

CHAPTER 8 INSTALLATION

8.1 INTRODUCTION.

This chapter provides instructions for unpacking, inventorying, inspecting, checking-out, storing, and shipping the Supplied Air Respirator (SAR) with the Self-Contained Breathing Apparatus (SCBA). No special installation procedures are required.

8.2 UNPACKING AND INVENTORY PROCEDURES.

8.2.1 Unpacking. Upon receipt of the equipment, carefully unpack shipping crates. Avoid puncturing hoses and damaging gauges and indicators when opening the shipment. As each item is removed from its container, perform a thorough inspection for damage and manufacturing defects. Report all damage or deficiencies to the supply or transportation department. If items are damaged or defective, they should not be placed in service until repaired or replaced.

8.2.2 Inventory. To ensure receipt of all equipment, inventory all components. Verify that all equipment serial numbers correspond with those on the packing list. Open and identify all the parts listed in Table 8-1, SAR/SCBA Ship's Issue Set.

8.3 INSPECTION.

Carefully remove each item from its packing container. Perform a thorough inspection, noting any discrepancies caused by the packing and manufacturing processes. Inspect for completeness of assemblies, faulty workmanship, dirt, cracks, corrosion, or deterioration. Specific items to be inspected are discussed in the following paragraphs.

NOTE

Cylinders manufactured after the year 2000 are the same model as previously required, but are shorter in length and require a cylinder pad to allow the securing of the cylinder in PASP/RASP cases.

8.3.1 Primary Air Supply Pack (PASP). Check the PASP for damage to the aluminum case or the control panel. This unit shall be inspected to ensure that all controls and indicators are in good operating condition.

- a. Check the PASP for signs of structural damage, such as dents or cracks on the aluminum case.
- b. Check all valves and handles to ensure smooth and proper operation. Ensure that no handles are missing or broken.

- c. Check gauges and indicators for damage.
- d. Ensure gauges have current calibration dates.
- e. Inspect QDs for dents, chips, scratches, or gouges.
- f. Inspect for loose, damaged, or missing nuts and screws.

8.3.2 Reserve Air Supply Pack (RASP). Check the RASP for possible damage to the aluminum case. This unit shall be inspected to ensure that no structural damage, such as dents, scratches, or corrosion, has occurred.

8.3.3 Self-Contained Breathing Apparatus (SCBA). Check the SCBA thoroughly for possible shipping damage. Replace any damaged components prior to use. Open the SCBA hard-shell carry cases and identify the following parts:

- a. Facepiece and mask-mounted (second-stage) regulator (MMR),
- b. Mask-mounted filter cartridge,
- c. Carry pouch, waist belt, and strap,
- d. One interconnecting air-supply hose (75 ft.) in case, one packed separately,
- e. PremAire® CADET 15M Air-Line Respirator Operation and Maintenance Manual, and
- f. Spare parts kit.

8.3.4 Hoses. Check all PASP, RASP, and SCBA hoses and fittings. Inspect the hoses and fittings to ensure they are in good operating condition.

- a. Inspect fittings for chips, dents, scratches, or gouges.
- b. Inspect each hose for blisters or abrasions.
- c. Inspect each hose for cuts, cracks, or punctures.
- d. Inspect each hose to ensure fittings are firmly attached.
- e. Ensure each hose has a current hydrostatic test date.

8.3.5 Air Cylinders. Pursuant to Department of Transportation (DOT) regulations, a copy of Appendix B to this manual must be retained on board all ships and aircraft

