



System Assessment and Validation for Emergency Responders (SAVER)

Portable Breathing Air Compressors and Cascade Systems Market Survey Report

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Prepared by Space and Naval Warfare Systems Center Atlantic

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FOREWORD

The U.S. Department of Homeland Security (DHS) established the System Assessment and Validation for Emergency Responders (SAVER) Program to assist emergency responders making procurement decisions. Located within the Science and Technology Directorate (S&T) of DHS, the SAVER Program conducts objective assessments and validations on commercially available equipment and systems and develops knowledge products that provide relevant equipment information to the emergency responder community. The SAVER Program mission includes:

- Conducting impartial, practitioner-relevant, operationally oriented assessments and validations of emergency response equipment
- Providing information, in the form of knowledge products, that enables decision-makers and responders to better select, procure, use, and maintain emergency response equipment.

SAVER Program knowledge products provide information on equipment that falls under the categories listed in the DHS Authorized Equipment List (AEL), focusing primarily on two main questions for the responder community: “What equipment is available?” and “How does it perform?” These knowledge products are shared nationally with the responder community, providing a life- and cost-saving asset to DHS, as well as to Federal, state, and local responders.

The SAVER Program is supported by a network of Technical Agents who perform assessment and validation activities. As a SAVER Program Technical Agent, the Space and Naval Warfare Systems Center (SPAWARSYSCEN) Atlantic has been tasked to provide expertise and analysis on key subject areas, including communications, sensors, security, weapon detection, and surveillance, among others. In support of this tasking, SPAWARSYSCEN Atlantic developed this report to provide emergency responders with information gathered during a market survey of commercially available portable breathing air compressors and cascade systems, which fall under AEL reference number 19GN-00-COMP titled Compressors and Systems, Breathing Air.

For more information on the SAVER Program or to view additional reports on portable breathing air compressors and cascade systems or other technologies, visit www.firstresponder.gov/SAVER.

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1. INTRODUCTION

Self-contained breathing apparatuses (SCBAs) are used by emergency responders to provide safe, breathable air when needed. Portable breathing air compressors (PBACs) are used to refill SCBAs during emergency situations. Portable air cascade systems (PACSSs) are an alternative to PBACs. To provide emergency responders with information on PBACs and PACSSs, the System Assessment and Validation for Emergency Responders (SAVER) Program conducted a market survey.

This market survey report is based on information gathered from June 2015 through August 2015 from vendors, Internet research, industry publications, and a government issued Request for Information (RFI) that was posted on the Federal Business Opportunities website. For inclusion in this report, the PBACs and PACSSs had to meet the following criteria:

- Portable breathing air compressors
 - Weigh under 300 pounds and if greater than 200 pounds, a wheel kit had to be available
 - SCBA ready
 - Occupational Safety and Health Administration (OSHA) air quality Grade D or better.
- Portable air cascade systems
 - Weigh under 400 pounds
 - SCBA ready
 - OSHA air quality Grade D or better
 - Have a minimum output pressure of 5,000 pounds per square inch (PSI).

Due diligence was performed to develop a report that is representative of products in the marketplace.

2. PORTABLE BREATHING AIR COMPRESSORS AND CASCADE SYSTEMS OVERVIEW

SCBAs are used by emergency responders during emergency operations when they need safe, breathable air. The amount of air that can be carried by an emergency responder is dependent on the weight of the SCBA. Typically, SCBAs can hold 30 to 60 minutes of breathable air and when depleted, emergency responders will refill their SCBAs using PBACs or PACSSs. Standard air compressors weigh over 500 pounds, which limits their mobility and use in emergency situations; however, PBACs and PACSSs are lighter and designed to be easily transportable.

2.1 Current Technologies

PBACs draw air through an air intake to compress. The PBAC then purifies the compressed air by removing contaminants such as oil and water. In addition, contaminants such as hydrocarbons and carbon monoxide (CO) are removed.

Cubic feet per minute (CFM), standard cubic feet per minute (SCFM), and PSI are common methods of measuring compressor performance. CFM and SCFM are measurements of the output volume of air that is supplied. SCFM is measured by holding variables such as temperature, humidity, ambient air pressure, and atmospheric pressure constant. PSI refers to the amount of force that a gas, in this case breathable air, exerts on the wall of the air tank.

High moisture content in breathable air can corrode and harm SCBA equipment, making a moisture indicator a valuable asset to a PBAC. In addition, CO is a deadly gas that can result from the combustion process. Some PBACs include a CO monitor to let the user know if there is a dangerous level of CO in the breathable air.

