



PUMA[™]

Self-Contained Breathing Apparatus (SCBA)

Product Specification Sheet

I. Purpose

To establish minimum standards for open-circuit self-contained breathing apparatus (SCBA).

II. Type

The open-circuit self-contained breathing apparatus covered by this specification shall be of the type using compressed air and maintaining a positive pressure in the facepiece (pressure demand).

III. Approvals

The apparatus shall be certified by the National Institute for Occupational Safety and Health (NIOSH) under Title 42, Part 84 of the Code of Federal Regulations for 30-, 45-, or 60-minute rated service life and for storage at temperatures between 10°F and 160°F.

IV. Facepiece

The facepiece shall be a tight-fitting hood with a primary neck seal. The hood shall:

- A. Be constructed of Responder[®] material—multi-layer polypropylene coated on the outside and inside to provide a permeation barrier. The color shall be a high-visibility blue.**
- B. Employ a flexible neoprene neck seal.**
- C. Employ a sealed 20 mil (.020 in) thickness PVC lens for low-distortion optical clarity.**
- D. Be available in a “one-size-fits-all” design.**
- E. Contain an easily removable spring-loaded exhalation valve which employs a silicone rubber valve seat designed for easy cleaning. Employ a factory-installed, removable, silicone nose cup, available in three sizes.**

- G. Have a removable adapter, onto which the second stage regulator attaches.**
- H. Utilize two pull-forward nylon straps to adjust the tightness and fit of the hood to individual facial configurations. The straps shall be attached to a rigid yoke, which shall be installed around the regulator adapter described above, in order to provide a stable front anchor for the adjustment straps; and the straps shall be joined in the back of the hood by a heavy-duty snap, in order to provide a stable back anchor.**

V. Regulator System and Intermediate Pressure Hose

The regulator system shall be designed to operate in two independent stages. The first stage reducer shall be mounted directly on the cylinder valve. There shall be no hoses or links carrying high pressure except for the pressure gauge line. The second stage shall be designed to provide positive pressure during an NFPA breathing machine test at 70 psi inlet pressure.

A. The first stage regulator shall:

- 1. Contain an overpressurization relief valve designed to vent relief pressure to the atmosphere should failure of the regulator's primary elements occur.**
- 2. Contain a pressure-reducing valve to reduce pressure from the cylinder to 80-150 psig. The reducing valve assembly shall be a balanced valve design and shall provide uniform flow performance throughout the full cylinder pressure range. This valve shall have a sintered metal inlet filter to retain particles of 120 microns or greater, shall be in an open position against the high pressure inlet, and shall seat in the direction of air flow.**
- 3. Be attached to a CGA handwheel with a threaded stainless steel core, color-coded to denote low or high pressure systems. This handwheel shall secure the first stage regulator assembly to the cylinder valve.**

B. The second stage regulator shall:

- 1. Be constructed of a super-tough material that will withstand a 30-foot drop onto concrete without sustaining breakage. The upper portion of the regulator, including the shutoff button, shall be covered by a rubber boot for impact absorption.**
- 2. Be a "pilot valve" type. It shall contain a spring-biased diaphragm, responsive to respiration demand, to actuate a pilot valve which, in turn, operates a flexible main valve to meet the user's flow demand during inhalation.**
- 3. Reduce pressure from 80-150 psi to .036-.054 psi.**
- 4. Produce a static pressure in the facepiece of 1.0 to 1.5 inches of water.**

5. Contain a 40-mesh metal screen filter at the outlet port to prevent entrance of particles into the regulator.
 6. Contain a bypass valve that provides a separate flow path around the regulator primary demand valve. In the event of a failure or blockage of the primary, the bypass valve shall be operable by either of the user's gloved hands.
 7. Employ a two-point fastening system which allows the regulator to be quickly mounted into the facepiece in any orientation by pushing the regulator until the two fasteners attach to the facepiece adapter. Once installed, the regulator shall be able to swivel 360° without detaching from the facepiece. The regulator shall remain secured to the facepiece should one of the fasteners inadvertently be released.
 8. Employ a first-breath-on feature which allows the user to actuate regulator flow by inhaling after the regulator is secured to the mask.
 9. Contain a safety override button which allows the wearer to manually start the regulator flow.
 10. Not obstruct the wearer's downward vision.
 11. Contain a manual shutoff button to prevent loss of air after removal from the mask.
- C. The second stage regulator intermediate pressure hose shall:
1. Be attached to the second stage regulator with a swivel connector.
 2. Attach to the first stage regulator intermediate pressure hose by an optional (available with buddy breather attachment) two-step push-pull quick-disconnect fitting designed to prevent accidental release.
 3. Contain a metal screen inlet filter to retain particles of 120 microns or greater.