Table 8-1. SAR/SCBA Ship's Issue Set

Ship's Set Inventory
2 Primary Air Supply Packs (PASP)
5 Reserve Air Supply Packs (RASP)
8 Self-Contained Breathing Apparatus (SCBAs) with hard-shell carry cases <ul style="list-style-type: none"> • 8 interconnecting air-supply hoses (75 ft.) - packed separately • 4 canvas bags (excess hose storage) • 1 SCBA Spare Parts Kit
1 SAR/SCBA Tool Kit - Specialty Tools Only <ul style="list-style-type: none"> • Pressure-demand exhalation wrench (spanner wrench) • Quick disconnect airflow adapter
1 SAR/SCBA Maintenance Manual, Organizational and Intermediate Levels, (hard copy), SS600-AN-MMA-010
1 CD-ROM <ul style="list-style-type: none"> • SAR/SCBA Maintenance Manual, Organizational and Intermediate Levels, SS600-AN-MMA-010 • Planned Maintenance System (PMS) • Interim Parts List • Ordering Information
1 SAR/SCBA Orientation Video

used to transport SAR/SCBA HP air cylinders. Note that the PASP/ RASP HP air cylinders are assigned designation DOT-E-9634, and the SCBA air cylinders are assigned the designation DOT-E-7277. Each cylinder requires hydrostatic testing every 3 years IAW 49 CFR 173.34(e) as prescribed for DOT 3HT cylinders, except that the rejection elastic expansion criteria does not apply and permanent volumetric expansion may not exceed 5% of total volumetric expansion at test pressure (5/3 service pressure). Reheat treatment or repair of rejected cylinders is not authorized. The service life of SAR/SCBA composite-type HP air cylinders is 15 years. See "Special Provisions" section (paragraph 8) of Appendix B. Appendix B also addresses the packaging of HP air cylinders IAW 49 CFR 173.301(k).

The cylinders shall be inspected IAW PMS requirements and this chapter to ensure that they meet U.S. Navy specifications for safety and operations. The cylinders should be clean and free of labels, dirt, or other attachments that may hinder an inspection. The manufacturer's labels shall not be removed from the air cylinders. No paint shall be removed.

The following paragraphs and figures illustrate the types of damage associated with fiberglass/epoxy cylinders, and describe cylinder repairs.

8.3.5.1 Types of Air Cylinder Damage.

CAUTION

Significant repairs on HP air cylinders are generally not performed at Shipboard Organizational level. Cylinder repairs shall be performed by authorized repair activities using repair standards and procedures designed for HP air cylinders.

- a. Scuffs — Minor abrasion damage (Level 1 damage) to protective coating (e.g, paint) on cylinders (Figure 8-1).
- b. Abrasions — Greater loss of surface with numerous fibers visible. Can be caused by sliding contact with a rough surface. Flat spots evident on the surface could indicate excessive loss of composite thickness (Figure 8-2).
- c. Cuts — Defects in the cylinder caused by a sharp object (Figure 8-3).
- d. Impact Damage — Defects caused by dropping or a blow from a blunt object.
 - (1) Dents or Bruises — Damage may appear as crazing (hairline cracking) or frosting of the fiberglass/epoxy (Figure 8-4).

- (2) Delamination — Delamination is a separation between the plies of the overwrap or at the overwrap-liner interface. Damage may appear as a whitish patch, like a blister or air space beneath the surface (Figure 8-5).
- e. Structural — Indicates severe damage to the cylinder. This damage is extreme and may involve damage to the liner, as well as to the exterior (Figure 8-6).
- f. Fire — Cylinders with signs of fire damage will be condemned (Figure 8-7).

8.3.5.2 Levels of Air Cylinder Damage. The following inspection criteria apply to fiberglass/epoxy-wrapped cylinders and are summarized in Table 8-2.

- a. Level 1 Damage (Acceptable) — Level 1 damage is minor and is considered normal, having no adverse effects on the safety of the cylinder and its continued use. Scratched paint, nicks, or dings that have no appreciable depth, or no significant quantity of frayed fibers, are considered Level 1.
- b. Level 2 Damage (Rejectable, additional inspection or repairs required) — Level 2 damage may be cuts or gouges which are deeper or longer than those of Level 1, or may include a group of severed fibers. This level of damage may be repairable. If an evaluation is made that the cylinder has Level 2 damage, it should be

returned to the appropriate maintenance authority for further evaluation and repair.

- c. Level 3 Damage (Condemned - not repairable) — Level 3 damage is a cylinder that has been rendered unfit for continued service and cannot be repaired. Discovery of such damage shall be recorded in writing, including notation of the cylinder serial number. The cylinder will be condemned and disposed of as directed in Table 8-2.

