

MILITARY SPECIFICATION

REGULATORS, PRESSURE, COMPRESSED GAS

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

1. SCOPE

1.1 Scope. This specification covers regulators for control and indication of the discharge pressure, or flow, from storage cylinders of compressed gas.

1.2 Classification. Regulators shall be of the following classes, styles, types and sizes as designated in Table I, as specified (see 6.2.1).

Class 1 - Single stage
2 - Two stage

Style A - Adjustable
B - Preset

Type I - Acetylene
II - HYdrogen
III - Oxygen
IV - Oil pumped air, argon, helium and nitrogen
V - Propane and propylene
VI - Water pumped air, argon, helium and nitrogen
VII - Water pumped argon
VIII - Water pumped helium

Size Y - Normal
Z - Small

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.

TABLE I. Designations.

Designation	Gages ¹ /		Service	Connections	
	Inlet	Outlet		Inlet	Outlet
1AIIIIY	A	C	Oxygen , welding and cutting (medium pressures and flows)	0.908 inch 14 NGO-RH- INT	.5625 inch- 18-NF-3 (male)
1AIIIZ	A	C			
1AIZ	B	D	Acetylene (small size)	0.628 inch 20 NGO-RH- INT	.5625 inch- 18-LH-NF-3 (male)
1BIY	None	None	Acetylene, preset		
1AVY	B	C	Propane and propylene (LPG)	0.800 inch 14 NGO-LH- EXT	.5625 inch- 18-LH-NF-3 (male)
1AIVY	A	C	Oil pumped air, argon, helium and nitrogen	0.960 inch 14 NGO-LH- EXT	.5625 inch- 18-LH-NF-3 (male)
1AVIY	A	C	Water pumped air, argon helium and nitrogen	0.960 inch- 14 NGO-RH- EXT	.5625 inch- 18-NF-3 (male)
1AIIY	A	C	Hydrogen	0.830 inch- 14 NGO-RH- EXT	.5625 inch- 18-LH-NF-3 (male)
(Class 2 - Two-stage regulators)					
2AIIIIY	A	C	Oxygen, welding and cutting (medium pressures and flows)	0.908 inch- 14 NGO-RH- INT	.5625 inch- 18-NF-3 (male)
2BIIIIY	None	None	Oxygen, cutting, preset		
2AVY	B	C	Propane and propylene (LPG)	0.880 inch- 14 NGO-LH EXT	.5625 inch- 18-LH-NF-3 (male)
2AIVY	A	C	Oil pumped air, argon helium, and nitrogen	0.960 inch- 14 NGO-LH- EXT	.5625 inch- 18-LH-NF-3 (male)

See footnote at end of table.

TABLE I. Designations. (continued)

Designation	Gages ^{1/}		Service	Connections	
	Inlet	Outlet		Inlet	Outlet
2AVIY	A	C	Water pumped air, argon, helium, and nitrogen	0.960 inch-14 NGO-RH-EXT	.5625 inch-18-NF-3 (male)
2AVIYY	A	Flow-meter	Water pumped argon (calibrated direct-reading flow meter discharge)	0.960 inch-14 NGO-RH-EXT	.5625 inch-18-NF-3 (male)
2AVIIYY	A	Flow-meter	Water pumped helium (calibrated direct-reading flow-meter discharge)	0.960 inch-14 NGO-RH-EXT	.5625 inch-18-NF-3 (male)
2BIIY	A	C	Hydrogen	0.830 inch-14 NGO-LH-INT	.5625 inch-18-LH-NF-3 (male)

^{1/} Letters refer to models of dial indicating gages specified in GG-G-76.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this document 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. (See 6.2)

SPECIFICATIONS

FEDERAL

GG-G-76	Gage, Pressure and Vacuum, Dial Indicating (for Air, Steam, Oil, Water, Ammonia, Chloro-Fluoro Hydrocarbon Gases, and Compressed Gases).
PPP-B-566	Box, Folding Paperboard.
PPP-B-576	Box, Wood, Cleated, Veneer, Overlaid.
PPP-B-591	Boxes, Shipping, Fiberboard Wood Cleated.
PPP-B-601	Boxes, Wood Cleated-Plywood.
PPP-B-621	Box, Wood, Nailed and Lock-Corner.
PPP-B-636	Box, Shipping, Fiberboard.
PPP-B-640	Box, Fiberboard, Corrugated, Triple Wall.

