



The International Marine
Contractors Association

Guidance on **The Use of Inert Gases**

Guidance Note on the Use of Inert Gases

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INTRODUCTION

As a result of a number of incidents and accidents, the Diving Medical Advisory Committee published a Recommendation in January 1981 that a minimum of 2% oxygen be present in all "pure" helium supplied for use offshore in depths of 50 - 150 metres. This recommendation was endorsed by AODC and by the Department of Energy Diving Inspectorate (Diving Safety Memorandum No. 14/1982 dated 25th May, 1982.)

The intention behind the recommendation was that history had shown that any gas present offshore may accidentally be fed to a diver, with potentially fatal results, if the gas is pure and inert. If however helium with 2% oxygen is accidentally fed to a diver, it may cause unconsciousness but will not cause anoxia. At 50m the partial pressure of 2% oxygen is 120 mbar, which would cause unconsciousness in some individuals. At 150m the partial pressure of 2% oxygen is 320 mbar which would not.

AODC agreed with the principle of the recommendation and endorsed it as a positive step to improve safety.

It has become apparent that the reasons for the original recommendation are not fully understood and this Guidance Note seeks to clarify it. (It also applies to onshore hyperbaric facilities.)

This Guidance Note does not cover the choice of gas to be used for any particular dive as that is the responsibility of the diving contractor involved. It refers only to the need for a small amount of oxygen to be mixed with any inert gases, at the worksite, in order to minimise the effects if these gases are connected accidentally to a diver. (There are a number of exceptions however - See paragraphs 2) and 3) below.)

1 DIVING DEPTHS

- a) At depths shallower than 50m (where the breathing mixture may contain either helium or nitrogen), a minimum of 2% oxygen may be insufficient to provide the safety protection required and **a higher percentage may be needed.**
- b) At depths between 50m and 150m a minimum of 2% oxygen should be present in all helium supplied offshore.
- c) At depths deeper than 150m, **a lower percentage of oxygen could be considered** as 2% may result in too high a partial pressure.

2 CALIBRATION GASES

Small amounts of pure helium, nitrogen or other inert gases are sometimes required for calibration purposes and are normally supplied in single cylinders. The chance of accidental connection of gas from such cylinders to the diver is small, however special care must always be taken to ensure that it cannot happen.

3 GASES AND GAS MIXING FOR CHAMBER COMPRESSION AND RECOMPRESSION

When compressing divers in deck chambers, particularly if deepening a saturation storage depth, it may be necessary to use pure helium or nitrogen. Similarly, occasions may arise when large volumes of premixed gas (having a higher oxygen content) are required to be diluted with pure helium or nitrogen to lower the oxygen percentage. In such circumstances special operational procedures must be instituted such as in the example in Appendix II.

4 COLOUR CODING

The International requirements for the colour coding of gas cylinders should be applied. The body of cylinders containing helium with the minimum % of oxygen should be coloured brown, while the neck should be quartered brown and white (**i.e. the same as all other oxy helium gas mixes**) and cylinders containing nitrogen with the minimum % of oxygen should be colour coded grey, with the neck quartered black and white (**i.e. the same as compressed air or nitrox.**) All such cylinders should also be marked to show the % of the constituent gases.

5 GAS ANALYSING

On-line monitors can fail or give misleading readings and in some incidents have been ignored because the readings were not believed. Where an apparently peculiar reading is obtained from an analyser it should be checked immediately, however, the use of the correct gas in the first place is the main requirement for safety.

6 CONCLUSION

The use of a minimum quantity of oxygen in otherwise pure inert gases used for breathing purposes will not overcome all problems and only good operational procedures will avoid accidents. Such gases should be treated for "safety purposes" as pure helium or nitrogen, as it is just as important that gas containing minimum oxygen is not fed accidentally to a diver.

Permit to use Pure Inert Gas in a Diving Operation

NOTE: It must be stressed that this appendix is provided as an example and that it indicates the type of information which is required. Individual content and layout may vary from company to company.

1. SHORE/BASE

Company Worksite

Pure inert gas on a worksite represents a potential hazard as it could be, and too often has been, connected by mistake to the divers supply.

1.1 Requirement

Pure..... in quantity
is required on this worksite for the following reason(s).

.....
.....
.....

Project/Operations Manager - Name

Signature Date

1.2 * Authorisation

This request is **granted/refused, as the requirement **is/is not justified in the circumstances. Further comments

.....
.....

Safety Officer - Name

Signature Date

* *The company should have a policy according to which pure inert gases cannot be ordered/purchased without the specific authorisation of the Safety Officer.*

** *Delete where applicable*

1.3 Information/consultation

The senior diving supervisor - name
on this worksite has been informed by telex/radio/letter on
that inert gas will be provided. He has been reminded of the risks and has confirmed
his willingness to use the gas.

Project/Operations Manager - Name

Signature Date

Permit to use Pure Inert Gas in a Diving Operation

2. OFFSHORE/WORKSITE

Company Worksite

Pure inert gas on a worksite represents a potential hazard as it could be, and too often has been, connected by mistake to the divers supply.

2.1 Reception at the worksite

Pure..... in quantity

has been received, today's date time

onboard under my responsibility.

Senior Diving Supervisor - Name

Signature Date

2.2 Logging/checking/safe storage

This gas has been checked for the following :

colour coding

marking

content analysis

recording on worksite gas logs .

Life Support Supervisor - Name

Signature Date Time

The following precautions against improper use have been taken :

a) Gas secured in a lockable hold/chamber compartment. It is locked and the key is in my possession.

b) The gas has been used immediately.

c) Each bank has been fitted with a locking device denying access to valve and connecting point, locked and key in my possession.

d) Other (describe)

The above has been done under my personal supervision and to my satisfaction:

Dive Supt or L.S. Supv - Name

Signature Date Time

2.3 Safe Utilisation

I am satisfied that this inert gas has been connected/put on stream in a safe way and that there is no possibility of it being delivered to the divers by accident.

Senior Dive Supervisor - Name

Signature Date

2.4 Safe Disposal

This inert gas, having served its purpose, has now been made safe in the following way :

Has been returned to the situation described in 2.2 above.

Has been returned to an alternative safe status. Describe :

.....

Has been returned to shore.

The remnant inert gas left in the quad(s) has been vented to the open air.

and I am satisfied that no possibility of accident exists.

Senior Diving Supervisor - Name

Signature Date Time