the right to waive the requirements for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract.

6.4 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 reference in lower tier documents need not be prepared for the Government and will not be required by the government unless specified in the contract or order.

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6.5 Subject term (key word) listing.

capsule, escape	seat, ejection
hose, oxygen	suit, altitude
hose, pressurization	suit, anti-G
ozone	

6.6 Specification part number. The definitive specification part number is formatted from requirements as shown below:

	M 26385 - X - XXX
M-Prefix - an item defined by inch-pound U.S. units -	
Specification number - - - - -	
Diameter of hose (see Table 1) - - - - -	
Length of hose in inches - - - - -	

EXAMPLE: M26385-2-120; a 0.250 inch dia hose, 10 feet long.

6.7 Change from previous issue. Asterisks or vertical lines are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodian

Army - AT
Air Force - 99

Review activities

Air Force - 11
DLA - CS

Preparing Activity

Air Force - 71

Agent

Air Force - 99

Project Number

4720-F010

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER MIL-H-26385		2. DOCUMENT TITLE HOSE, OXYGEN AND PRESSURATION, OZONE RESISTANT	
3a. NAME OF SUBMITTING ORGANIZATION		4. TYPE OF ORGANIZATION <i>(Mark one)</i>	
b. ADDRESS <i>(Street, City, State, ZIP Code)</i>		<input type="checkbox"/> VENDOR <input type="checkbox"/> USER <input type="checkbox"/> MANUFACTURER <input type="checkbox"/> OTHER <i>(Specify):</i> _____	
5. PROBLEM AREAS			
a. Paragraph Number and Wording:			
b. Recommended Wording:			
c. Reason/Rationale for Recommendation:			
6. REMARKS			
7a. NAME OF SUBMITTER <i>(Last, First, MI) - Optional</i>		b. WORK TELEPHONE NUMBER <i>(Include Area Code) - Optional</i>	
c. MAILING ADDRESS <i>(Street, City, State, ZIP Code) - Optional</i>		8. DATE OF SUBMISSION (YYMMDD)	