8.3.5.3 Air Cylinder Inspection Criteria. The following inspection criteria apply to fiberglass/epoxy-wrapped cylinders and are summarized in Table 8-2.

- a. Abrasions — Level 1: Minor abrasions, such as scuffs, are acceptable unless the damage is deep enough to expose groups of fibers. Abrasions must not exceed a depth of 0.005 inch to qualify as Level 1 damage for PASP, RASP, and SCBA cylinders.

Level 2: Abrasions in this category must not exceed a depth of 0.045 inch for PASP/RASP cylinders (0.010 inch for cylindrical section and 0.0055 inch for dome section of SCBA cylinder), and a maximum of 1 inch in length transverse to the fiber.

Level 3: Cylinder abrasions exceeding a depth of 0.045 inch for PASP/RASP cylinders (0.010 inch for cylindrical section and 0.0055 inch for dome section of SCBA cylinder) are condemned.



Figure 8-1. Cylinder Scuffs*

*All photographs (Fig. 8-1 through 8-7) of damaged air cylinders were reprinted with permission from the Compressed Gas Association publication *Guidelines for Visual Inspection & Requalification of Fiber Reinforced High Pressure Cylinders*, CGA C-62, 1988.

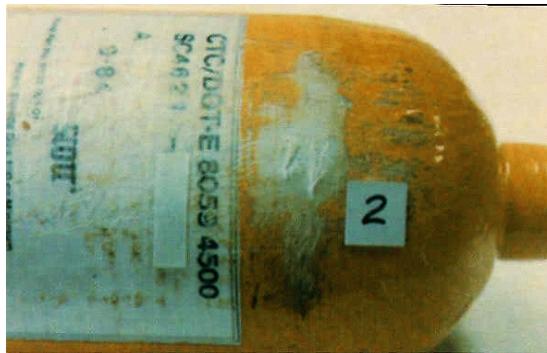
ABRASION DAMAGE



Paint stripping (condemned)



Level 1 abrasion (acceptable)



Level 1 abrasion (acceptable)



Level 2 abrasion (repair and hydrotest needed)



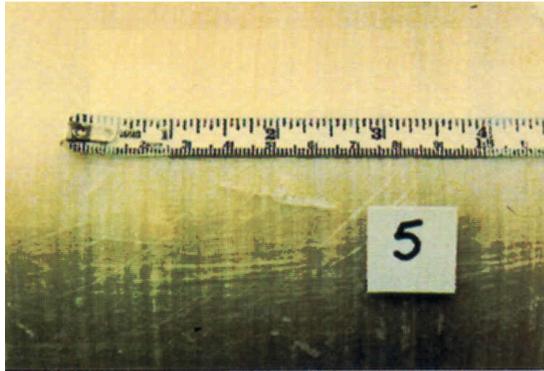
Level 3 abrasion (condemned)



Level 3 abrasion (condemned)

Figure 8-2. Cylinder Abrasions*

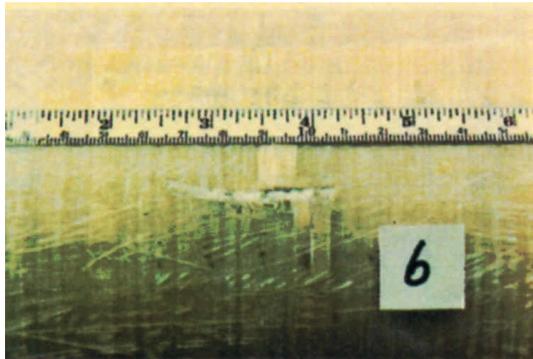
CUT DAMAGE



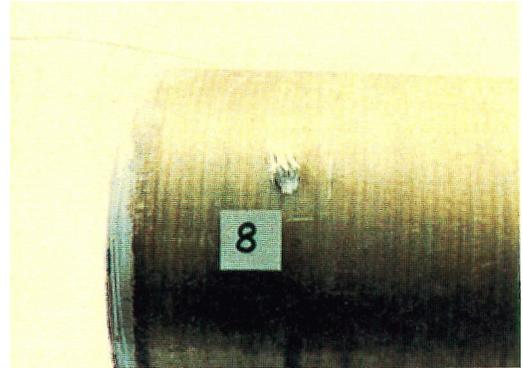
Level 1 cuts (acceptable)



