BB-H-1168C
August 3, 2000
SUPERSEDING
BB-H-1168B
May 9, 1977

FEDERAL SPECIFICATION

HELIUM, TECHNICAL

The General Services Administration has authorized the use of this federal specification by all federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers two technical grades of gaseous helium (see 6.1).

1.2 Classification. Helium shall be of the following grades as specified (see 6.2).

Grade A - 99.995 percent helium
Grade B - 97.5 percent helium

2. APPLICABLE DOCUMENTS

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

Federal Specification

RR-C-901 – Cylinders, compressed gas, with valve or plug and cap; ICC 3AA.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be used in improving this document should be addressed to: Defense Supply center Richmond, Standardization Program Branch, ATTN: DSCR-VBD, 8000 Jefferson Davis Highway, Richmond, VA 23297-5610.

AMSC N/A FSC 6830

Federal Standard

FED-STD-123 - Marking for Shipment (Civil Agencies).

Military Specifications

MIL-DTL-2/11 - Valve, cylinder, gas: argon, helium, nitrogen, neon and xenon (inert oil free), outlet 580, pressures through 3000 psig (20680 Kpa) at 120°F (48.9°C).

Military Standards

MIL-STD-101 - Color code for pipelines and for compressed gas cylinders.
MIL-STD-129 - Standard practice for military marking.
MIL-STD-1411 - Inspection and maintenance of compressed gas cylinders.

(Government documents are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

Federal Regulations

43 CFR 3195 - Purchase of helium by federal agencies and their contractors.
49 CFR 171-181 - Transportation of hazardous materials.

(The Code of Federal Regulations (CFR) and the Federal Register (FR) are available from the Superintendent of Documents, US Government Printing Office, P.O. Box 371954, Pittsburgh, PA 15250-7954.)

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

Bureau of Land Management

Information Circular (IC) 8367 - Computing volume of helium in cylindrical steel containers at 10 to 10,000 psia.
Report of Investigations (RI) 7444 - An improved method and apparatus for analysis of impurities in helium.

(Application for copies should be addressed to the Superintendent of Documents, US Government Printing Office, P.O. Box 371954, Pittsburgh, PA.)

Compressed Gas Association (CGA)

CGA G-9.1 – Commodity specification for helium.

(Application for copies should be addressed to Compressed Gas Association, Inc., 1725 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202-4102.)

3. REQUIREMENTS

3.1 Material. Helium shall be Bureau of Land Management helium pursuant to 43 CFR 3195 (see 6.3).

3.2 Pressure. Each container shall be filled to the maximum pressure authorized by 49 CFR 171-181, when tested as specified in 4.5.1. The net content of helium shall be corrected to 70°F and 14.7 psia and reported in standard cubic feet as shown in IC 8367.

3.3 Leakage. Each container shall show no evidence of leakage when tested as specified in 4.5.2.

3.4 Helium (grade A). Grade A helium shall contain not greater then 50 ppm by volume aggregate impurities, when tested as specified in 4.5.3.

3.5 Helium (grade B). Grade B helium shall exhibit non-flammability and buoyancy, when tested as specified in 4.5.4.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, 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 Points of inspection. When helium containers are filled from production plant systems or other storage facilities for delivery to destination by any mode of transportation, quality conformance inspection shall be conducted on the containers and their contents prior to leaving the site of filling or shipment.

4.3 Examination of preparation for delivery. The packing and marking of the cylinders shall be examined to determine compliance with the requirements of section 5.

4.3.1 Individual tests. Each container shall be tested for filling pressure and leakage as specified in 4.5.1 and 4.5.2.

4.3.2 Sampling tests. When applicable, helium shall be sampled and tested, as specified in 4.5.3 or 4.5.4.

4.3.2.1 Lots. When helium cylinders are filled, each set of cylinders charged on the same manifold at the same time shall constitute a lot. When helium tanks are filled, each tank shall constitute a lot.

4.3.2.2 Sampling plans. Sample unit for testing shall be one filled container. Sample size from cylinder lots shall conform to table I. With the exception of tanks for initial service, each tank shall be sampled prior to filling and after approximately one cubic foot of gas has been purged. Lot shall be rejected if sample fails to pass any test.

TABLE I. Sampling size for cylinder lots.

Lot size	Sample size
2 to 10	1
11 to 40	2
41 to 70	3
71 and up	4

4.4 Testing. Testing of the helium shall be classified as individual tests or sampling tests as specified herein.

4.5 Test methods.

4.5.1 Pressure. Measure pressure to the nearest 5 psig by attaching a pressure gauge having minor scale gradations of 10 psig or less to the valve outlet and attaching a thermocouple or mercury-in-glass thermometer having scale divisions of 1°F to the container wall. If a thermometer is used, apply tape or putty to the bulb to insulate it from ambient temperatures, but do not apply it between the bulb and the container wall. For service pressures of 1800-2640 psig, use the Pressure-Temperature Conversion Chart as specified in CGA G-9.1. Open the container valve and observe the internal gauge pressure. The internal pressure should not vary from the maximum marked nominal pressure by more than 25 psig.

