CHAPTER 4

Dive Systems

4-1 INTRODUCTION

4-1.1 Purpose. The purpose of this chapter is to promulgate general policy for maintaining diving equipment and systems.

4-1.2 Scope. This chapter provides general guidance applicable to maintaining all diving equipment and diving systems. Detailed procedures for maintaining diving equipment and systems are found in applicable military and manufacturer's operating and maintenance (O&M) manuals and Planned Maintenance System (PMS) Maintenance Requirement Cards (MRC).

4-2 GENERAL INFORMATION

4-2.1 Document Precedence. If a conflict arises between the documents containing the maintenance procedures for diving equipment and systems, the following actions are required:

1. PMS/MRC takes precedence.

2. If PMS/MRC is inadequate or incorrect, the applicable military O&M manual takes precedence. Report inadequate or incorrect PMS via a PMS feedback report in accordance with current PMS instructions.

3. If PMS/MRC and applicable military O&M manual are inadequate or incorrect, the manufacturer's technical manual takes precedence. Report inadequate or incorrect military technical manual information in accordance with procedures in the affected technical manual.

Call NAVSEA or NAVFAC prior to disregarding any required maintenance procedures on certified diving equipment. Failure to do so may compromise certification.

4-2.2 Equipment Authorized For Navy Use (ANU). Diving equipment used to conduct diving operations shall be authorized for use by NAVSEA/00C Diving Equipment Authorized For Navy Use (ANU) list or hold a current NAVSEA or NAVFAC system safety certification certificate. Naval Sea Systems Command (Code 00C3B), Supervisor of Diving is the cognizant authority for the NAVSEA/00C ANU list. Surface supplied diving systems, hyperbaric chamber systems, and selected free swimming scuba underwater breathing apparatus shall be certified in accordance with *U.S. Navy Diving and Manned Hyperbaric System Safety Certification Manual* (SS521-AA-MAN-010).

The publication for Continuation of Certification Handbook For U.S. Navy Diving Systems, (SS521-AB-HBK-010) also provides information concerning maintaining system certification.

4-2.3 System Certification Authority (SCA). Naval Sea Systems Command Code 00C4 is SCA for all afloat and portable diving and hyperbaric systems. Naval Facilities Engineering Command Code 00CE is SCA for all shore-based diving and hyperbaric systems. Naval Sea Systems Command Code 92Q is SCA for submarine-employed Dry Deck Shelters and one atmosphere diving systems.

4-2.4 Planned Maintenance System. Diving equipment shall be maintained in accordance with the applicable PMS package. Failure to maintain equipment in accordance with current PMS guidance reduces the equipment reliability and may void the system safety certification for formally certified systems.

4-2.5 Alteration of Diving Equipment. Diving equipment shall not be modified or altered from approved configuration unless prior written approval has been granted by the applicable diving equipment technical program manager.

4-2.5.1 **Technical Program Managers for Shore-Based Systems.** Alterations for shore-based systems are managed by Naval Facilities Engineering Command (Code 00CE), who is the cognizant technical authority for the development and approval of alterations to shore-based systems.

4-2.5.2 **Technical Program Managers for Other Diving Apparatus.** The technical program managers for other diving apparatus are:

- EX 14 - NAVSEASYSCOM (PMS-395)
- MK 16 - NAVSEASYSCOM (PEO-MIW)
- MK 20 - NAVSEASYSCOM (SEA 00C)
- MK 21 - NAVSEASYSCOM (SEA 00C)
- MK 25 (LAR-V) - NAVSEASYSCOM (PMS 325)
- Dry Deck Shelter - NAVSEASYSCOM (PMS 395)

4-2.6 Operating and Emergency Procedures. Operating procedures (OPs) are detailed check sheets for operating the diving system and for performing various system-related tasks. All diving and recompression chamber systems shall be operated in accordance with a set of NAVSEA or NAVFAC approved operating procedures (OPs) and Emergency Operating Procedures (EPs) and requires the Commanding Officer's or OIC's signature on the cover page as final review.

4-2.6.1 **Standardized OP/EPs.** Standardized diving equipment such as the Light Weight MK 3 Surface Supplied Diving System, Transportable Recompression Chamber System (TRCS), and class-certified equipment such as the MK 16 and MK 25 Underwater Breathing Apparatus shall be operated per a single set of standardized OP/EPs that are included as part of the system O&M Manual.

