

# Safety and health alert

## 60/99 Enriched air nitrox (EANX) compressor systems

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### Incident

Earlier this year an incident occurred within a diving establishment in South Australia that resulted in an explosion of a compressor coupled to a NITROX membrane. The compressor was in use filling a dive cylinder with a 36% oxygen mix and had reached approximately 20 bar at the time of the explosion. The filter assembly was ejected from the compressor into an adjoining room. The immediate area was subjected to extreme heat and there was some damage to the surrounding area. No one was injured, however the potential for severe and/or fatal injuries was high.

### Factors

Investigation revealed that the explosion originated at the base of the final filter assembly on the second stage compressor. While the exact cause of the explosion has not been established, it is suspected that there may have been a small quantity of oil present within the compressor since overhaul. This oil is believed to have collected within the filter assembly and mixed with the 36% oxygen, which led to the explosion.

Persons handling high pressure oxygen in the production of Nitrox or other gas mixes are at risk of being seriously injured by fire or explosion when unclean or unsuitable equipment or cylinders are used for this purpose.

High-pressure oxygen is extremely reactive and is not compatible with most materials. Many materials, which will not burn in air, will be vigorously consumed in pure oxygen once ignited.

Generally, systems used for air will not be acceptable for handling oxygen or mixture with greater than 23% of oxygen.

### What is Nitrox?

Nitrox is a compressed breathing gas mixture of the gases oxygen and nitrogen, in which, most commonly, the oxygen percentage is greater than atmosphere, typically around 30-50% in the mixture.

### Recommendations

1. Owner/operators of similar systems and those involved in decanting oxygen rich mixtures should be familiar with the potential hazards and have an expert understanding of the strict procedures necessary for their safe mixing and use.

Please be aware that the following factors may affect the safety of the process:

- Compressor types, the integrity of filtration and cleanliness of the compressed gas;
- Cleanliness of the components of the scuba system exposed to oxygen;



- The materials used in the manufacture of the equipment and components;
- Compatibility of lubricants used within the equipment when exposed to high pressure oxygen or high oxygen concentration mixes; and
- Incorrect assembly of breathing apparatus or filling system.

Should there be any doubt as to the suitability of any such systems, owners and/or operators should contact the manufacturer or supplier of the equipment for technical advice.

2. In addition the following are strongly recommended:
  - Filling and decanting systems should be installed, operated and maintained by competent persons in strict accordance with the manufacturer and/or supplier's recommendations and requirements.
  - Careful consideration should be given to the positioning of compressors and decanting systems. Where possible cylinders should be filled in an area remote from the public.
  - Where compressors are used consideration should be given to performing regular oil analysis.

## Further Information

Further information can be obtained from the WorkSafe internet site [www.worksafe.wa.gov.au](http://www.worksafe.wa.gov.au), or by contacting customer service on 1300 307 877 or email: [safety@docep.wa.gov.au](mailto:safety@docep.wa.gov.au).

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