MILITARY

MIL-V-2	Valve, Cylinder, Gas (for Compressed or Liquidified Gases), General Specification for.
MIL-F-116	Preservation, Methods of.
MIL-L-10547	Liners, Case, and Sheet, Overwrap, Water-Vaporproof or Waterproof, Flexible.
MIL-R-19180	Regulators, Pressure, Compressed Gas
MIL-C-52211	Components and Assemblies for Industrial Gas.

STANDARDS

FEDERAL

FED-STD-H28	Screw Thread Standards for Federal Services.
-------------	--

MILITARY

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-129	Marking for Shipping and Storage.
MIL-STD-130	Identification Marking of U.S. Military Property.
MIL-STD-147	Palletized Loads for 40" X 48" Pallets.
MIL-STD-889	Dissimilar Metals.

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as 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 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 issues of documents not listed in the DODISS shall be the issue of the non-government documents which is current on the date of the solicitation.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 3951	Standard Practice for Commercial Packaging
-------------	--

(Applications for copies of this ASTM should be addressed to American Society for testing materials, 1916 Race Street, Philadelphia, PA 19101.)

UNIFORM CLASSIFICATION COMMITTEE

Uniform Freight Classification Ratings, Rules, and Regulations.

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

NATIONAL CLASSIFICATION BOARD

National Motor Freight Classification Classes and Rules.

(Application for copies should be addressed to the ATA Tariff Section, 1616 P Street, N.W., Washington, DC 20036.)

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B57.1 Compressed Gas Cylinder Valve Outlet and Inlet Connections.

(Applications for copies should be addressed to the American Standards Institute, 1430 Broadway, New York, NY 10018.)

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal Agencies.)

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 Qualification. Regulators furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time set for opening of bids (see 4.3 and 6.3).

3.2 General.

3.2.1 Material. Material shall be as specified herein, and shall be free of defects which may effect the serviceability of the regulators and their intended function. All material and parts in contact with oxygen or fuel gases shall be corrosion resistant or treated to prevent corrosion caused by fuel, salt spray, or atmospheric conditions during the normal service life of the regulators. Material used for scaling and sealing purposes shall be dimensionally stable and resistant to oxidation under all operating conditions throughout a temperature range of minus 50.0 degrees Celsius ($^{\circ}\text{C}$) to plus 65.6 $^{\circ}\text{C}$. Nonferrous metals shall be used for all metallic parts throughout the valve which comes in contact with the system fluid. Non-metallic material in contact with the line fluid shall have a minimum spontaneous ignition temperature of 260 $^{\circ}\text{C}$ in a high pressure static oxygen bomb combustor. It shall not be permissible to use reclaimed

parts or rebuild from scrap or other used equipment. When dissimilar metals are used in contact with each other, suitable protection against galvanic corrosion shall be applied per MIL-STD-889.

3.2.2 Design. Discharge pressures or flows of metering type regulators shall be readily adjustable by means of simple hand-operated devices. Preset types shall be adjustable by means of a key, wrench, or screwdriver engaged adjusting screw, the design of which shall incorporate a device to hold adjustment and discourage tampering. The design and specification of materials for the contacting surfaces of wearing parts shall be such as to render use of a lubricant unnecessary (or if a lubricant is used it shall be an approved lubricant specified by the manufacturer and used only where specified), yet insure a minimum of friction and wear. Regulators shall, without vibrating or humming, reduce from the cylinder pressures indicated, and deliver the gases for which they are designed at any desired regulated pressure or flow, as applicable, within the ranges specified in Table III. Registry and delivery characteristics shall fall within the limits specified, when subjected to the test of 4.7.6.

3.2.3 Construction. The regulators shall be constructed of parts which are new, without defects and free from any characteristics that would prevent them from passing any of the examinations or tests specified herein.