Proposed changes/updates to OP/EPs for standardized diving equipment shall be submitted as a formal change proposal to the respective O&M Manual in accordance with directions contained therein.

4-2.6.2 **Non-standardized OP/EPs.** Diving and diving support equipment such as ships, small boats, and unique shore facility surface supplied diving and recompression chamber systems shall be operated in accordance with a single set of standard OP/EPs that are developed at the command level and approved for use after validation by NAVSEA Code 00C3 or NAVFAC Code 00CE. Proposed changes/updates to OPs/EPs for non-standardized diving equipment shall be submitted to the applicable approval authority. The following addresses are provided to assist in submitting proposed OP/EP changes and updates.

Submit proposed OP/EP changes and updates for afloat, portable diving and recompression chamber systems, and class-certified equipment to:

COMNAVSEASYSCOM (Code 00C3)
2531 Jefferson Davis Highway
Arlington, VA 22242-5160

Submit proposed OP/EP changes and updates for fixed, shore-based facilities to:

NAVFAC (Code 00CE)
Washington Navy Yard
901 M Street SE, Bldg. 212
Washington, DC 20374-5054

4-2.6.3 **OP/EP Approval Process.** Submission of OPs/EPs for approval (if required) must precede the requested on-site survey date by 90 calendar days to allow complete review and resolution of questions. Follow these procedures when submitting OPs/EPs for approval:

- The command shall validate in the forwarding letter that the OPs/EPs are complete and accurate.
- The command must verify that drawings are accurate. Accurate drawings are used as a guide for evaluating OPs/EPs. Fully verified system schematics/drawings with components, gas consoles, manifolds, and valves clearly labeled shall be forwarded with the OPs/EPs.
- Approved OPs/EPs shall have the revision date listed on each page and not have any changes without written NAVSEA/NAVFAC approval.
- The command shall retain system documentation pertaining to DLSS approval, i.e., PSOBs, supporting manufacturing documentation, and OPs/EPs.

4-2.6.4 **Format.** The format for OPs/EPs is as follows:

- System: (Name or description, consistent with drawings)
- Step, Component, Description, Procedure, Location, Check, Note (read in seven columns)

4-2.6.5 **Example.**

- System: High Pressure Air
- Step/Component/Description/Procedure/Location /Initials /Note

1. ALP-15/Reducer outlet/Open/Salvage Hold/Initials/Note
2. ALP-GA-7/Reducer outlet/Record Pressure/Salvage Hold/Initials/Note 1

The operator executing the procedure shall initial the Check column. Hazards and items of particular concern shall be identified in the Note column.

Once NAVSEA or NAVFAC has approved the system OP/EPs, they shall not be changed without specific written approval from NAVSEA or NAVFAC.

4-3 DIVER'S BREATHING GAS PURITY STANDARDS

4-3.1 Diver's Breathing Air. Diver's air compressed from ANU or certified diving system sources shall meet the U.S. Military Diver's Breathing Air Standards contained in Table 4-1.

Table 4-1. *U.S. Military Diver's Compressed Air Breathing Purity Requirements for ANU Approved or Certified Sources.*

Constituent	Specification
Oxygen (percent by volume)	20-22%
Carbon dioxide (by volume)	1,000 ppm (max)
Carbon monoxide (by volume)	20 ppm (max)
Total hydrocarbons (as CH_4 by volume)	25 ppm (max)
Odor and taste	Not objectionable
Oil, mist, particulates	5 mg/m3 (max)

Diver's breathing air may be procured from commercial sources if a source of military diver's air is not readily available. Diver's air procured from commercial sources shall be certified in writing by the vendor as meeting the purity standards of FED SPEC BB-A-1034 Grade A Source I (pressurized container) or Source II (compressor) air. Specifications for this standard are outlined in Table 4-2.

4-3.2 Diver's Breathing Oxygen. Oxygen used for breathing at 100-percent concentrations and for mixing of diver's breathing gases shall meet Military Specification

Table 4-2. *Diver's Compressed Air Breathing Requirements if from Commercial Source.*

Constituent	Specification Source I Source II
Oxygen (percent by volume)	20-22%
Carbon dioxide (by volume)	500 ppm (max)
Carbon monoxide (by volume)	10 ppm (max)
Total hydrocarbons [as Methane (CH_4) by volume]	25 ppm (max)
Odor	Not objectionable
Oil, mist, particulates	.005 mg/l (max)
Separated Water	None
Total Water	0.02 mg/1 (max)
Halogenated Compounds (by volume):	
Solvents	0.2 ppm (max)
Reference: FED SPEC BB-A-1034 B	

MIL-O-27210F, Oxygen, Aviators Breathing, Liquid and Gaseous. The purity standards are contained in Table 4-3.

