15. Advanced Gas Blender

15.1 Introduction

This course enables the successful candidate to engage in the blending of oxygen and helium-based gases. The objective of this course is to train candidates in the proper procedures needed for the preparation and blending of high-quality nitrox and trimix gases for use in technical diving.

15.2 Qualifications of Graduates

Upon successful completion of this course candidates will be able to prepare high quality scuba gases.

15.3 Who May Teach

Any active TDI Advanced Gas Blending Instructor may teach this course.

15.4 Student to Instructor Ratio

Academic:

1. Unlimited, so long as adequate facility, supplies and time are provided to ensure comprehensive and complete training of subject matter.

Confined Water (swimming pool-like conditions):

1. N/A.

Open Water (ocean, lake, quarry, spring, river or estuary):

1. N/A.

15.5 Student Prerequisites

1. Minimum age 18.
2. Provide proof of certification as a TDI Nitrox Gas Blender or equivalent.

15.6 Course Structure and Duration

Open Water Execution:

1. N/A.

Course Structure:

1. TDI allows instructors to structure courses according to the number of students participating and their skill level.

Duration:

1. The minimum number of classroom and briefing hours is 6.

15.7 Administrative Requirements

Administrative Tasks

1. Collect the course fees from all the students.
2. Ensure that the students have the required equipment.
3. Communicate the schedule to the students.
4. Have the students complete the:
    a. *TDI Liability Release and Express Assumption of Risk* for non-SCUBA courses Form.
    b. *TDI Medical Statement* Form.

Upon successful completion of the course the instructor must

1. Issue the appropriate TDI certification by submitting the *TDI Diver Registration* Form to TDI Headquarters or registering the students online through member's area of the TDI website.

15.8 Training Material

Required Material:

1. *TDI Advanced Gas Blender* Manual.

15.9 Required Equipment

The following are required for this course:

1. Oxygen analyzer (instructor may provide).
2. Helium analyzer (instructor may provide).

15.10 Required Subject Areas

The TDI Advanced Gas Blender Manual is mandatory for use during this course, but instructors may use any additional text or materials that they feel help present these topics.

The following topics must be covered during this course:

1. The Responsibility of the Gas Blender.
2. Gases of Diving:
    a. Oxygen (O_2).
    b. Nitrogen.
    c. Helium.
    d. Other gases.
3. Oxygen (O_2) Handling:
    a. Oxygen (O_2) hazards.
    b. Causes and prevention of oxygen (O_2) fire.
    c. Oxygen system design.
    d. Local regulations for gas blending and handling.
    e. Oxygen compatible systems components.
4. Gas Production Equipment:
    a. Compressors.
    b. Cylinders.
    c. Filtration systems.
    d. Gauges.
5. Mixing Techniques:
    a. General considerations.
    b. Continuous blending systems.
    c. Membrane separation systems.
    d. Pre-mix systems.
    e. Partial pressure blending:
        i. Mathematics of partial pressure
        ii. Mixing by weight (optional).

6. Oxygen (O_2) Analysis:
    a. Procedures.
    b. Oxygen (O_2) analyzers.
7. Cylinder Handling and Sign Out.
8. Helium analyzer, recommended.

15.11 Required Skill Performance and Graduation Requirements

In order to complete this course, students must:

1. Candidates must successfully blend and analyze a minimum of 5 cylinders of nitrox and 3 cylinders of Trimix, all cylinders must be +/- 1 percent of target amount of oxygen and +/- 3 percent helium.
2. Candidate must satisfactorily complete a nitrox fill log to include MOD and oxygen percentage.
3. Satisfactorily completes the TDI Advanced Gas Blender Course written examination.
4. Demonstrate proficiency in blending and analysis of nitrox and trimix gases.