3.2.4 Interchangeability. All parts for the regulators from the same manufacturer shall be manufactured to standards which will permit replacement or adjustment of similar parts without modification and insure ease of interchangeability. Further, all internal parts shall be readily accessible, removable and replaceable without the application of heat and without the aid of special tools. If disconnecting of a high pressure joint should be necessary to accomplish such repairs, the joint shall be easily resealable, without requiring new parts other than sealing material.

3.2.5 Finish. The finish of the regulators shall be equivalent to the best commercial practice offered to the welding and cutting industry.

3.3 Detail.

3.3.1 Pressure adjustment. Pressure adjustment shall be such that differences not greater than those specified in Table II will result upon one full turn of the adjustment device.

TABLE II. Fineness of adjustment.

Regulator type	Delivery change per turn 2 (lb/in , gage)
I	8
II, III, IV, V, VI	16
VII	Full scale reading
VIII	Full scale reading

TABLE III. Performance characteristics.

Designation	Inlet pressure (lb/in gage)	Discharge pressure (lb/in, gage)		No-flow test pressure (lb/in, gage)	Steady flow test pressure (initial) (lb/in, gage)	Orifice (drill size)	Time of test (minutes)	Pressure range (lb/in, gage)		Test conditions
		Maximum or minimum (max.)	Vibration (max.)					Cylinder	Discharge	
	1600 min.	10 max.	---	---	8	48	---			Orifice suddenly closed
IAIII	1600 min. 1200 to 900	6 min.	2	8	8	48	---	2500 to 50	0 to 40	Orifice suddenly closed Steady Steady Steady
IAIII	400 to 75 1600 min.	---	7 1	---	8 4	48 76	10			
IAIZ	250 to 180 100 to 40 250 min.	---	1 2 1	---	10 10 4	52 52 76	---	350 to 40	0 to 15	Steady Steady Steady
IAIV	250 min. 250 min. 250 to 50 50	7-1/2 max. 4 min	---	6-1/2 to 7-1/2	---	56 56	---	350 to 50	Preset at 6-1/2 to 7-1/2	Orifice suddenly closed Orifice suddenly closed Orifice suddenly opened Steady
IAVI	250 min. 250 min. 250 to 180 100 to 40 250 min.	10 max. 6 min.	1 2 1	8	8	48 48 48 76	10	350 to 50	0 to 40.	Orifice suddenly closed Orifice suddenly closed Orifice suddenly open Steady Steady Steady

TABLE III. Performance characteristics. - (Continued)

Designation	Inlet pressure (lb/in. gage)	Discharge pressure (lb/in. gage)		No-flow test pressure (lb/in. gage)	Steady flow test pressure (initial) (lb/in. gage)	Orifice (drill size)	Time of test (minutes)	Pressure range (lb/in. gage)		Test conditions
		Maximum or minimum	Variation (max.)					Cylinder	Discharge	
	1600 min.	10 max.	---	---	8	48	---			Orifice suddenly closed
1A1VY	1600 min.	6 min.	---	8	---	48	---	2500 to 50	0 to 40	Orifice suddenly opened
1A1VY	1200 to 900	---	2	---	8	48	---			Steady
1A1VY	400 to 75	---	7	---	8	48	---			Steady
	1600 min.	---	1	---	4	76	10			Steady
	1600 min.	8 max.	---	---	6		---			Orifice suddenly closed
	1600 min.	4 min.	---	6	---	40	---	2500 to 50	0 to 40	Orifice suddenly opened
2A1VY	2000 to 250	---	+1.0	---	6		---			Steady
	2000 to 50	---	+2.0	---	6		---			Steady
	1600 min.	40 max.	---	35 to 40	---		---			Orifice suddenly closed
2B1VY	1600 min.	30 min.	---	35 to 40	---	46	---	2500 to 200	Pre-set 35 to 40	Orifice suddenly open
	2000 to 200	As pre-set	7.0	35 to 40	---		---			Steady

TABLE III. Performance characteristics. - (Continued)