4-3.3 Diver's Breathing Helium. Helium used for diver's breathing gas shall meet Military Specification, MIL-P-27407B Propellant Pressurizing Agent Helium, Type I Gaseous Grade B, Respirable Helium. The purity standards are contained in Table 4-4.

4-3.4 Diver's Breathing Nitrogen. Nitrogen used for divers breathing gas shall meet Federal Specification BB-N-411C Nitrogen, Technical. The purity standards are contained in Table 4-5.

4-4 DIVER'S AIR SAMPLING PROGRAM

NAVSEA Code 00C manages the diver's breathing air sampling program in accordance with OPNAVINST 3150.27 (series). The purpose of the air sampling program is to:

- Provide technical support for the operation and maintenance of diver's breathing air compressors and diving air storage systems.
- Provide general guidance concerning use of local commercial air sampling sources, including the evaluation of commercial air sampling capabilities and equipment.
- Perform program management for centrally funded air sampling services as directed by CNO Code N873D.

Table 4-3. *Diver's Compressed Oxygen Breathing Purity Requirements.*

Constituent	Specification
General Note: Gaseous and liquid oxygen shall contain not less than 99.5% by volume. The remainder, except for moisture and minor constituents specified below, shall be Argon and Nitrogen.	
Type I Gaseous	
Oxygen (percent by volume)	99.5%
Carbon dioxide (by volume)	10 ppm (max)
Methane (CH_4 by volume)	50 ppm (max)
Acetylene (C_2H_2)	0.1 ppm (max)
Ethylene (C_2H_4)	0.4 ppm (max)
Ethane (C_2H_6 and other hydrocarbons)	6.0 ppm (max)
Nitrous Oxide (N_2O by volume)	4.0 ppm (max)
Halogenated Compounds (by volume):	
Refrigerants	2.0 ppm (max)
Solvents	0.2 ppm (max)
Moisture (water vapor measured by ppm or measured by dew point)	7 ppm (max) >-83°F
Odor	Odor free
Type II Liquid	
Oxygen (percent by volume)	99.5%
Carbon dioxide (by volume)	5 ppm (max)
Methane (CH_4 by volume)	25 ppm (max)
Acetylene (C_2H_2)	0.05 ppm (max)
Ethylene (C_2H_4)	0.2 ppm (max)
Ethane (C_2H_6 and other hydrocarbons)	3.0 ppm (max)
Nitrous Oxide (N_2O by volume)	2.0 ppm (max)
Halogenated Compounds (by volume):	
Refrigerants	1.0 ppm (max)
Solvents	0.10 ppm (max)
Moisture (water vapor measured by ppm or measured by dew point)	7 ppm (max) >-83°F
Odor	Odor free
Reference: Military Specification MIL-O-27210F	

- Collaborate with other government agencies and commercial industry on gas purity standards and sampling procedures related to diver's breathing gases.

4-4.1 Maintenance Requirements. Taking periodic air samples is a required maintenance action and shall be performed in accordance with the PMS card(s) applicable to the compressor or system producing diver's breathing air. Each diver

Table 4-4. *Diver's Compressed Helium Breathing Purity Requirements.*

Constituent	Specification
Helium (percent by volume)	99.997%
Moisture (water vapor)	7 ppm (max)
Dew Point (not greater than)	-78°F
Hydrocarbons (as Methane)	1 ppm (max)
Oxygen	3 ppm (max)
Nitrogen + Argon	5 ppm (max)
Neon	23 ppm (max)
Hydrogen	1 ppm (max)
Reference: Military Specification MIL-PRF-27407B	

breathing-air source in service must be sampled approximately every 6 months (within the interval between 4 and 8 months following the last accomplishment), when contamination is suspected and after system overhaul.

Do not use a compressor that is suspected of producing contaminated air or that has failed an air sample analysis until the cause of the problem has been corrected and a satisfactory air sample analysis has been obtained validating the production of acceptable air.

