

# **TDI – Advanced Trimix Diver Course**

## **1.1 Introduction**

The TDI Advanced Trimix Course provides the training required to competently and safely utilize breathing gases containing helium for dives that require staged decompression, utilizing Nitrox and / or oxygen mixtures during decompression to a maximum depth of three hundred (300) fsw / ninety one (91) msw. The objective of this course is to train divers in the benefits, hazards and proper procedures of utilizing custom oxygen / helium / nitrogen mixtures as breathing gases.

## **1.2 Qualifications of Graduates**

Upon successful completion of this course, graduates may engage in technical diving activities utilizing custom Trimix mixtures without direct supervision so long as:

1. The diving activities approximate those of training.
2. The area of activities approximates those of training.
3. Environmental conditions approximate those of training.

## **1.3 Who May Teach**

Who may teach this course:

1. Any active TDI Advanced Trimix Instructor may teach this course

## **1.4 Student – Instructor Ratio**

Academic:

1. Unlimited, so long as adequate facility, supplies and time are provided to insure comprehensive and complete training.

Confined Water (Swimming pool-like conditions):

1. N/A.

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

1. A maximum of four (4) students per Instructor. However, it is the instructor's discretion to reduce this number as conditions dictate.

## **1.5 Student Pre-Requisites**

The student must:

1. Be a minimum age of eighteen (18).
2. Have a minimum certification as an Extended Range Diver or Entry Level Trimix Diver (or equivalent).
3. Show proof a minimum of one hundred (100) logged dives or equivalent at the discretion of the instructor.

## **1.6 Course Structure and Duration**

Open Water Execution:

1. Four (4) dives with a minimum accumulated bottom time of one hundred (100) minutes
2. At least two (2) dives should be deeper than one hundred eighty (180) fsw / forty (40) msw.

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 eight (8).

## **1.7 Administrative Requirements**

The following is the administrative tasks:

1. Collect the course fees from all the students.
2. Ensure that the students have the required equipment.
3. Communicate the training schedule to the students.
4. Have the students complete the Liability Release and Medical history forms.
5. The Instructor should review the Liability Release and Medical Forms before starting on the course.

Upon successful completion of the course the Instructor must:

1. Complete the Student Registration Form and send the Registration Form to TDI HQ.
2. Award card and certificate.

## **1.8 Required Equipment**

The following are required the equipment for this course:

1. TDI Trimix Manual.

The following equipment is required for each student:

1. Bottom Mix Cylinder(s)
  - A. Cylinder volume appropriate for planned dive and student gas consumption.
  - B. Dual outlet valve, double manifold or independent doubles.
  - C. Labeled in accordance with TDI Standards.
2. Travel Mix Cylinder(s)
  - A. Cylinder volume appropriate for planned dive and student gas consumption.
  - B. Labeled in accordance with TDI Standards.
3. Decompression Mix Cylinder(s)
  - A. Cylinder volume appropriate for planned dive and student gas consumption.
  - B. Labeled in accordance with TDI Standards.
4. Suit Inflation Cylinder (required for dry suit divers only).
5. Regulators
  - A. Primary and primary redundant required on all bottom mix cylinder(s).
  - B. Submersible pressure gauges are required on all primary bottom mix cylinders.
  - C. A contingency use long hose second stage should be designated and appropriately rigged to facilitate air sharing at depth if necessary.
  - D. It is strongly recommended that all four (4) required regulators be DIN or all four (4) regulators be yoke.
6. Buoyancy Compensator(s) adequate for equipment configuration.
7. Redundant Depth and Timing Devices. Air decompression computers allowed for use as depth and timing devices.
8. Redundant Light System if required by site.
9. Ascent Reel with Lift Bag/Surface Marker Buoy
  - A. Adequate for maximum planned depth.
  - B. Minimum of twenty five (25) kg/ fifty (50) lb. lift bag (a dump valve highly recommended).
10. Exposure suit adequate for the open water environment.
11. Line Cutting Device.
12. Underwater Slate (for decompression / contingency tables).

## 1.9 **Required Subject Areas**

The TDI Trimix 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. Physics
  - A. Pressure review.
2. Physiology
  - A. Hypoxia.
  - B. Oxygen toxicity
    - I. Whole Body (OTUs).
    - II. Central Nervous System (CNS).
  - C. Nitrogen Narcosis.
  - D. Nitrogen and Helium absorption and elimination.
  - E. Carbon Dioxide Toxicity.
  - F. Carbon Monoxide Toxicity.
  - G. Helium
    - I. HPNS.
    - II. Effects on respiration.
    - III. Effects as an insulator.
  - H. Counter Diffusion.
  - I. Hyperthermia.
  - J. Hypothermia.
3. Decompression Options
  - A. Air.
  - B. Nitrox.
  - C. Helium.
4. Equipment Considerations
  - A. Cylinder options.
  - B. Stage cylinders options.
  - C. Suit inflation options.
  - D. Regulator options.
  - E. Harness / BC options.
  - F. Computer / depth gauge bottom timer options.
  - G. Ascent and navigation reels.
  - H. Lift bags/surface marker buoys.
  - I. Lights.
  - J. Redundant mask and knife.
  - K. Jon-line.
5. Dive Tables
  - A. Computer generated tables.
  - B. DCIEM Heliox Tables and / or other published tables.
6. Dive Planning
  - A. Operational Planning
    - I. Support.
    - II. Teams.
  - B. Team Planning
    - I. Gas requirements.
    - II. Oxygen limitations.
    - III. Inert gas limitations.
  - C. Emergency Planning
    - I. Omitted decompression.
    - II. Oxygen toxicity.
    - III. Analysis and logging.

- IV. General.
- 7. Procedures
  - A. Bottom, Travel and Decompression Gas
    - I. Normal operations.
    - II. Failure, loss or inadequate emergency procedures.
    - III. Analysis and logging.

## **1.10 Required Skill Performance And Graduation Requirements**

The following open water skills must be completed by the student during open-water dives. It is recommended that all dives be conducted between one hundred eighty (180) fsw / fifty five (55) msw and three hundred (300) fsw / ninety one (91) msw.

1. Properly analyze all gas mixtures to be used.
2. Demonstrate adequate pre-dive planning
  - A. Limits based on personal and team gas consumption.
  - B. Limits based on oxygen exposures at planned depths for actual mixes.
  - C. Limits based on inert gas absorption at planned depths with actual mixes.
3. Properly execute the planned dive within all pre-determined limits.
4. Demonstrate the proper navigational techniques for the specific dive.
5. On two (2) of the dives, demonstrate an ascent with ascent reel and lift bag. Perform staged decompression.
6. Demonstrate the proper procedures for switching and isolating a malfunctioning primary regulator. (This exercise should not be practiced deeper than one hundred thirty (130) fsw / forty (40) msw)

In order to complete this course, students must:

1. A. Satisfactorily complete the TDI Trimix Course written examination
2. B. Complete all open water requirements safely and efficiently
3. C. Demonstrate mature, sound judgment concerning dive planning and execution