Available power options for PBACs are electric and fuel (e.g., gasoline, diesel). When considering electrically powered compressors, it is important to know the voltage and phase available where the compressor will be deployed. Fuel powered compressors may be beneficial in emergency situations and mobile applications as electrical service is not required.

PACs fill SCBAs by equalizing the pressure between the SCBA and the lowest supply cylinder in the cascade chain. The supply cylinders in the cascade system must have a higher pressure than the SCBA cylinder to be filled. If the first cylinder in the cascade does not produce the pressure required for the SCBA, the system automatically switches to the next cylinder in line and the pressure between the cascade cylinder and the SCBA equalize.

Weight is a significant factor in that PBACs and/or PACs must be light enough to move with simple manpower. Wheel kits may be an accessory for consideration when the equipment weighs more than 200 pounds.

2.2 Applications

PBACs and PACs provide emergency responders with the ability to refill SCBA bottles at the scene of an emergency. Some emergency situations where PBACs and PACs are used include firefighting, search and rescue, and hazmat response. Medical personnel may also use PBACs and/or PACs to refill respirator tanks that are used when dealing with dangerous pathogens such as Ebola. In addition, the National Institute for Occupational Safety and Health (NIOSH) provides guidance on immediately dangerous to life or health (IDLH) situations when respirators are required to prevent exposure to a toxic, corrosive, or asphyxiant substance that can cause an immediate or delayed threat to life. For more information about IDLH, visit www.cdc.gov/niosh/idlh/idlhintr.html.




2.3 Standards/Regulations

PBAC and PACS manufacturers must adhere to guidelines set by OSHA. OSHA Directive 02-00-158 requires the air quality to be Grade D or better. Grade D is defined as air with oxygen content between 19.5 and 23.5 percent, hydrocarbons at a maximum density of 5mg/m³, CO levels less than 10 parts per million (ppm), carbon dioxide content no greater than 1,000 ppm, and no odor. Furthermore, OSHA Standard 1910.134(i) requires that the intake be located so that vehicle exhaust does not contaminate the breathable air. A tag to maintain a record of inspections must be attached to the compressor to ensure these regulations are followed. OSHA guidelines on PBACs and PACs are located at www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=12716 and www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=DIRECTIVES&p_id=5988.

3. PRODUCT INFORMATION–VENDOR PROVIDED

This section provides information on 22 PBACs that range in price from \$1,913 to \$25,421 and 5 PACSs that range in price from \$1,780 to \$3,210. Table 3-1 and Table 3-2 provide general product specifications of PBACs and PACSs, respectively. Product information presented in this section was obtained from an RFI and directly from vendors and their websites. The information has not been independently verified by the SAVER Program.

Table 3-1. Portable Breathing Air Compressors Specifications – Vendor Provided

Vendor: Bauer Compressors Inc		
 <p>Dive Mate DMT10-E1 MSRP: \$21,609</p>	<p>Output Pressure (PSI): 6,000 Output Volume (CFM or SCFM): 9.7 SCFM OSHA Air Quality Grade: D Weight: 300 to 400 pounds Wheel Kit: Optional Dimensions (LxWxH): 43.0x24.0x27.0 inches Power Source: 230 VAC, 60 Hz, single phase</p>	<p>Fuel Consumption Rate: Not applicable Fill Time for 30 minute cylinder: 4.0 minutes Fill Time for 60 minute cylinder: 8.0 minutes Hour Meter: Yes Moisture Meter: Yes Carbon Monoxide Meter: Optional</p>
 <p>Dive Mate DMT10-E3 MSRP: \$21,196</p>	<p>Output Pressure (PSI): 6,000 Output Volume (CFM or SCFM): 9.7 SCFM OSHA Air Quality Grade: D Weight: 300 to 400 pounds Wheel Kit: Optional Dimensions (LxWxH): 43.0x24.0x27.0 inches Power Source: 230/460 VAC, 60 Hz, three phase</p>	<p>Fuel Consumption Rate: Not applicable Fill Time for 30 minute cylinder: 4.0 minutes Fill Time for 60 minute cylinder: 8.0 minutes Hour Meter: Yes Moisture Meter: Yes Carbon Monoxide Meter: Optional</p>
 <p>Dive Mate DMT10-GS MSRP: \$25,421</p>	<p>Output Pressure (PSI): 6,000 Output Volume (CFM or SCFM): 9.7 SCFM OSHA Air Quality Grade: D Weight: 300 to 400 pounds Wheel Kit: Optional Dimensions (LxWxH): 43.0x24.0x27.0 inches Power Source: Gasoline Fuel Capacity: Not provided</p>	<p>Fuel Consumption Rate: Not provided Fill Time for 30 minute cylinder: 4.0 minutes Fill Time for 60 minute cylinder: 8.0 minutes Hour Meter: Yes Moisture Meter: Yes Carbon Monoxide Meter: Optional</p>