Designation	Inlet pressure ₂ (lb/in. gage)	Discharge pressure ₂ (lb/in. gage)		No-flow test pressure ₂ (lb/in. gage)	Steady flow test pressure (initial) (lb/in. gage)	Orifice (drill size)	Time of test (minutes)	Pressure range ₂ (lb/in. gage)		Test conditions
		lb/in. gage	Maximum or minimum (max.)					Cylinder	Discharge	
	250 min.	8 max.	---	---	6	---	---	---	---	Orifice suddenly closed
	250 min.	4 min.	---	6	---	40	---	---	---	Orifice suddenly opened
2AVY	250 to 100 250 to 50	---	+1.0 +2.0	---	6 6	---	---	350 to 20	0 to 40	Steady
	1600 min.	8 max.	---	---	6	---	---	---	---	Orifice suddenly closed
2AIVY	1600 min.	4 min.	---	6	---	40	---	2500 to 50	0 to 40	Orifice suddenly closed
2AVIY	2000 to 250	---	+1.0 +2.0	---	6 6	---	---	---	---	Orifice suddenly opened
2BVIY	2000 to 50	---	---	---	---	---	---	---	---	Steady

Two-stage flow-metering types

Designation	Inlet pressure ₂ (lb/in. gage)	Discharge pressure ₂ (lb/in. gage)	Test flow ₃ (ft ³ /h)	Flow variation ₃ (ft ³ /h, max)	Range		Test conditions
					Cylinder pressure (lb/in. gage)	Discharge flow (ft ³ /h)	
2AVIY	1600 min.	25	60	---	---	---	Discharge suddenly closed
	2000 to 50	---	30	2.5	---	2500 to 50	Steady
2AVIIV	1600 min.	20	160	---	---	---	Discharge suddenly closed
	2000 to 50	---	40	5	---	2500 to 50	Steady

3.3.2 Delivery pressure. The delivery pressure of a particulat regulator shall be not greater than 120 percent of the delivery pressure shown in Table III for that regulator, to compensate for variances in honnet springs.

3.3.3 Bonnet pressure. Each regulator bonnet shall be provided with openings with total area sufficient to safely relieve excessive bonnet pressure should the diaphragm fail.

3.3.4 Body pressure. Regulators, except those types designed for inlet pressures of 350 pounds per square inch (lb/in^2) gage and lower, shall be equipped with an overpressure relief device for safety venting any excessive body pressure that may occur in the event of a rupture of a diaphragm.

3.3.5 Preset pressure.

3.3.5.1 lBIY regulators. Regulators of this design shall be preset to a delivery pressure of $7.0 \pm 0.5 \text{ lb/in}^2$, gage at cubic feet per hour (ft^3/h).

3.3.5.2 2BIIIIY regulators. Regulators of this design shall be preset to a delivery pressure of $37.5 \pm 2.5 \text{ lbs/in}^2$, gage at 5 ft^3/h .

3.3.6 Connections.

3.3.6.1 All designs, except lBIY and lAIZ. Unless otherwise specified (see 6.2.1), all designs except lBIY and lAIZ shall conform to the standards specified in FED-STD-H28 and ANSI B57.1 for the specific gases for which designed. Outlet fittings shall have a minimum bore diameter of .1875 inch. Inlet glands shall be of the standard design as specified in ANSI B57.1.

3.3.6.2 lAIZ and lAIY. Regulators of these designs shall conform with the standards specified in FED-STD-H28. They shall have an outlet bore of .1875 inch minimum. Inlet glands and threads shall seal and operate with those specified in MIL-V-2 for acetylene valve number 03-201-4.

3.3.7 Filter. Each regulator shall be equipped with a non-combustible, porous metal filter mounted within the regulator capable of excluding particles courser than 0.005 inch, largest dimension from the seating members. The filter material shall be corrosion resistant and compatible with the gas and pressure to which it will be exposed in service.

3.3.8 Valve construction. Seating shall be accomplished between a metallic and a nonmetallic material. The physical form and properties of the nonmetallic material shall not be affected by moisture or prolonged pressure to a degree which impairs efficiency of the regulator. Design of the seat, its location, and mount shall minimize any propensity toward seat ignition under a pressure surge. The relatively soft seating member and the mating parts shall be held in alignment with each other in such a way as to maintain the sensitivity of the regulator.