VI. Primary Audible Alarm

The user shall have the option of choosing either a continuous whistle alarm, a warbling whistle alarm, or a bell alarm.

A. The continuous whistle alarm and the warbling whistle alarm shall be mounted on the first stage regulator and shall be air-actuated, automatically operating when air pressure in the supply cylinder reaches approximately 25% of original full pressure. The alarm flute shall be downward-facing, so as to prevent blockage. The alarm shall have a metal shroud to further prevent blockage. Both alarms shall work off intermediate pressure (the pressure after reduction by the first stage regulator) and shall have a

discrete start, rather than a “ramping up” effect, with constant performance across the pressure range. They shall operate without interruption until the cylinder pressure reaches approximately 100 psig. The continuous whistle alarm shall be a continuous tone. The warbling whistle shall incorporate a “shuttling piston” to create a distinctive chirping effect through frequency variations, so that the alarm is easily differentiated from other sounds in the user’s proximity.

- B. The bell alarm shall be mounted on the first stage regulator and shall be an air-actuated, self-cocking, continuous ringing bell, automatically operating when air pressure in the supply cylinder reaches approximately 25% of original full pressure.

VII. Secondary (Redundant) Alarm

A secondary (redundant) alarm shall be available as an option. The user shall be able to choose either an analog gauge with visual alarm or a digital gauge with electronic alarm (ADAM). The analog gauge with visual alarm and ADAM shall be remotely mounted on the right shoulder strap within easy view of the user and shall indicate the quantity of air remaining in the cylinder. They shall swivel to allow protection of the gauge face against the user's body.

- A. The analog gauge with visual alarm shall:

1. Have a luminous gauge face.
2. Have pressure increments marked in psig and “Empty,” “1/4,” “1/2,” “3/4,” and “Full.”
3. Employ a protective silicone boot.
4. Have a replaceable gauge face secured with three screws.
5. Utilize two 3-volt ½ AA lithium batteries, with a battery life of at least 250 hours of use.
6. Incorporate a low battery alarm—a flash every 10 seconds—at 15% useful life remaining. The alarm shall only be functional when the SCBA is pressurized. The low air visual alarm shall override the low battery alarm.

- B. The digital gauge with electronic alarm shall meet the specifications listed in the document entitled, “ADAM® (Advanced Display and Alarm Module).”

VIII. Pressure Gauge

The pressure gauge shall be remotely mounted on the right shoulder strap within easy view of the user and shall indicate the quantity of air remaining in the cylinder. The gauge shall swivel to allow protection of the gauge face against the user's body. The gauge shall be luminous and shall be protected with a rubber guard.

IX. Cylinder

A. The volume of the 30-minute cylinder shall be approximately 45 cubic feet when filled to 2216 psig or 4500 psig pressure and shall conform to the DOT approval or exemption numbers listed in section G below.

B. The volume of the 30-minute cylinder shall be approximately 60 cubic feet when filled to 3000 psig pressure and shall conform to the DOT exemption number listed in section G below.

C. The volume of the 45-minute cylinder shall be approximately 66 cubic feet when filled to 4500 psig pressure and shall conform to the DOT exemption numbers listed in section G below.

D. The volume of the 60-minute cylinder shall be approximately 87 cubic feet when filled to 4500 psig pressure and shall conform to the DOT exemption numbers listed in section G below.

E. The cylinder shall contain a closing valve which incorporates a pressure gauge to indicate the cylinder pressure at all times. The handwheel shall be at a 90° angle from the longitudinal axis of the cylinder.

F. The cylinder shall be either an all-aluminum, fully wrapped, or hoop-wrapped design. Wrapped cylinders shall be constructed of a deep-drawn, seamless aluminum liner wound with high-strength fiberglass or carbon filaments impregnated with epoxy resin.