Diving systems that do not have a high-pressure (HP) air compressor within the scope of certification shall only be charged with air produced by HP air compressors listed on the ANU list and must have all applicable PMS completed up to date, including air sample requirements. Examples of these types of systems include MK 3 LWDS, Roper Cart, and various diving boats. HP banks on these systems need not be sampled unless contamination is suspected.

Air drawn from submarine HP air storage banks for use as diver's breathing air shall be sampled in accordance with the PMS maintenance requirement card applicable to the system, i.e., dry deck shelter system, submarine escape trunk, scuba charging station. See paragraph 4-4.2 for additional information on system line-up for sampling compressors where a sampling connection cannot be made immediately downstream from the last air filtration device.

Table 4-1 shows the minimum purity requirements for diving air produced by ANU-approved and certified diving air compressors. Air sampling services may be procured locally from government or commercial air analysis facilities, or may be acquired by utilizing analysis services coordinated via Coastal Systems Station (CSS), Panama City, Florida.

NOTE **The most recent air sample analysis report shall be maintained on file for each air compressor (by compressor serial number) used to produce diver's breathing air.**

4-4.2 General Air Sampling Procedures. The following general information is provided to assist commands in managing air sample analysis programs.

Ensure all applicable PMS has been completed on the compressor and associated filtration system prior to taking an air sample.

Table 4-5. *Diver's Compressed Nitrogen Breathing Purity Requirements.*

Class I Oil Free, Type I Gaseous & Type II Liquid			
	Specification/Grade		
Constituent	**A**	**B**	**C**
Nitrogen	99.5%	99.5%	99.5%
Oxygen	0.05%	0.50%	0.50%
Moisture (water vapor)	.02 mg/l	.02 mg/l	*
Total Hydrocarbons	50 ppm	50 ppm	50 ppm
Odor	None	None	None

* Not a limiting characteristic

Note: Type I Nitrogen shall not contain any solid particles whose dimensions are greater than 50 microns. This shall be assumed to have been assured by the used of a 10 micron or better nominal filter at or close to the cylinder charging manifold.

Reference: Federal Specification BB-N-411C

- When sampling from HP charging systems, separate samples should be taken from each compressor supplying the system. Samples from the compressors should be taken as close to the compressor as possible but down stream of the last compressor-mounted air treatment device (moisture separator, filter, etc.). Some systems do not have fittings that allow samples to be taken from the system at a location other than the charging connection. In this case, the storage flasks should be isolated from the system, the system purged with air from the compressor to be sampled and the sample taken at the charging connection.

- When sampling from a low-pressure (LP) breathing-air system, separate air samples shall be taken from each LP compressor connected to the system. Samples shall be taken from each LP compressor as close to the compressor as possible, but downstream of the last compressor installed air treatment device (moisture separator, filter, etc.). Some systems do not have fittings that allow samples to be taken at connections other than the diver's manifold. In this case, a HP source should be isolated from the LP system, the system purged with air from the LP compressor to be sampled, and the sample obtained from the diver's manifold.

NOTE **Failure to purge the system line-up of air produced from other compressors or storage flasks will lead to an invalid air sample for the compressor being sampled.**

- Ensure that the compressor being sampled has reached full operating status (proper operating temperature, oil pressure, and air pressure) and is properly lined up to deliver air to the sample kit.

- Ensure that the compressor's intake is clear of any potential sources of contamination (including consideration of ambient smog levels in areas where smog is a problem).

- Follow the procedures on applicable air sample MRC card.

- Follow the instructions for operation of the air sampling kit.

4-4.3 CSS Air Sampling Services. The following applies to centrally funded air sampling services coordinated by CSS. Due to limited funding, commands are requested to schedule all compressors and associated samples to be taken at the same time. CSS coordinates air sampling services with a commercial contractor. Commands are not authorized to communicate directly with the commercial contractor. Sampling services are provided at no cost to the command. To request air sampling services, fill out and fax Air Sampling services request to COAST-SYSTA (Attn: Air Sampling). Telephone numbers are listed in Appendix 1C.

- The user must provide the sample expiration date, the number and type (HP or LP) of samples required, a complete mailing address, user point of contact and phone number. Air sample kits will not be shipped until the required information is received.

- Allow a minimum of 5 working days after submitting a properly filled out request form for delivery of a sampling kit in CONUS. Kits will be sent via commercial air with a prepaid return mailer. Incomplete sample requests cannot be acted on and will result in delay of shipping of sample kit.