3.3.9 Pressure gages. Unless otherwise specified (see 6.2.1), dial indicating pressure gages shall conform to GG-G-76 and may be either 2 or 2-1/2 inches in diameter.

3.3.10 Flowmeters. Unless otherwise specified (see 6.2.1), metering type regulators (2AVIIY and 2AVIIIIY) shall be equipped with and discharge through tapered-tube area type flowmeters calibrated to indicate directly the flow of argon and helium, respectively, in ft³ /h. Minimum range of indication shall be 4 to 60 ft³ /h for argon, and 8 to 150 ft³ /h for helium. Flow indication in these ranges shall be accurate within 10 percent of the true flow. Design of the flowmeters shall be simple and shall afford the tubes reasonable protection against accidental breakage, as may result from a blow. Flowmeters may be of either single or dual range type. If dual range, they shall incorporate an indicating device or arrangement such that the scale corresponding to the particular range setting of operation can be readily ascertained by visual examination.

3.3.11 Leakage. Grade of materials, fits, and gaskets shall be such that no leakage from any part of the regulator assembly will occur when subjected to the maximum pressure which may be encountered in service. Regulators shall be gas-tight externally, that is, to atmosphere, and internally, that is, between the high pressure and low pressure part for all pressures or pressure differences normally occurring with the gases concerned.

3.4 Marking. Each regulator shall be clearly and permanently marked or labeled with the manufacturer's name or trademark, MIL-R-19180 designation, operating inlet pressure, name of gas it is to be used with, and contract number per MIL-STD-130 and shall be securely attached to the regulator.

3.5 Workmanship. All parts of the regulators shall show no wear, breakage, distortion, nor shall be swaged, peened or staked. Surfaces shall be clean and free of sharp edges, burrs, scratches and gouges. Marking shall be legible.

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 specified in the contract or purchase 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 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 inspection 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 the 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.

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

- a. Qualification inspection (see 4.3).
- b. Quality conformance inspection (see 4.4).

4.3 Qualification inspection. Qualification inspection shall be conducted at a laboratory satisfactory to SA-ALC/MMIARD. Qualification inspection shall consist of the examination and tests specified in 4.3.1. Copies of test reports shall be retained by the contractor for at least 5 years from date of testing for Government review.

4.3.1 Samples for qualification. Two sample regulators from each designation shall be subjected to the qualification tests and shall be conducted in the order shown in Table IV. Failure of both shall result in rejection. If only one should fail, retests shall be conducted on two additional regulators. Failure of either regulator in the course of retests shall be grounds for rejection.

TABLE IV. Qualification inspection.

Examination and test	Requirement paragraph	Test paragraph
Leakage	3.3.11	4.7.2
Corrosion	3.2.1	4.7.3
Wear	3.2.2	4.7.4
Accuracy (flowmeter)	3.3.10	4.7.5
Regulation	3.3.2	4.7.6
Filter	3.3.7	4.7.7
Gasket	3.3.11	4.7.8

4.4 Sampling for quality conformance.

4.4.1 Inspection of product for delivery. Inspection of product for delivery shall consist of groups A and B inspection.

4.4.2 Lot. All regulators of the same designation offered for delivery at one time shall be considered a lot for purposes of sampling, examination and tests.

4.4.3 Sampling for group A inspection. A random sample of regulators shall be selected in accordance with inspection level II of MIL-STD-105 with an Acceptance Quality Level (AQL) of 2.5 and subjected to the group A tests specified in Table V.

TABLE V. Quality conformance inspections.

Inspection	Requirement paragraph	Test paragraph
Group A Leakage	3.3.11	4.7.2
Group B Regulation	3.3.2	4.7.6
Accuracy (Flowmeters)	3.3.10	4.7.5
Filter	3.3.7	4.7.7
Leakage	3.3.11	4.7.2
Group C Corrosion	3.2.1	4.7.3
Leakage	3.3.11	4.7.2
Wear	3.2.2	4.7.4
Regulation	3.3.2	4.7.6
Gasket	3.3.11	4.7.8
Accuracy (Flowmeters)	3.3.10	4.7.5

4.4.4 Sampling for group B inspection. A random sample of regulators shall be selected in accordance with inspection level II of MIL-STD-105 with an AQL of 2.5 and shall be subjected to the group B tests specified in Table V.

