

TDI ADVANCED TRIMIX DIVER COURSE

I. 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 300 fsw /91 msw.

II. COURSE OBJECTIVES

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.

III. 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 approximate those of training
3. Environmental conditions approximate those of training

IV. WHO MAY TEACH

Any active TDI Advanced Trimix Instructor may teach this course.

V. STUDENT INSTRUCTOR RATIO

- A. Classroom
Unlimited, so long as adequate facility, supplies and additional time are provided to insure comprehensive and complete training.
- B. Openwater
A maximum of four students per active TDI Instructor are allowed. The ratio should be reduced as required due to environmental or operational constraints.

VI. STUDENT PRE-REQUISITES

- A. Minimum age of 18
- B. Minimum certification as an Extended Range Diver or Entry Level Trimix Diver (or equivalent)
- C. Minimum of 100 logged dives or equivalent at the discretion of the instructor

VII. REQUIRED COURSE MINIMUMS

- A. Classroom / Briefing Hours .8
- B. Open water Dives
 1. 4 with a minimum accumulated bottom time of 100 minutes, with at least two dives deeper than 180 fsw /40 msw
 2. Two dives may be credited from the Extended Range course or

equivalent at the discretion of the Instructor.

VIII. REQUIRED EQUIPMENT

The following equipment is required for each student

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

IX. REQUIRED SUBJECT AREAS

The following topics must be covered during this course. 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.

- A. Physics
 - Pressure review
- B. Physiology
 - 1. Hypoxia
 - 2. Oxygen toxicity
 - a. Whole Body (OTUs)
 - b. Central Nervous System (CNS)
 - 3. Nitrogen Narcosis
 - 4. Nitrogen and Helium absorption and elimination

5. Carbon Dioxide Toxicity
6. Carbon Monoxide Toxicity
7. Helium
 - a. HPNS
 - b. Effects on respiration
 - c. Effects as an insulator
8. Counter Diffusion
9. Hyperthermia
10. Hypothermia
- C. Decompression Options
 1. Air
 2. Nitrox
 3. Helium
- D. Equipment Considerations
 1. Cylinder options
 2. Stage cylinders options
 3. Suit inflation options
 4. Regulator options
 5. Harness / BC options
 6. Computer / depth gauge bottom timer options
 7. Ascent and navigation reels
 8. Lift bags/surface marker buoys
 9. Lights
 10. Redundant mask and knife
 11. Jon-line
- E. Dive Tables
 1. Computer generated tables
 2. DCIEM Heliox Tables and / or other published tables
- F. Dive Planning
 1. Operational Planning
 - a. Support
 - b. Teams
 2. Team Planning
 - a. Gas requirements
 - b. Oxygen limitations
 - c. Inert gas limitations
 3. Emergency Planning
 - a. Omitted decompression
 - b. Oxygen toxicity
 - c. Analysis and logging
 - d. General
- G. Procedures
 - Bottom, Travel and Decompression Gas
 - a. Normal operations
 - b. Failure, loss or inadequate emergency procedures
 - c. Analysis and logging

X. REQUIRED OPEN WATER SKILLS

The following open water skills must be completed by the student during open-water dives. It is recommended that all dives be conducted between 180 fsw /55 msw and 300 fsw /91 msw.

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

XI. GRADUATION REQUIREMENTS

In order to complete this course, students must:

- A. Satisfactorily complete the TDI Trimix Course written examination
- B. Complete all openwater requirements safely and efficiently
- C. Demonstrate mature, sound judgment concerning dive planning and execution

XII. SUPPORT MATERIALS

- A. TDI Student Record Folder
- B. TDI Trimix Manual