- Allow a minimum of 3 weeks after submitting a properly filled out request form for delivery of a sampling kit if overseas. Kits will be sent via certified priority mail for overseas/FPO-APO addressees with prepaid return mailing. Incomplete sample requests cannot be acted on and will result in delay of shipping of sample kit.

- Detailed instructions are included with each sample kit. It is imperative to follow those instructions and the instructions on the applicable compressor air sampling MRC card.

- Air samples shall be taken and returned to COASTSYSTA within 5 working days of receipt of the air sample kit to preclude incurring late fees.

- Air sample analysis reports for samples that meet air purity standards will be mailed to the command. Commands will be notified by quickest means possible, normally via fax, of any samples that do not meet minimum purity requirements.

- The user will be contacted immediately by phone and/or message by COASTSYSTA if the sample fails to meet established purity standards. The user will discontinue use of the air source until cause of contamination is corrected. Corrective action must be taken prior to laboratory retest.

4-4.4 Local Air Sampling Services. Commands may use local government (e.g., shipyards, ship repair facilities, government research laboratories) or commercial laboratories to analyze diver's air samples. Commands are required to bear the cost of locally procured air sample services. Local sampling facilities must be able to analyze to U.S. Navy air purity standards.

4-5 DIVING COMPRESSORS

4-5.1 Equipment Requirements. Compressors used to supply diving air or transfer oxygen or mixed gases shall be listed in the NAVSEA/00C Authorized for Navy use (ANU) list or be an element of a certified diving system.

4-5.2 Air Filtration System. Military diving compressors shall be equipped with an air filtration system that is listed in the NAVSEA/00C Authorized for Navy use (ANU) list or be an element of a certified diving system. The term air filtration system as used here is inclusive, referring collectively to compressed gas system filters, moisture separators, air purification, air cooling, and dehydration equipment.

4-5.3 Lubrication. Compressors used to produce military diver's breathing air are normally of oil-lubricated, two-to-five-stage reciprocating type. Oil lubrication:

- Prevents wear between friction surfaces
- Seals close clearances
- Protects against corrosion
- Transfers heat away from heat-producing surfaces
- Transfers minute particles generated from normal system wear to the oil sump or oil filter if so equipped

A malfunctioning oil-lubricated compressor poses a contamination risk to the diver's air supply. Contamination may occur due to excess oil mist being passed out of the compressor due to excess clearances, broken parts, or overfilling the oil sump.

Gaseous hydrocarbons and carbon monoxide may also be produced should a compressor overheat to the point of causing combustion of the lubricating oil and/or gaskets and other soft goods found in the compressor. Compressor overheating may be caused by a number of events including, but not limited to: loss of cooling water or air flow, low lube oil level, malfunction of stage unloader or relief valves,

friction from broken or excessively worn parts, and/or compressor operation at an RPM above its rated capacity.

Diver's air filtration systems are designed to work with compressors operating under normal conditions, and cannot be relied on to filter or purify air from a malfunctioning compressor.

WARNING **Do not use a malfunctioning compressor to pump diver's breathing air or charge diver's air storage flasks as this may result in contamination of the diver's air supply.**

Lubricants used in diver's air compressors shall conform to MIL-L-17331 (2190 TEP) for normal operations, or MIL-H-17672 (2135TH) for cold weather operations. Where the compressor manufacturer specifically recommends the use of a synthetic base oil in their compressor for production of breathing air, that manufacturer recommended synthetic base oil may be used in lieu of MIL-L-17331 or MIL-H-17672 oil. Oil shall be changed out on compressors in strict accordance with the PMS requirements applicable to that compressor.

4-6 DIVING GAUGES

4-6.1 **Selecting Diving System Guages.** Select a gauge whose full scale reading approximates 130 percent to 160 percent of the maximum operating pressure of the system. Following this guideline, a gauge with a full scale reading of 4,000 or 5,000 psi would be satisfactory for installation in a system with a maximum operating pressure of 3,000 psi.

Selecting gauge accuracy and precision should be based on the type of system and how the gauge will be used. For example, a high level of precision is not required on air bank pressure gauges where only relative values are necessary to determine how much air is left in the bank or when to shut down the charging compressor. However, considerable accuracy (¼ of 1 percent of full scale for saturation diving operations and 1 percent of full scale for surface supplied operations) is required for gauges that read diver depth (pneumofathometers and chamber depth gauges). Depth gauge accuracy is critical to selecting the proper decompression or treatment table.