4.4.4.1 Test results. Test results shall be compared with the specification requirements. Failure in any group B test shall be counted as a defect and the regulator shall be rejected. If the number of such nonconforming regulators in any sample exceeds the acceptance number for that sample, the lot represented by the sample shall be rejected.

4.5 Comparison inspection (group C). Two regulators shall be selected from each initial production lot being manufactured for shipment against a Government contract for the group C tests of table V to determine whether or not the item for current production is identical to that originally qualified, or is equivalent in every way. Additional samples from the same manufacturer will not be necessary within a 6 month period. When the group C tests indicate nonconformance with this specification, the results will be reported to SA-ALC/MMIARD.

4.6 Visual and dimensional examination. Regulators shall be visually and dimensionally examined for conformance with all the requirements of section 3 not requiring tests.

4.7 Tests.

4.7.1 Oxygen shall be used for all tests of oxygen regulators; and nitrogen for all others, except 2AVIIY and 2AVIIY. All tests of these latter two designs may be conducted with either nitrogen, helium, or argon except that the regulation tests of 4.7.6 shall be conducted with the appropriate inert gas.

4.7.2 Leakage. Regulators, except types "I" and "V", shall be connected
2
to a pressure source of 1600 lb/in², gage minimum. "I" and "V" designs shall be connected to pressure sources of 350 + 10 lb/in², gage. Discharge ports shall be plugged and adjustment screws positioned such that all parts of the regulator are under maximum pressure. The assembly shall be checked for leakage by application of an indicating solution. Any evidence of leakage shall be grounds for rejection.

4.7.3 Corrosion. Assemblies which have passed the leakage test of 4.7.2, and are still under pressure, shall be subjected alternately to ten minute periods of exposure to a finely-divided sea water (or solution approximating sea water in composition) mist maintained at 26.7°C to 29.4°C, and a 53.4°C to 60.0°C dry air blast. After 1000 cycles, an application of indicating solution shall reveal no leakage from any part, and a visual examination shall reveal no cracks or significant pitting.

4.7.4 Wear. Regulators shall be connected to any gas source of pressure between the maximum and minimum cylinder pressure shown for the design in Table III. The discharge, through the orifice and at the test pressure first listed in the table for each designation under test, shall be interrupted for approximately one second at approximately three second intervals. Periodically, the adjustment screw shall be backed off and the condition of the diaphragm and seating members checked for leaks through the bonnet and the discharge port. Any leaks not correctable by replacement of the seating members shall be grounds for rejection. After 50,000 pressure interruptions, with replacement of seating members if necessary, the performance of the regulator shall conform to the requirements of 3.3.2 when tested as specified in 4.7.6.

4.7.5 Flowmeter. The accuracy of flowmeters and their calibrations shall be checked by comparison of reading at one-quarter scale, one-half scale, three-quarter scale and full scale against a calibrated master standard.

4.7.6 Regulation. The regulator, except 2AVIIY and 2AVIIIIY, which shall be tested only with the specific gas for which calibrated, shall be connected to a gas pressure source, as specified in 4.7.1. Its performance shall conform to 3.2.2 and shall exhibit characteristics within the limits specified in Table III. 2AVIIY and 2AVIIIIY shall conform to similar applicable standards of performance when tested with argon and helium, respectively. In determination of the foregoing, for interrupted flow runs, the flow shall be quickly initiated and quickly cut off at 20 second intervals. Reading shall be taken at the lowest dip after initiation of flow, and 15 seconds after interruption. There shall be no indication of vibration or humming of regulator parts during discharge. All orifices specified shall be simple square-edged drillings in plates or plugs not exceeding .125 inches in thickness; and with discharge directly to the atmosphere.