See page 8 for definitions of the abbreviations used throughout this matrix.

Vendor: Bauer Compressors Inc, continued

 <p>Junior II JR11-E1 MSRP: \$4,329</p>	<p>Output Pressure (PSI): 5,000 Output Volume (CFM or SCFM): 3.9 SCFM OSHA Air Quality Grade: D Weight: 90 pounds Wheel Kit: No Dimensions (LxWxH): 26.8x13.5x16.3 inches Power Source: 230 VAC, 60 Hz, single phase</p>	<p>Fuel Consumption Rate: Not applicable Fill Time for 30 minute cylinder: 11.5 minutes Fill Time for 60 minute cylinder: 22.6 minutes Hour Meter: Optional Moisture Meter: Optional Carbon Monoxide Meter: Optional</p>
 <p>Junior II JR11-G MSRP: \$4,921</p>	<p>Output Pressure (PSI): 5,000 Output Volume (CFM or SCFM): 4.3 SCFM OSHA Air Quality Grade: D Weight: 110 pounds Wheel Kit: No Dimensions (LxWxH): 29.5x13.5x16.3 inches Power Source: Gasoline Fuel Capacity: 0.95 gallons</p>	<p>Fuel Consumption Rate: 0.7 gallons per hour Fill Time for 30 minute cylinder: 10.4 minutes Fill Time for 60 minute cylinder: 20.5 minutes Hour Meter: Optional Moisture Meter: Optional Carbon Monoxide Meter: Optional</p>
 <p>Oceanus-E1 MSRP: \$5,599</p>	<p>Output Pressure (PSI): 5,000 Output Volume (CFM or SCFM): 4.9 SCFM OSHA Air Quality Grade: D Weight: 111 pounds Wheel Kit: No Dimensions (LxWxH): 25.7x17.0x16.3 inches Power Source: 230 VAC, 60 Hz, single phase</p>	<p>Fuel Consumption Rate: Not applicable Fill Time for 30 minute cylinder: 9.2 minutes Fill Time for 60 minute cylinder: 18.0 minutes Hour Meter: Optional Moisture Meter: Optional Carbon Monoxide Meter: Optional</p>
 <p>Oceanus-G MSRP: \$6,105</p>	<p>Output Pressure (PSI): 5,000 Output Volume (CFM or SCFM): 4.9 SCFM OSHA Air Quality Grade: D Weight: 96 pounds Wheel Kit: Optional Dimensions (LxWxH): 30.0x13.5x16.3 inches Power Source: Gasoline Fuel Capacity: 0.95 gallons</p>	<p>Fuel Consumption Rate: 0.7 gallons per hour Fill Time for 30 minute cylinder: 9.2 minutes Fill Time for 60 minute cylinder: 18.0 minutes Hour Meter: Optional Moisture Meter: Optional Carbon Monoxide Meter: Optional</p>

See page 8 for definitions of the abbreviations used throughout this matrix.

