

BB-H-1168B
May 9, 1977
SUPERSEDING
Fed. Spec. BB-H-1168A
May 31, 1968

FEDERAL SPECIFICATION

HELIUM, TECHNICAL

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of 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 The following documents, of the issues in effect on 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.

Federal Standard:

Fed. Std. No. 123 - Marking for Shipment (Civil Agencies).

(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.

(Single copies of this specification and other Federal Specifications required by activities outside the Federal Government for bidding purposes are available without charge from Business Service Centers at the General Services Administration Regional Offices in Boston, New York, Washington, DC, Atlanta, Chicago, Kansas City, MO, Fort Worth, Denver, San Francisco, Los Angeles, and Seattle, WA.

(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-V-2/11 - Valve, Cylinder, Gas, Helium, Oil Free, 3/4 Inch Inlet Connection,
Type 07-381-1, 2500 PSI Service Pressure.

MIL-C-52752 - Cylinders, Compressed Gas, Packaging of.

Military Standards:

MIL-STD-101 - Color Code for Pipelines and For Compressed Gas Cylinders.

MIL-STD-129 - Marking for Shipment and Storage.

MIL-STD-1411 - Inspection and Maintenance of Compressed Gas Cylinders.

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(Copies of Military Specifications and Standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

Federal Regulations:

- 30 CFR 602 - Purchase of Helium by Federal Agencies and Their Contractors.
- 49 CFR 170-179 - Hazardous Materials Regulations.

(The Code of Federal Regulations (CFR) and the Federal Register (FR) are for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. When indicated, reprints of certain regulations may be obtained from the Federal agency responsible for issuance thereof.)

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 date of invitation for bids or request for proposal shall apply.

Bureau of Mines:

Information Circular 8367 - Computing Volume of Helium in Cylindrical Steel Containers at 10 to 10,000 PSIA, March 1968.

Report of Investigations 7444 - An Improved Method and Apparatus for Analysis of Impurities in Helium, November 1970.

(Application for copies should be addressed to the Publications Distribution Section, Bureau of Mines, 4800 Forbes Street, Pittsburgh, PA 15213.)

Compressed Gas Association (CGA):

Specification G-9.1 - Commodity Specification for Helium.

(Application for copies should be addressed to the Compressed Gas Association, Inc., 500 Fifth Ave., New York, NY 10036.)

National Motor Freight Traffic Association, Inc., Agent:

National Motor Freight Classification.

(Application for copies should be addressed to the American Trucking Associations, Inc., Traffic Department, 1616 P Street, N.W., Washington, DC 20036.)

Uniform Classification Committee, Agent:

Uniform Freight Classification.

(Application for copies should be addressed to the Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

3. REQUIREMENTS

3.1 Material. Helium shall be Bureau of Mines helium pursuant to 30 CFR 602 (see 6.3).

3.2 Pressure. Each container shall be filled to the maximum pressure authorized by 49 CFR 170-179 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 than 50 ppm by volume aggregate impurities when tested as specified in 4.5.3.

3.5 Helium (grade B). Grade B helium shall exhibit nonflammability and buoyancy when tested as specified in 4.5.4.

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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. Helium shall be sampled as specified herein and tested for helium as specified in 4.5.3 or 4.5.4 as applicable.

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 1. 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 1. 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 in CGA Specification G-9.1. pet 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.

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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 different thermal conductivities 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 differences 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.

1/ Standards used for calibration shall be Bureau of Mines Certified Standards, obtained from the Bureau at the address in 6.3. Alternatively, standards may be prepared and the synthetic mixture analyzed in accordance with MI 7444.

4.5.4 Helium (grade B).

4.5.4.1 Nonflammability. Test for nonflammability 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. PREPARATION FOR DELIVERY

5.1 Packing. Cylinders shall conform to 49 CFR 170-179 and shall be packed in accordance with MIL-C-52752. 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-V-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. No. 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

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 date 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 (see 5.1).
- (e) When procurement shall be made on a cost-per-unit basis in accordance with MIL-STD-1411.

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6.3 Bureau of Mines 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 Mines helium. A private distributor who desires to establish its eligibility may contact the Bureau of Mines at the following address:

Bureau of Mines, Helium Operations
Department of the Interior
8 4372 Herring Plaza
Amarillo, TX 79101

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

Military Interest:

Air Force - 68

Preparing activity:

GSA-FSS

CIVIL AGENCY COORDINATING ACTIVITIES:

DOT-ACO
ERDA
GSA-FSS, PCD
HEW-NIE
Interior-MIN
NASA-JFK
VA-DMS

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