4.7.7 Filter. The filter performance of the regulator shall be determined by introducing 2 grams of clean, dry, oil-free brass powder or filings of various minute sizes (.003 and larger, largest dimensions) into the inlet line upstream from the filter. The regulator shall then operate for a period of 20 minutes under the pressure, flow, and discharge conditions first listed for the specific designation under test, in Table III. Disassembly and microscopic examination of the soft seating material shall reveal no particle greater than 0.005 inch embedded therein.

4.7.8 Gasket. A gasket of each type from one of the regulators offered shall be subjected to alternate soaking for 1/2 hour in warm (26.7°C to 29.4°C) solution approximating sea water in composition and drying in an air blast. This cycle shall be repeated four times. The tested gasket shall then be replaced on the regulator from which it was removed, and put under normal operating pressure. No leakage shall be observable.

4.8 Inspection of preparation for delivery. Sample packages and packs and the inspection of the preservation-packaging, packing and marking for shipment and storage shall be in accordance with the requirements of section 5 and the documents specified therein.

5. Preservation and packaging.

5.1 Oxygen gas regulators. Oxygen gas regulators shall be cleaned, dried and preserved-packaged in accordance with method B of MIL-C-52211.

5.2 Preservation-packaging. Preservation-packaging shall be level A or C, or commercial as specified (see 6.2).

5.2.1 Level A.

5.2.1.1 Oxygen gas regulators. Oxygen gas regulators shall be preserved-packaged in accordance with 5.1.

5.2.1.2 Other gas regulators. Gas regulators other than oxygen service shall be preserved-packaged in accordance with method III of MIL-P-116. Opening shall be sealed with plastic or metal plugs or pressure sensitive waterproof tape.

5.2.1.3 Unit containers. Each regulator preserved-packaged as specified in 5.2.1 or 5.2.1.2 shall be cushioned and placed in a set-up or folding paperboard or fiberboard box conforming to PPP-B-576, PPP-B-566 or PPP-B-636 class domestic, respectively. Box closure shall conform to the applicable box specification or appendix thereto, with method I closure applicable to PPP-B-636 boxes using pressure sensitive tapes.

5.2.1.3.1 Army only. Unless otherwise specified (see 6.2.2.1), the container shall conform to PPP-B-636, class weather-resistant.

5.2.2. Level C and commercial packaging.

5.2.2.1 Level C. Preservation-packaging of regulators shall afford protection against contamination, corrosion, deterioration and physical damage during shipment for the supply source to the first receiving activity for immediate use. The contractors normal retail or wholesale preservation-packaging methods may be utilized when such meet the requirements of this level.

5.2.2.1.1 Oxygen regulators shall be preserved-packaged in accordance with 5.2.1.1.

5.2.2.2 Commercial packaging. When specified (see 6.2.1) commercial packaging shall be in accordance with the requirements of 5.3.4.

5.2.2.2.1 Oxygen regulators shall be preserved-packaged in accordance with 5.2.1.1.

5.3 Packing. Packing shall be level A, B, C or commercial, as specified (see 6.2.1).

5.3.1 Level A^{1/}. Regulators preserved-packaged as specified in 5.2 shall be packed in containers conforming to any one of the following, with container selection at the option of the contractor.

<u>Specification</u>	<u>Container</u>	<u>Type or Class</u>
PPP-B-591	Box, Wood, Cleated Fiberboard	Class 2
PPP-B-601	Box, Wood, Cleated, Plywood	Overseas Type
PPP-B-621	Box, Wood, Nailed and Lock Corner	Class 2
PPP-B-636 ^{1/}	Box, Fiberboard	Weather-resistant
PPP-B-640	Box, Corrugated, Triple Wall	Class 2

^{1/} PPP-B-636 boxes shall be restricted to the special requirements and V-grades.