Level 1 cuts (acceptable)



Level 3 cuts (condemned)



Level 3 cuts (condemned)

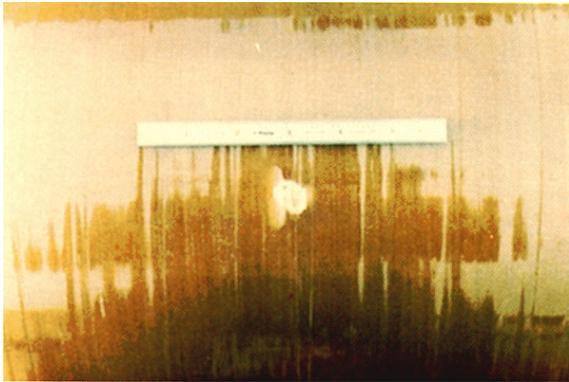


Level 3 cuts (condemned)

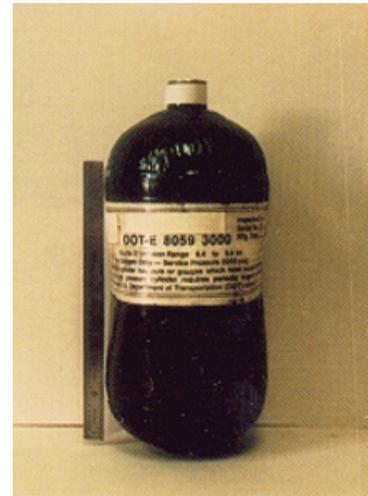


Level 3 cuts (condemned)

Figure 8-3. Cylinder Cuts*



Level 1 impact damage (acceptable)



Level 3 impact damage (condemned)

Figure 8-4. Cylinder Dents*



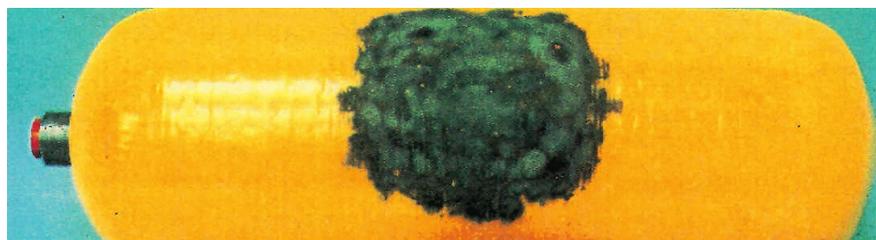
Figure 8-5. Cylinder Delamination*



Figure 8-6. Cylinder Structural Damage*



Level 3 fire damage (condemned)



Level 3 fire damage (condemned)

Figure 8-7. Cylinder Fire Damage*

- b. Cuts — Level 1: Cuts or scratches less than 0.005 inch deep are acceptable for PASP, RASP, and SCBA cylinders.

Level 2: Cuts or gouges with a maximum depth of 0.090 inch for PASP/RASP cylinders (0.020 inch for cylindrical section and 0.011 inch for dome section of SCBA cylinder) and with a maximum of 1 inch in length transverse to the fiber are repairable. Cuts should be epoxy-coated with a room-temperature-cure, using a two-component epoxy resin system. Loose fibers should be trimmed away before coating with resin. All repaired cylinders must be subjected to hydrostatic testing before being returned to service. No cut enlargement or lift/peeling of the overwrap is allowed after hydrostatic testing.

Level 3: Cylinders with cuts deeper than 0.090 inch (PASP/RASP) and 0.020 inch for cylindrical section and 0.011 inch for dome section (SCBA) are condemned. Cylinders with bare metal showing through a cut in the wrapping are also condemned.

