



Guidance Note No: AODC 014

Minimum Quantities of Gas Required Offshore

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The information contained herein is given for guidance only and endeavours to reflect best industry practice.
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The International Marine Contractors Association
Incorporating AODC and DPVOA

Carlisle House, 235 Vauxhall Bridge Road, London, SW1V 1EJ, UK
Tel: +44 (0) 20 7931 8171 Fax: +44 (0) 20 7931 8935 E-mail: imca@imca-int.com Website: www.imca-int.com

Minimum Quantities of Gas Required Offshore

Certain minimum quantities of gas or breathing mixture are necessary before diving operations commence. During diving operations, if gas supplies are not replenished, then the amount of remaining gas onboard will fall to a level at which diving operations must cease for safety reasons.

To attempt to formalise these minimum levels is difficult as they are heavily dependent on individual circumstances such as breathing mixtures used, decompression schedules used, depth of dive, work rate, etc., but this note provides guidance on the absolute minimum levels to be carried onboard.

1 SURFACE ORIENTATED (AIR) DIVING

- a) Sufficient compressed air must always be available for two emergency dives to the full intended diving depth as reserve. This air must either be stored in containers or else supplied by two totally independent dedicated sources .
- b) Sufficient compressed air must be available to pressurise both locks of the deck decompression chamber to the maximum possible treatment depth plus sufficient air for three complete surface decompression cycles. This air must either be stored in containers or else supplied by two totally independent dedicated sources.

NB:

Two totally independent sources could be two separate compressors, one of which is connected to the rig or vessel emergency electric power or separate power source (e.g. diesel) or one compressor plus compressed air storage containers.

Rig air should not normally be considered as a dedicated air supply for diving as it is principally provided for other purposes and may not be available to the quality, or in the quantity or at the pressures required.

- c) 90m³ (3200 cu ft) of breathing oxygen must be available for emergency treatment procedures.

2 MIXED GAS DIVING

2.1 General

- a) Helium and helium gas mixtures, due to the extremely small size of the helium atom, leak from storage cylinders even when precautions are taken to tighten fittings.

Due allowance must always be made, therefore, for leakage when calculating minimum quantities of gas required at the start of a diving operation.

- b) In either mixed gas, bounce, or saturation diving, there is always the possibility of the deck chamber atmosphere becoming fouled due to smoke or other contaminant. In such circumstances the chamber occupants should use the built-in breathing system (BIBS), dumping the exhaust overboard while the main chamber atmosphere is cleansed or flushed out. Sufficient gas should always be available to allow each diver 4 hours breathing on BIBS masks in addition to other gas reserves.
- c) The composition and use of therapeutic or treatment gases varies from company to company, dependent on their detailed operating procedures and treatment tables used. Sufficient quantities of treatment gas must be available to carry out any foreseeable treatments as detailed in the company's Rules for the depths-involved. This applies to both bounce and saturation diving.
- d) If the use of the Helicopter Rescue Chamber is to be included in any of the rescue, evacuation or other contingency plans for the diving operation then it must be remembered that gas to pressurise both the helicopter chamber and the portable chamber have to be supplied from the main diving gas storage onboard the vessel or installation. This quantity of gas must, therefore, always be available for emergency use.

2.2 Bounce Diving

Before commencing diving, certain quantities of gas and/or air should be available as follows:

- a) Sufficient mixed gas must be available for the divers in the water or bell to carry out their planned work plus additional gas to allow a complete dive to be made to the maximum depth as an emergency.
- b) Sufficient mixed gas and/or air must be available to pressurise the deck chamber to the transfer depth, twice. If atmospheric control in the chamber is to be achieved by flushing, then sufficient gas or air must be available for the necessary flushing for two complete decompressions from the intended transfer depth. Should it be intended to use air for the deck chamber then this air must be available from two independent sources (see para 1 NB) or else be stored in containers.
- c) Sufficient helium or mixed gas must be available to pressurise the deck chamber to maximum diving depth and then carry out a full saturation decompression in the event of emergency medical treatment being required. In this case sufficient oxygen must be available as identified in para 2.3(d).

2.3 Saturation Diving

Before commencing diving certain quantities of gas should be available as follows. If the gas supplies fall to a level such that the remaining gas only satisfies paragraphs b) to d), then decompression must be started.

- a) Sufficient mixed gas must always be available to carry out the intended bell run plus the same quantity of gas as a reserve. This gas will be in addition to the gas requirements in the following paragraphs. Gas carried onboard the bell in cylinders must not be included in these calculations.
- b) Before the start of a saturation there must be sufficient mixed gas available, to be able to pressurise all deck chambers required for the envisaged operation, to the maximum intended storage depth, plus at least an equal amount as a reserve. During the operation, the reserve of mixed gas, sufficient to completely repressurise the chambers must be maintained.

As well as providing a safety reserve against major leaks in the system this gas can also be used to pressurise any hyperbaric rescue chamber which may be fitted to the system.

- c) Sufficient gas to allow a full decompression from the storage depth to the surface twice allowing for the normal daily consumption of gas due to leakage, foodlock use, toilet flushing etc.
- d) Sufficient oxygen to allow for metabolic consumption by each diver plus that required to maintain PO_2 during decompression. This quantity to be doubled for safety reasons.

CONCLUSIONS:

This document provides guidance to supervisors and others as to when diving operations should not be commenced due to inadequate gas or air reserves or when decompression should be commenced in a saturation operation due to diminishing gas reserves.

The quantities referred to are absolute minima and normally much greater quantities will be maintained offshore.

Appendix

For assistance in calculating the minimum quantities required, as specified in this document, the following values may be of use. These are either proven figures or have been derived from reasonable assumptions based on many years of operating experience.

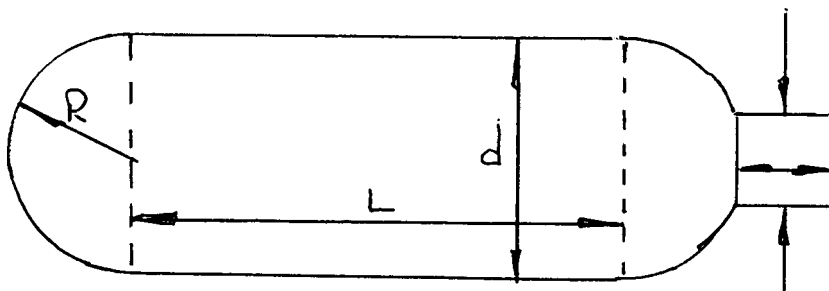
Divers Gas Consumption (In Water)

- ♦ On open circuit 20 to 60 litres (0.7 to 2.1 cu ft) per minute depending on the type of work. Mean value of 35 litres (1.24 cu f t) /minute can be assumed .
- ♦ On reclamation a mean value of 5 litres (0.18 cu ft)/minute can be assumed .

Oxygen Metabolic Consumption (In Chambers)

- ♦ 0.5 litres (0.018 cu ft)/minute/ diver
This equates to 0.7 m³ (25.4 cu f t) /day/diver (i.e. 720 litres/ day) .

Volume of Chambers:



$$\text{Volume of Chamber} = \pi L \left(\frac{d}{2}\right)^2 + \frac{4}{3} \pi R^3$$

NB: Add on the volume of any spoolpieces or foodlocks to give total volume.
Volume of spoolpiece is $\pi \times \text{length} \times \left(\frac{\text{diameter}}{2}\right)^2$