5.3.1.1 Closure, case liners and gross weight. Wood and plywood containers shall be closed, strapped and banded in accordance with the applicable container specification or appendix thereto. Fiberboard containers shall be closed, water-proofed and reinforced with tape or non-metallic banding as specified in the appendix to the applicable specification with method V closure applicable to PPP-B-636 containers. Shipping containers shall have case liners conforming to MIL-L-10547. Case liners shall be closed and sealed in accordance with MIL-L-10547. Case liners may be omitted for fiberboard boxes closed and waterproofed as specified herein. The gross weight of wood or wood cleated boxes shall not exceed 200 pounds. Fiberboard boxes shall not exceed the weight limitations of the applicable box specification.

5.3.2 Level B. Regulators preserved-packaged as specified in 5.2 shall be packed in containers as specified in 5.3.1 except that the containers shall be of the domestic type of class and case liners are not required. Containers shall be closed, strapped and banded in accordance with the applicable container specification or appendix thereto, with method I closure applicable to PPP-B-636 boxes using pressure sensitive tapes.

5.3.2.1 Army only. When specified (see 6.2.1) fiberboard containers shall conform to class weather-resistant for level B.

5.3.3 Level C. Regulators packaged as specified in 5.2, shall be packed in containers acceptable to the common carrier and which will insure safe delivery at destination in a satisfactory condition at the lowest applicable rate. Containers, packing or method of shipment shall comply with Uniform Freight or National Motor Freight Classification Rules or Regulation or other carrier rules as applicable to the mode of transportation.

5.3.4 Commercial packaging (preservation, packing and marking). When specified (see 6.2.1), commercial packaging shall conform to ASTM-D-3951. Procuring activities shall specify what options are required under ASTM-D-3951 (see 6.2).

5.3.5 Palletized and containerized unit loads. When specified (see 6.2.1), products packed as specified shall be palletized or containerized in accordance with MIL-STD-147. Unitized load bonding shall be at the option of the contractor.

5.4 Marking. In addition to any special marking required herein, or in the contract (see 6.2.1), interior and intermediate packages and extended shipping containers for levels A, B, and C shall be marked in accordance with MIL-STD-129. Packages and exterior shipping containers conforming to commercial packaging (see 5.2.2 and 5.3.4) shall be marked as specified in ASTM-D-3951.

5.4.1 Special marking. Oxygen gas regulator unit packages (see 5.2.1.1) shall be marked in accordance with the special marking requirements of MIL-C-52211.

1/
Army only. Fiberboard containers are not acceptable for level A packing as an exterior container unless V2's fiberboard is used, the weight limited to 65 pounds and the containers are palletized or unitized in a plywood or other consolidation (see 5.3.5) container.

6. NOTES.

6.1 Intended use, special types.

6.1.1 1AIZ and 1AIIIZ. These designs are for use particularly in the submarine type welding and cutting outfit or in other outfits where space is a premium and a standard quality regulator is required.

6.1.2 1BIY and 2BIIY. These designs are for use in the Emergency Pack type Cutting Outfit.

6.2 Ordering data.

6.2.1 Acquisition. Procurement documents should specify the following:

- a. Title, number, and date of this specification.
- b. Designation required (see 1.2).
- c. Connection required, if other than standard (see 3.3.6).
- d. Indicators (gages, flowmeter) required, if other than standard (see 3.3.9 and 3.3.10).
- e. Levels of preservation-packaging and packing (see 5.2 and 5.3).
- f. When overwrapping of non-weather resistant containers is not required (see 5.2.1.3.1).
- g. When commercial packaging is required (see 5.2.2.2 and 5.3.4).
- h. When weather-resistant class fiberboard containers are required (see 5.3.2.1).
- i. Optional requirements of ANSI-D-3951 (see 5.3.4).
- j. When palletized or containerized unit loads are required (see 5.3.5).
- k. Special markings required (see 5.4).

6.3 Sub-contracted material and parts. The preparation for delivery requirements of referenced documents listed in section 2 do not apply when material and parts are procured by the contractor for incorporation into the equipment and lose their separate identity when the equipment is shipped.

6.4 Subject term keyword listing.

Regulator

Compressed gases

Adjustable and preset

6.5 Changes 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.

Custodians:

Air force - 99

Preparing activity:

Air Force - 82

Review activities:

Army - AR

Air Force - 11

DLA - CS

User activity:

Navy - SH

(Project 4820-0514)