- c. Dents — If the dent affects structural configuration, the cylinder will be condemned. Dents existing in localized areas of the fiberglass wrapping only are acceptable. If damage includes delamination or exposed fiber ends and is less than 0.005 inch (PASP/RASP/SCBA), the area must be repaired with an epoxy coating. If delamination or exposed fiber ends exceed a depth of 0.005 inch, the cylinder is to be returned to the proper maintenance authority for evaluation and repair.
- d. Delamination — Delaminations are acceptable only if repaired by coating all exposed fibers with epoxy. If the delaminated area shows evidence of broken fibers or flaw growth after hydrostatic testing, the cylinder must be condemned.
- e. Structural — Structural damage is severe damage, usually with visual evidence of a change in envelope configuration. A cylinder must be condemned for any evidence of bulges, cocked end fitting, or concave areas on the domes or on the cylinder section. If visual inspection of the interior indicates exterior damage causing deformation of the liner, the cylinder must be condemned.
- f. Fire Damage — Cylinder with signs of fire damage shall be condemned. Fire damage may be evident by charring or burning of the composite, labels, paint, or plastic components of the valve. If, however, the protective coating is only soiled from smoke or other debris and is found

by examination to be intact underneath, the cylinder shall not be considered affected.

8.3.5.4 Interior Inspection of Air Cylinders. Inspect cylinder for last hydrostatic test date. If three or more years have elapsed, perform visual and hydrostatic tests in accordance with MRC 5519 S-1R. The interior of SCBA cylinders shall be inspected by the authorized repair facility only. The interior of all PASP/RASP fiberglass/epoxy cylinders will be inspected as indicated below.

- a. Threads — Inspect threads for nicks, cuts, cracks, and damage.
- b. O-Ring Gland — Make sure O-ring gland is clean and free from damage.
- c. Interior — Inspect interior with a borescope.
 - (1) Moisture — If moisture appears in cylinders, a review of the charging filter system is required to prevent further damage.
 - (2) Pitting — Any pitting in new cylinders is cause for return to the appropriate maintenance authority. Random, minor shallow pitting is permissible in used cylinders; however, groups of shallow pits, a line of shallow pits, or deep pitting (shadow cast in bottom of pit) require that the cylinders be returned to the appropriate maintenance authority.
 - (3) Dents — Dents which are visible on the interior are cause for condemnation of the cylinder.
 - (4) Cracks — Cracks which are visible on the interior are cause for condemnation of the cylinder.
 - (5) Foreign material — If any foreign material is found in the cylinder, it must be identified and its source located before using cylinder.

8.3.5.5 Manufacturer's Label. The manufacturer's label is located on the sidewall near the end of the cylinder's valve outlet. The label contains the information below.

- a. Department of Transportation (DOT) exemption number followed by service pressure
- b. Numerical serial number followed by inspector's mark
- c. Manufacturer's identification
- d. Date of manufacture

If the label is missing, the cylinder shall be condemned. If the label is illegible, the manufacturer shall be asked for the information. Missing data shall be placed on a label and the label securely affixed to the cylinder and overcoated with epoxy.

Table 8-2. Summary of Inspection Criteria for Fiberglass/Epoxy Composite Cylinders

