

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/m ³ (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.

Diver's air procured from commercial sources may also be qualified for use by utilizing an ANU portable air monitor. Non-ANU or certified compressors or sources of air generated by non-ANU or certified compressors can be utilized for SCUBA or surface supplied diving except for cold water (i.e., at or below 37 degrees F), since the portable air monitor does not measure water vapor. Topside flasks, if used, must also be kept above 37 degrees F to prevent issues related to freezing.

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, acquired utilizing analysis services coordinated via Naval Surface Warfare Center, Panama City, Florida (NSWC-PC) or analyzed with an ANU approved portable air monitor.

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.

- 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.

- 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 of any samples that do not meet minimum purity requirements.
- The user will be contacted immediately by phone and/or message by NSW-PC 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.

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4-4.5 →
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

4-4.5 ANU Portable Air Monitor. Commands may use an ANU portable air monitor to analyze diver's air samples for ANU or certified compressors. The air sample results must be recorded in the air sample log in order to satisfy periodic sampling requirements. Divers may use an ANU portable air monitor to qualify any air source for divers' use. Non-ANU or certified compressors or sources of air generated by non-ANU or certified compressors can be utilized for SCUBA or surface supplied diving except for cold water (i.e., at or below 37 degrees F), since the portable air monitor does not measure water vapor. Water vapor is not an issue for ANU or certified compressors due to the inherent drying capabilities of the air compressor purification system. Topside flasks, if used, must also be kept above 37 degrees F to prevent issues related to freezing. All flasks filled with non-ANU or certified air compressors which have been qualified by an ANU portable air monitor should have an internal visual inspection at the end of the diving mission to ensure no water has condensed in the flask.