Vendor: Nardi Compressori, S.r.l.		
 <p>Atlantic G MSRP: \$2,070</p>	<p>Output Pressure (PSI): 4,700 Output Volume (CFM or SCFM): 3.5 OSHA Air Quality Grade: D Weight: 93 pounds Wheel Kit: Optional Dimensions (LxWxH): 22.8x16.1x16.1 inches Power Source: Gasoline Fuel Capacity: Not provided</p>	<p>Fuel Consumption Rate: 0.53 gallons per hour Fill Time for 30 minute cylinder: 12.8 minutes Fill Time for 60 minute cylinder: 24.6 minutes Hour Meter: Optional Moisture Meter: Optional Carbon Monoxide Meter: Optional</p>
 <p>Atlantic P MSRP: \$1,913</p>	<p>Output Pressure (PSI): 4,700 Output Volume (CFM or SCFM): 3.5 OSHA Air Quality Grade: D Weight: 94 pounds Wheel Kit: Optional Dimensions (LxWxH): 22.8x16.1x16.1 inches Power Source: 230-400 VAC, 50 or 60 Hz, single or three phase</p>	<p>Fuel Consumption Rate: Not applicable Fill Time for 30 minute cylinder: 12.8 minutes Fill Time for 60 minute cylinder: 24.6 minutes Hour Meter: Optional Moisture Meter: Optional Carbon Monoxide Meter: Optional</p>
 <p>Pacific E23 MSRP: \$4,535</p>	<p>Output Pressure (PSI): 4,700 Output Volume (CFM or SCFM): 8.1 OSHA Air Quality Grade: D Weight: 238 pounds Wheel Kit: Optional Dimensions (LxWxH): 39.0x21.0x25.6 inches Power Source: 230-400 VAC, 50 or 60 Hz, 4.0 kW, three phase</p>	<p>Fuel Consumption Rate: Not applicable Fill Time for 30 minute cylinder: 5.5 minutes Fill Time for 60 minute cylinder: 10.7 minutes Hour Meter: Optional Moisture Meter: Optional Carbon Monoxide Meter: Optional</p>
 <p>Pacific E27 MSRP: \$5,050</p>	<p>Output Pressure (PSI): 4,700 Output Volume (CFM or SCFM): 9.5 OSHA Air Quality Grade: D Weight: 260 pounds Wheel Kit: Optional Dimensions (LxWxH): 39.0x21.0x25.6 inches Power Source: 230-400 VAC, 50 or 60 Hz, 5.5 kW, three phase</p>	<p>Fuel Consumption Rate: Not applicable Fill Time for 30 minute cylinder: 4.7 minutes Fill Time for 60 minute cylinder: 9.1 minutes Hour Meter: Optional Moisture Meter: Optional Carbon Monoxide Meter: Optional</p>





See page 8 for definitions of the abbreviations used throughout this matrix.

Vendor: Nardi Compressori, S.r.l., continued

 <p>Pacific E30 MSRP: \$5,633</p>	<p>Output Pressure (PSI): 4,700 Output Volume (CFM or SCFM): 10.6 OSHA Air Quality Grade: D Weight: 260 pounds Wheel Kit: Optional Dimensions (LxWxH): 39.0x21.0x25.6 inches Power Source: 230-400 VAC, 50 or 60 Hz, 5.5 kW, three phase</p>	<p>Fuel Consumption Rate: Not applicable Fill Time for 30 minute cylinder: 4.3 minutes Fill Time for 60 minute cylinder: 8.2 minutes Hour Meter: Optional Moisture Meter: Optional Carbon Monoxide Meter: Optional</p>
 <p>Pacific E35 MSRP: \$6,954</p>	<p>Output Pressure (PSI): 4,700 Output Volume (CFM or SCFM): 12.4 OSHA Air Quality Grade: D Weight: 277 pounds Wheel Kit: Optional Dimensions (LxWxH): 39.0x21.0x25.6 inches Power Source: 230-400 VAC, 50 or 60 Hz, 7.5 kW, three phase</p>	<p>Fuel Consumption Rate: Not applicable Fill Time for 30 minute cylinder: 3.6 minutes Fill Time for 60 minute cylinder: 7.0 minutes Hour Meter: Optional Moisture Meter: Optional Carbon Monoxide Meter: Optional</p>
 <p>Pacific EG23 MSRP: \$5,296</p>	<p>Output Pressure (PSI): 4,700 Output Volume (CFM or SCFM): 8.1 OSHA Air Quality Grade: D Weight: 249 pounds Wheel Kit: Optional Dimensions (LxWxH): 40.0x21.0x25.6 inches Power Source: Gasoline Fuel Capacity: 1.61 gallons</p>	<p>Fuel Consumption Rate: 1.5 gallons per hour Fill Time for 30 minute cylinder: 5.5 minutes Fill Time for 60 minute cylinder: 10.7 minutes Hour Meter: Optional Moisture Meter: Optional Carbon Monoxide Meter: Optional</p>
 <p>Pacific EG27 MSRP: \$5,957</p>	<p>Output Pressure (PSI): 4,700 Output Volume (CFM or SCFM): 3.5 OSHA Air Quality Grade: D Weight: 94 pounds Wheel Kit: Optional Dimensions (LxWxH): 40.0x21.0x25.6 inches Power Source: Gasoline Fuel Capacity: 1.61 gallons</p>	<p>Fuel Consumption Rate: 1.5 gallons per hour Fill Time for 30 minute cylinder: 4.7 minutes Fill Time for 60 minute cylinder: 9.1 minutes Hour Meter: Optional Moisture Meter: Optional Carbon Monoxide Meter: Optional</p>




See page 8 for definitions of the abbreviations used throughout this matrix.