(PART A - LEVEL 1 DAMAGE)		
Levels of Damage	Inspection Criteria and Type of Damage	Maintenance Actions
Category 1 (Acceptable, no repairs required.)	1. Abrasions in this category must not exceed a depth of 0.005 inch (PASP/RASP/SCBA); if they do, refer to Category 2.	1. Depth less than 0.005 inch, repair IAW MRC Q-2R.
	2. Cuts in this category must not exceed a depth of 0.005 inch (PASP/RASP/SCBA); if they do, refer to Category 2.	2. Depth less than 0.005 inch, repair IAW MRC Q-2R.
	3. There must be no significant amount of loose or broken fibers; if there is, refer to Category 2.	3. No repairs allowed.
	4. There must be no metal visible through the fiberglass/epoxy wrapping; if there is, refer to Category 3.	4. No repairs allowed.
	5. All information on the DOT label must be legible; if not, refer to Category 2.	5. No repairs allowed.
	6. Hydrostatic test date must not have expired; if it has, refer to Category 2.	6. No repairs allowed.
(PART B - LEVEL 2 DAMAGE)		
Level of Damage	Inspection Criteria and Type of Damage	Maintenance Action
Category 2 (Rejectable, additional inspection or repairs required.)	1. Abrasions in this category must not exceed a depth of 0.045 inch (PASP/RASP) or 0.010 inch for cylindrical section and 0.0055 inch for dome section (SCBA), and a maximum of 1 inch in length transverse to the fiber; if they do, refer to Category 3.	Further evaluation and/or repairs required. (Send to authorized repair facility.)
	2. Cuts in this category must not exceed a depth of 0.090 inch (PASP/RASP) or 0.020 inch for cylindrical section and 0.011 inch for dome section (SCBA), and a maximum of 1 inch in length transverse to the fiber; if they do refer to Category 3.	
	3. There can be small, isolated patches of visible loose or broken fibers (see item 1 above).	
	4. All information on the DOT label not legible.	
	5. Expired hydrostatic test date.	
	6. All cylinders in Category 2 must pass a hydrostatic retest prior to returning to service.	

Table 8-2. Summary of Inspection Criteria for Fiberglass/Epoxy Composite Cylinders - Continued

(PART C - LEVEL 3 DAMAGE)		
Level of Damage	Inspection Criteria and Type of Damage	Maintenance Action
Category 3 (Condemned, not re- pairable.)	1. Cylinder abrasions exceeding a depth of 0.045 inch (PASP/RASP) or 0.010 inch for cylindrical section and 0.0055 inch for dome section (SCBA).	Not repairable. (Depressurize and drill hole in cylinder through DOT label.) Dispose of in accordance with applicable organization supply and ship/facility procedures.
	2. Cylinder cuts exceeding a depth of 0.090 inch (PASP/RASP) or 0.020 inch for cylindrical section and 0.011 inch for dome section (SCBA).	
	3. Metal visible through the wrapping.	
	4. Cylinders with severe structural damage affecting cylinder configuration.	
	5. Cylinders with signs of fire damage (evidence of charring or burning of composite, labels, paint, or plastic components of valve).	

8.4 CHECK-OUT PROCEDURES.

To check-out the SAR/SCBA equipment, follow the pre-operational procedures in Chapter 2, Operation.

8.5 STORAGE PROCEDURES.

The SAR/SCBA is a life-support system; therefore, careful storage of its components is required.

8.5.1 Storage Precautions. Short-term and long-term storage precautions are listed below.

- a. The equipment shall not be stored in an area that is hot, near a potential heat source, or near flammable materials. Components shall not be stored in temperatures higher than 150°F (65.6°C) or lower than 0°F (-17°C).
- b. Components shall not be stored in direct sunlight due to the deteriorating effects of sunlight on the hoses.
- c. Store in a clean, dry space to prevent dust from setting in the interior of the facepiece and being stirred up and breathed during the next use of the device.
- d. Components shall be clean and dry when stored. Ensure that there is no moisture inside the hoses prior to storage. The outside of all hoses should be free of residue, dirt, or grease.

- e. Hoses shall not be stored in a distorted position which may cause permanent damage. To store HP PASP hose, disconnect from cylinder and coil hose around brackets inside PASP control panel (Figure 8-8).

- f. Components shall not be stacked when stored. This will prevent damage caused by pressure, weight, or from falling.

8.5.2 Storage Procedures. General storage procedures are listed below.

- a. Wash system exterior with NID solution. Rinse with fresh water and dry thoroughly.
- b. Ensure hose interiors are dry.
- c. Check entire system for damage, cracks, etc.
- d. Accomplish applicable PMS actions.
- e. Cover QDs with protective dust caps.

Follow the instructions below when storing the SCBA.

- a. Open the hard-shell carry case and remove any dust or debris that may be in the case.
- b. Repack the sections of air-supply hose along the outer walls of the hard-shell carry case.
- c. Place the cylinder pack in the center of the case in the "pocket" formed by the air-supply hose.