4.5.2 Leakage. Test for leakage by brushing some leak-detecting solution over the valve and the junction between the valve and the container, but be careful not to get any solution on the valve outlet. Test for leakage through the closed valve outlet by connecting one end of a tube over the valve outlet and immersing the other end in a container of liquid. Any evidence of gas bubbling through the liquid shall be considered evidence of leakage.

4.5.3 Helium (grade A). Determine percent (v/v) grade A helium with a thermal conductivity analyzer by measuring the aggregate impurities which have a different thermal conductivity than helium. Calibrate the analyzer to appropriate intervals with calibration gas standards. The range of the analyzer should be no greater than ten times the difference between the specified percent helium and 100 percent. Thus for 99.995 percent helium the analyzer should have a maximum range of 500 ppm impurity.

(Standards used for calibration shall be Bureau of Land Management certified Standards, obtained from the Bureau of the address in 6.3. Alternatively, standards may be prepared and the synthetic mixture analyzed in accordance with RI 7444.)

4.5.4 Helium (grade B).

4.5.4.1 Non-flammability. Test for non-flammability of grade B helium by collecting a sample in an inverted test tube and inserting a burning splinter of wood up into the tube. (Note-use caution.) The flame should be extinguished without audible pop.

4.5.4.2 Buoyancy. Test for buoyancy of grade B helium by collecting a sample in a toy balloon, tying the open end and releasing the balloon. The balloon should show buoyancy.

5. PACKAGING

5.1 Packing. Cylinders shall conform to, and shall be packed in accordance with 49 CFR 178. In addition, helium shall be provided in government-furnished cylinders conforming to RR-C-901. When specified (see 6.2), helium shall be provided in contractor-furnished cylinders conforming to RR-C-901, equipped with valves conforming to MIL-DTL-2/11. When specified (see 6.2), helium shall be furnished in contractor-owned cylinders. All cylinders shall be inspected and maintained in accordance with MIL-STD-1411 for helium cylinders.

5.2 Marking. Marking shall be for civil agencies or military activities, as specified (see 6.2).

5.2.1 Civil agencies. Marking for shipment to civil agencies shall be in accordance with FED-STD-123.

5.2.2 Military activities. Marking for shipment to military activities shall be in accordance with MIL-STD-129. In addition, cylinders shall be tagged and color-coded as specified below.

5.2.2.1 Identification tag. An identification tag impervious to climatic conditions shall be wired to the outlet port of each container and shall bear the following information: proper shipping name, specification number with revision letter, grade, NSN, quantity, name of manufacturer, name of contractor (if different from manufacturer), date of manufacture, lot identification number, and lot analysis.

5.2.2.2 Color codes. Department of Defense (DoD)-owned cylinders shall be color-coded in accordance with MIL-STD-101.

6. NOTES

INFORMATION FOR GUIDANCE ONLY. (This section contains information of a general or explanatory nature that is helpful, but is not mandatory.)

6.1 Intended use. Grade A helium is intended for use as a shielding gas in arc welding. Grade B helium is intended for use as a buoyant in lighter-than-air craft such as weather balloons.

6.2 Ordering data. Purchasers should select the preferred options permitted herein, and include the following information in procurement documents:

a. Title, number, and data of this specification.
b. Grade required (see 1.2 and 6.1)
c. Marking required (see 5.2).
d. When other than government-furnished cylinders are to be used.
e. When procurement shall be made on a cost-per-unit basis in accordance with MIL-STD-1411.

6.3 Bureau of Land Management helium. In order to supply helium to a Federal agency and its contractors, a private helium distributor is required to be an eligible supplier of Bureau of Land Management helium. A private distributor who desires to establish its eligibility may contact the Bureau of Land Management at the following address:

Bureau of Land Management
Helium Operations Office
801 South Fillmore Street, Suite 500
Amarillo, TX 7901-3545

The Bureau of Land Management will also maintain at this address a current list of eligible private helium distributors. Upon request, a copy of this list will supplied to Federal agencies, their contractors, and any other interested persons.

MILITARY INTERESTS:

Custodians
Air Force - 68
Navy - SH

Reviewers
Air Force - 19
Other – DS

CIVIL AGENCY COORDINATING ACTIVITIES:
GSA-FSS
HHS-NIH
NA-YB-A
Interior-BLM
DOT-ACO

Preparing activity:
DLA-GS

(Project 6830-1037)