Vendor: Nardi Compressori, S.r.l., continued

 <p>Pacific EG30 MSRP: \$6,623</p>	<p>Output Pressure (PSI): 4,700 Output Volume (CFM or SCFM): 3.5 OSHA Air Quality Grade: D Weight: 94 pounds Wheel Kit: Optional Dimensions (LxWxH): 40.0x21.0x25.6 inches Power Source: Gasoline Fuel Capacity: 1.61 gallons</p>	<p>Fuel Consumption Rate: 1.5 gallons per hour Fill Time for 30 minute cylinder: 4.3 minutes Fill Time for 60 minute cylinder: 8.2 minutes Hour Meter: Optional Moisture Meter: Optional Carbon Monoxide Meter: Optional</p>
 <p>Pacific EG35 MSRP: \$8,118</p>	<p>Output Pressure (PSI): 4,700 Output Volume (CFM or SCFM): 3.5 OSHA Air Quality Grade: D Weight: 94 pounds Wheel Kit: Optional Dimensions (LxWxH): 40.0x21.0x25.6 inches Power Source: Gasoline Fuel Capacity: 1.61 gallons</p>	<p>Fuel Consumption Rate: 1.5 gallons per hour Fill Time for 30 minute cylinder: 3.6 minutes Fill Time for 60 minute cylinder: 7.0 minutes Hour Meter: Optional Moisture Meter: Optional Carbon Monoxide Meter: Optional</p>
 <p>Pacific P23 MSRP: \$6,942</p>	<p>Output Pressure (PSI): 4,700 Output Volume (CFM or SCFM): 8.1 OSHA Air Quality Grade: D Weight: 300 pounds Wheel Kit: Optional Dimensions (LxWxH): 46.5x21.3x27.2 inches Power Source: 230-400 VAC, 50 or 60 Hz, 4.0 kW, three phase</p>	<p>Fuel Consumption Rate: Not applicable Fill Time for 30 minute cylinder: 5.5 minutes Fill Time for 60 minute cylinder: 10.7 minutes Hour Meter: Optional Moisture Meter: Optional Carbon Monoxide Meter: Optional</p>
 <p>Pacific PG23 MSRP: \$5,957</p>	<p>Output Pressure (PSI): 4,700 Output Volume (CFM or SCFM): 8.1 OSHA Air Quality Grade: D Weight: 249 pounds Wheel Kit: Optional Dimensions (LxWxH): 45.7x21.0x25.6 inches Power Source: Gasoline Fuel Capacity: 1.61 gallons</p>	<p>Fuel Consumption Rate: 1.5 gallons per hour Fill Time for 30 minute cylinder: 5.5 minutes Fill Time for 60 minute cylinder: 10.7 minutes Hour Meter: Optional Moisture Meter: Optional Carbon Monoxide Meter: Optional</p>

See page 8 for definitions of the abbreviations used throughout this matrix.

Vendor: Nardi Compressori, S.r.l., continued

 <p>Pacific PG27 MSRP: \$6,304</p>	<p>Output Pressure (PSI): 4,700 Output Volume (CFM or SCFM): 9.5 OSHA Air Quality Grade: D Weight: 249 pounds Wheel Kit: Optional Dimensions (LxWxH): 45.7x21.0x25.6 inches Power Source: Gasoline Fuel Capacity: 1.61 gallons</p>	<p>Fuel Consumption Rate: 1.5 gallons per hour Fill Time for 30 minute cylinder: 4.7 minutes Fill Time for 60 minute cylinder: 9.1 minutes Hour Meter: Optional Moisture Meter: Optional Carbon Monoxide Meter: Optional</p>
 <p>Pacific PG30 MSRP: \$6,942</p>	<p>Output Pressure (PSI): 4,700 Output Volume (CFM or SCFM): 10.6 OSHA Air Quality Grade: D Weight: 271 pounds Wheel Kit: Optional Dimensions (LxWxH): 45.7x21.0x25.6 inches Power Source: Gasoline Fuel Capacity: 1.61 gallons</p>	<p>Fuel Consumption Rate: 1.5 gallons per hour Fill Time for 30 minute cylinder: 4.3 minutes Fill Time for 60 minute cylinder: 8.2 minutes Hour Meter: Optional Moisture Meter: Optional Carbon Monoxide Meter: Optional</p>
 <p>Pacific PG35 MSRP: \$8,365</p>	<p>Output Pressure (PSI): 4,700 Output Volume (CFM or SCFM): 12.4 OSHA Air Quality Grade: D Weight: 282 pounds Wheel Kit: Optional Dimensions (LxWxH): 45.7x21.0x25.6 inches Power Source: Gasoline Fuel Capacity: 1.61 gallons</p>	<p>Fuel Consumption Rate: 1.5 gallons per hour Fill Time for 30 minute cylinder: 3.6 minutes Fill Time for 60 minute cylinder: 7.0 minutes Hour Meter: Optional Moisture Meter: Optional Carbon Monoxide Meter: Optional</p>