Many gauges are provided with a case blowout plug on the rear surface. The blowout plug protects the operator in the event of Bourdon tube failure, when case overpressurization could otherwise result in explosion of the gauge lens. The plug must not be obstructed by brackets or other hardware.

All diving system gauges should be provided with gauge isolation valves and calibration fittings. If a gauge fails during an operation, the isolation valve closes to prevent loss of system pressure.

4-6.2 **Calibrating and Maintaining Gauges .** All installed gauges and portable gauges (tank pressure gauges, submersible tank pressure gauges, and gauges in small portable test sets) in use must be calibrated or compared in accordance with the

Planned Maintenance System schedule unless a malfunction requires repair and calibration sooner. Programs such as the Shipboard Gauge Calibration Program as outlined in the NAVSEA Instruction 4734.1 (series) provide authority for a command to calibrate its own gauges. Calibrated gauges not in use should be kept in a clean, dry, vibration-free environment. The Meteorology Requirements List, NAVSEA OD-45845, should be consulted to determine storage times not considered part of the calibration interval.

Calibration and comparison data must include the date of the last satisfactory check, the date the next calibration is due, and the activity accomplishing the calibration. Labels attached to gauge lens are satisfactory for recording this data.

When oxygen systems are being cleaned, gauge lines should be removed and cleaned separately, after first cleaning the system with gauge lines attached. This will ensure that the gauge lines are thoroughly flushed. All gauges should be removed from the system prior to the cleaning process to avoid dead ends in the system and damage to the gauges from the cleaning solution.

Gauges are delicate instruments and can be damaged by vibration, shock, or impact. They should be mounted in locations that minimize these factors and should always be mounted to gauge boards, panels, or brackets. The piping connection should not be the sole support for the gauge. A gauge can be severely damaged by rapid pulsations of the system when the fluid pressure is being measured. When this condition exists, a gauge snubber should be installed between the isolation valve and the gauge to protect the instrument. Most gauges are not waterproof and are not designed for use in a marine environment. Enclosures of transparent acrylic plastic, such as lucite, can be used to protect the gauges from water and salt spray. However, the enclosure must have vent passages to allow the atmospheric pressure to act on the gauge sensing element.

4-6.3 Helical Bourdon Tube Gauges. Manufacturers make two basic types of helical Bourdon tube gauges for use on recompression chambers and for surface-supplied diving systems. One is a caisson gauge with two ports on the back. The reference port, which is capped, is sealed with ambient air pressure or is piped to the exterior of the pressure chamber. The sensing port is left open to interior pressure. The other gauge is the standard exterior gauge.

Both are direct-drive instruments employing a helical Bourdon tube as the sensing element. The gauges are accurate to ¼ of 1 percent of full scale pressure at all dial points. With no gears or linkages, the movement is unaffected by wear, and accuracy and initial calibration remains permanent.

A comparative check in lieu of recalibration should be made in accordance with the Planned Maintenance System. A dial adjustment screw on the front face of the gauge provides for zero-point adjustment and special set pressure. Dial readout units of measure can be in pounds per square inch (psi) and/or feet of seawater (fsw).

4-7 COMPRESSED GAS HANDLING AND STORAGE

Handling and storing compressed gas are inherent parts of virtually all diving activities, whether conducted with scuba or surface supplied diving equipment. It is imperative that divers be familiar with the safety aspects of handling compressed gas. Diver's compressed gas shall be stored in military standard (MIL-STD) or DOT approved cylinders or ASME flasks applicable to the type and pressure levels of the compressed gas being stored.

Compressed gas shall be transported in cylinders meeting Department of Transportation (DOT) regulations applicable to the compressed gas being handled. DOT approved cylinders bear a serial number, DOT inspection stamp, a pressure rating, the date of last hydrostatic test, are equipped with applicable cylinder valve, and are appropriately color coded.

Refer to the following references for more detailed information on compressed gas handling and storage:

- *Industrial Gases, Generating, Handling and Storage*, NAVSEA Technical Manual S9086-SX-STM-000/CH-550
- *American and Canadian Standard Compressed-Gas Cylinder Valve Outlet and Inlet Connections* (ANSI-B57.1 and CSA-B96).
- *American National Standard Method of Marking Portable Compressed-Gas Containers to Identify the Material Contained* (Z48.1)
- *Guide to the Preparation of Precautionary Labeling and Marking of Compressed Gas Cylinders* (CGA Pamphlet C-7).

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