G. Cylinders, less air and cylinder valves, shall not exceed the following weights:

- 1. 30-minute, all-aluminum, 2216 psig: 17.3 lb (DOT-3AL).**
- 2. 30-minute, fiberglass hoop-wrapped, 2216 psig: 11.8 lb (DOT-E-7235).**
- 3. 30-minute, fiberglass fully wrapped, 2216 psig: 9.4 lb (DOT-E-8059/9634).**
- 4. 30-minute, carbon fully wrapped, 2216 psig: 6.7 lb (DOT-E-10915).**
- 5. 30-minute, carbon fully wrapped, 3000 psig: 9.5 lb (DOT-E-10915).**
- 6. 30-minute, fiberglass hoop-wrapped, 4500 psig: 11.5 lb (DOT-E-9894).**
- 7. 30-minute, fiberglass fully wrapped, 4500 psig: 10.3 lb (DOT-E-8059/9634).**
- 8. 30-minute, carbon fully wrapped, 4500 psig: 6.4 lb (DOT-E-10915).**
- 9. 45-minute, carbon fully wrapped, 4500 psig: 8.6 lb (DOT-E-10915).**
- 10. 60-minute carbon fully wrapped, 4500 psig: 11.6 lb (DOT-E-10915).**

X. Cylinder Valve

A. The cylinder valve shall be fitted with a two-sided luminous boldface dial-type gauge with rubber and metal protective guards. The cylinder valve body shall be permanently coated to prevent galling and corrosion.

B. The cylinder valve shall have a handwheel with an optional safety locking collar device to keep the handwheel locked open during use.

C. The cylinder valve outlet shall conform with the Compressed Gas Association (CGA) standard for threaded connection: for low pressure, number 346; for high pressure, number 347.

XI. Harness and Backpack

The backpack and harness assembly shall weigh approximately 4 pounds. No tools shall be necessary to replace any harness components. No adhesives shall be necessary to secure any replaceable components. The backpack harness shall be readily adjustable for various wearer sizes, and shall include the following components:

A. Harness straps of 1580 denier nylon construction to provide maximum resistance to abrasion. The shoulder straps shall have thick Nomex-covered neoprene padding attached for added user comfort and shall have snap-open hose loops for ease of maintenance. All harness straps shall secure to the backpack without fasteners, utilizing the WedgeLock™ style of attachment.

B. A two-piece 1580 denier nylon waist strap, adjustable from both sides, with a front-release, automotive-style, metal belt buckle. The waist strap shall be tightened by pull-forward-style straps.

C. A waist-strap-mounted holder for the second stage regulator so that the regulator may be kept actuated in a stand-by mode during use, and so that the regulator may be stored protected from the environment when not in use. The holder shall have a provision for relief of excess pressure when the regulator is actuated, and it shall have a vacuum breaker to prevent the regulator from being accidentally actuated upon removal from the holder.

D. A long-fiber flame- and heat-resistant polymer backplate contoured to the user's back. The backplate shall incorporate a friction pad in the tank band area to help keep the cylinder in the proper position.

E. A hose attachment block to keep the intermediate pressure hose and the gauge hose secured in their proper position, so that during a cylinder change, the hoses do not reposition the CGA handwheel to misalign with the cylinder valve.

F. A tubular stainless steel cylinder support and an adjustable 1580 denier nylon cylinder band to properly secure various sizes of cylinders. The cylinder band shall be secured to the backpack with a cam-over style buckle that attaches to a spring-loaded catch.

F. Long-fiber flame- and heat-resistant polymer hinged "wings" to position the backpack comfortably and securely on the hips and to stabilize the backpack during movement.

XII. Carrying Case

If specified, a molded carrying case shall be provided to retain the complete apparatus and instruction card or booklet. The carrying case shall have replaceable front latches.

XIII. Instruction Card or Booklet

An instruction card or booklet shall be provided with each apparatus. Instructions shall contain complete operation and maintenance procedures.

XIV. Warranty and Overhaul Cycle

The apparatus shall carry a limited warranty of not less than twelve (12) years, with the exception of the cylinder, which shall carry a limited warranty of not less than fifteen (15) years, and the first stage regulator, which shall carry a limited warranty of not less than the lifetime of the SCBA. The overhaul cycle for the apparatus, including the regulators, shall be a period of not less than six years. Electronic components shall carry their own, separate, limited warranties.

XV. Accessories

The following NIOSH-certified accessories shall be available for the apparatus:

- A. Supplied air attachment.**
- B. Buddy breathing adapter.**
- C. Anti-fog solution.**
- F. Integrated PASS device.**
- G. Rapid intervention crew universal air connection (rapid cylinder filling system).**
- H. Haz-mat suit pass-through fitting.**