Notes:

Output Pressure—PSI—pounds per square inch
Output Volume—CFM—cubic feet per minute; SCFM—standard cubic feet per minute
Dimensions—L—length; W—width; H—height
Power Source—VAC—volts of alternating current; Hz—hertz; kW—kilowatt


Information in the table is based on data gathered from vendors and their websites from June 2015 through August 2015.

Table 3-2. Portable Air Cascade Systems Specifications – Vendor Provided

Vendor: Bauer Compressors Inc		
 <p>HC5000-2 MSRP: \$3,243</p>	<p>Number of Cylinders: 2 Output Pressure (PSI): 5,000 Output Volume (CFM or SCFM): 486 cubic feet OSHA Air Quality Grade: E Weight (empty): 158 pounds Weight (full): Not provided Dimensions (LxD): 55x9.38inches</p>	<p>Fill Time for 30 Minute Cylinder: Not provided Number of 30 Minute Cylinders Filled: 5 Fill Time for 60 Minute Cylinder: Not provided Number of 60 Minute Cylinders Filled: 2</p>
Vendor: Breathing Air Systems		
 <p>CS5-1R MSRP: \$1,780</p>	<p>Number of Cylinders: 1 Output Pressure (PSI): 5,000 Output Volume (CFM or SCFM): Not provided OSHA Air Quality Grade: D Weight (empty): 170 pounds Weight (full): 230 pounds Dimensions (LxD): 52.5x9.41inches</p>	<p>Fill Time for 30 Minute Cylinder: 1 minute Number of 30 Minute Cylinders Filled: 1 Fill Time for 60 Minute Cylinder: Not Applicable Number of 60 Minute Cylinders Filled: 0</p>
 <p>CS5-2R MSRP: \$2,775</p>	<p>Number of Cylinders: 2 Output Pressure (PSI): 5,000 Output Volume (CFM or SCFM): Not provided OSHA Air Quality Grade: D Weight (empty): 340 pounds Weight (full): 440 pounds Dimensions (LxD): 52.5x9.41inches</p>	<p>Fill Time for 30 Minute Cylinder: 1 minute Number of 30 Minute Cylinders Filled: 5 Fill Time for 60 Minute Cylinder: 1 minute Number of 60 Minute Cylinders Filled: 2</p>
 <p>CS6-1R MSRP: \$1,925</p>	<p>Number of Cylinders: 1 Output Pressure (PSI): 6,000 Output Volume (CFM or SCFM): Not provided OSHA Air Quality Grade: D Weight (empty): 195 pounds Weight (full): 245 pounds Dimensions (LxD): 52.5x9.41inches</p>	<p>Fill Time for 30 Minute Cylinder: 1 minute Number of 30 Minute Cylinders Filled: 2 Fill Time for 60 Minute Cylinder: 1 minute Number of 60 Minute Cylinders Filled: 1</p>

See page 10 for definitions of the abbreviations used throughout this matrix.

Vendor: Breathing Air Systems, continued

 <p>CS6-2R MSRP: \$3,310</p>	<p>Number of Cylinders: 2 Output Pressure (PSI): 6,000 Output Volume (CFM or SCFM): Not provided OSHA Air Quality Grade: D Weight (empty): 390 pounds Weight (full): 490 pounds Dimensions (LxD): 52.5x9.41inches</p>	<p>Fill Time for 30 Minute Cylinder: 1 minute Number of 30 Minute Cylinders Filled: 10 Fill Time for 60 Minute Cylinder: 1 minute Number of 60 Minute Cylinders Filled: 5</p>
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Notes:

Output Pressure—PSI—pounds per square inch

Output Volume—CFM—cubic feet per minute; SCFM—standard cubic feet per minute

Dimensions—L—length; D—diameter

Information in the table is based on data gathered from vendors and their websites from June 2015 through August 2015.

4. PRODUCT INFORMATION—RESEARCHED

This section provides general product specifications on 33 PBACs. Contact the vendors for pricing information. All of the PBACs in Table 4-1 support an OSHA air quality of Grade E. All of the American AirworksTM PBACs have frames with wheels. All of the SeaComAir PBACs have wheel kits as an option. Contact the vendors for information on wheel kits for the other PBACs. Specifications presented in Table 4-1 were obtained from Internet and industry publication research. The information has not been independently verified by the SAVER Program.

Table 4-1. Portable Breathing Air Compressors—Researched

Vendor	Product	Output Pressure (PSI)	Output Volume (CFM or SCFM)	Weight (pounds)	Dimensions (inches) (LxWxH)	Power Source	Fill Time ¹ (minutes)	Hour Meter	Moisture Monitor	CO Monitor
American Airworks	Fast35 PE1	4,700	3.5 CFM	119	29.0x15.0x19.0	E	NP	✓	O	O
	Fast35 PE3	4,700	3.5 CFM	117	29.0x15.0x19.0	E	NP	✓	O	O
	Fast35 PG	4,700	4.8 CFM	121	35.0x15.0x19.0	G	NP	✓	O	O
Coltri Americas/ Nuair	MCH6/3E	4,500	3.4 SCFM	90	26.5x15.0x15.5	E	23.0	O	O	O
	MCH6/3.5E	4,500	4.2 SCFM	88	26.0x15.0x15.0	E	19.0	O	O	O
	MCH6/3.5G	4,500	4.2 SCFM	84	31.0x14.0x15.0	G	19.0	✓	O	O
	MCH6/3E Compact	4,500	3.4 SCFM	126	29.0x14.5x19.0	E	23.0	O	O	O
	MCH6/3.5E Compact	4,500	4.2 SCFM	126	29.0x14.5x19.0	E	19.0	O	O	O
	MCH6/3.5G Compact	4,500	4.2 SCFM	121	29.0x14.5x19.0	G	19.0	✓	O	O
	MCH13/5 Standard	5,000	6.6 SCFM	218	34.0x18.0x25.0	E	11.0	O	O	O
	MCH13/7 Standard	5,000	8.9 SCFM	218	34.0x18.0x25.0	E	9.0	O	O	O
	MCH16/9 Standard	5,000	10.8 SCFM	240	34.0x18.0x25.0	E	7.4	O	O	O

See page 13 for notes and definitions of the abbreviations used throughout this matrix.

Vendor	Product	Output Pressure (PSI)	Output Volume (CFM or SCFM)	Weight (pounds)	Dimensions (inches) (LxWxH)	Power Source	Fill Time ¹ (minutes)	Hour Meter	Moisture Monitor	CO Monitor
Max-Air	Max-Air 55 Standard GH	5,000	6.6 SCFM	256	41.0x20.0x29.0	G	12	O	O	O
	Max-Air 90 Standard E3	5,000	10.8 SCFM	276	42.0x20.0x29.0	E	7.5	O	O	O
	Max-Air 90 Standard GH	5,000	10.8 SCFM	276	42.0x20.0x29.0	G	7.5	✓	O	O
RIX Industries	SA-3E	3,300	3.5 SCFM	130	24.0x16.0x15.0	E	NP			
	SA-3G	3,300	3.5 SCFM	108	27.0x16.0x15.0	G	NP			
	SA-6E	4,500	6.5 SCFM	213	30.0x19.0x18.0	E	NP			
	SA-6G	4,500	6.5 SCFM	155	35.0x19.0x18.0	G	NP			
SeaComAir	SCA80E21/3	4,500	3.4 SCFM	88	27.0x15.0x15.0	E	23	O		
	SCA80E11/3	4,500	3.4 SCFM	88	27.0x15.0x15.0	E	23	O		
	SCA100E23/4	4,850	4.2 SCFM	95	27.5x14.0x15.0	E	19	O		
	SCA100E23/4C	4,850	4.2 SCFM	106	27.5x18.5x14.5	E	19	O		
	SCA100E43/4	4,850	4.2 SCFM	95	27.5x14.0x15.0	E	19	O		
	SCA100E43/4C	4,850	4.2 SCFM	106	27.5x18.5x14.5	E	19	O		

See page 13 for notes and definitions of the abbreviations used throughout this matrix.

Vendor	Product	Output Pressure (PSI)	Output Volume (CFM or SCFM)	Weight (pounds)	Dimensions (inches) (LxWxH)	Power Source	Fill Time ¹ (minutes)	Hour Meter	Moisture Monitor	CO Monitor
SeaComAir (continued)	SCA100GH/55	4,850	4.2 SCFM	85	30.0x14.0x15.0	G	19	O		
	SCA100GH/55C	4,850	4.2 SCFM	99	27.5x18.5x15.0	G	19	O		
	SCA100SR/6	4,850	4.2 SCFM	86	30.0x14.0x15.0	G	19	O		
	SCA140E21/4OSS	5,000	6.5 SCFM	242	39.0x20.0x28.0	E	12	O		
	SCA215E43/55OSS	5,000	10.0 SCFM	262	39.0x20.0x28.0	E	8	O		
	SCA215SR/9OSS	5,000	10.0 SCFM	277	44.0x20.0x28.0	G	8	O		
	SCA265E43/75OSS	5,000	13.0 SCFM	262	39.0x20.0x28.0	E	6	O		
	SCA265GH/9OSS	5,000	13.0 SCFM	277	44.0x20.0x28.0	G	6	O		
<p>Notes:</p> <p>Blank cell—product is not equipped with corresponding feature</p> <p>✓—system is equipped with corresponding feature</p> <p>NP—information not provided</p> <p>O—Optional</p> <p>Output Pressure—PSI—pounds per square inch</p> <p>Output Volume—CFM—cubic feet per minute; SCFM—standard cubic feet per minute</p> <p>Dimensions—L—length; W—width; H—height</p> <p>Power Source—E—electric; G—gasoline</p> <p>¹Fill Time—Time to fill a single 80 cubic feet cylinder from 500 PSI to 3000 PSI</p>										

Information in the table is based on data gathered from Internet and industry publication research from June 2015 through August 2015.

5. VENDOR CONTACT INFORMATION

Additional information on the PBACs and PACSs included in this market survey report can be obtained from the vendors listed in Table 5-1. Additional vendors of PBACs and PACSs are also included, as designated by an asterisk (*).

Table 5-1. Vendor Contact Information

Vendor	Phone Number	Website
Air Systems International Inc.*	(800) 866-8100	www.airsystems.com
AireTex Compressors*	(877) 712-1588	www.airetex.com
American Airworks	(800) 523-7222	www.americanairworks.com
Bauer Compressors Inc.	(757) 855-6006	www.bauercomp.com
Breathing Air Systems	(614) 964-1235	www.breathingair.com
Coltri Americas/Nuvair	(954) 344-2420	www.coltriamericas.com
Cramer-Decker Industries*	(800) 347-9766	www.cramerdecker.com
Draeger Safety Inc.*	(412) 787-8383	www.draeger.com
Max-Air	(830) 257-5006	www.max-air.com
Mako*	(888) 909-2942	www.makocompressors.com
Nardi Compressori S.r.l.	+39 0444 159111	www.nardicompressori.com/en
North Shore Compressor & Machine Inc.*	(800) 526-6395	www.northshorecompressor.com
RIX Industries	(707) 747-5900	www.rixindustries.com
SCBAS Inc.*	(800) 747-7442	www.scbas.com
SeaComAir	+49 8057 904674	www.seacomair.com

6. SUMMARY

This market survey report provides information on 55 PBACs and 5 PACSs. SCBAs are used by emergency responders to provide safe, breathable air when needed. PBACs are used to refill SCBAs during emergency situations. PACSs are an alternative to PBACs. PBACs and PACSs often differ in output pressure, output volume, and weight. Electrically powered PBACs may differ in power requirements. In addition, indicators or gauges such as an hour meter, a moisture monitor, and a CO monitor may be available for PBACs. The supply cylinders in the PACS must have a higher pressure than the SCBA cylinder to be filled. Considerations in purchasing PBACs and PACSs vary by user need and application.

Emergency responder agencies that consider purchasing PBACs and PACSs should carefully research each product's overall capabilities and limitations in relation to their agency's operational needs.