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## **18. TDI –Basic Closed Circuit Rebreather Instructor Course - Unit Specific**

### **18.1 Introduction**

This is the Instructor level certification course for Instructors wishing to teach the Unit Specific Closed Circuit Rebreather course. The objective of this course is to train Instructors to teach recreational Rebreather diving, and to develop basic Rebreather diving skills appropriate to diving within the normal recreational depth limits for minimum decompression diving to 40 metres (130 fsw) using oxygen and an air diluent.

### **18.2 Qualifications of Graduates**

Upon successful completion of this course, graduates may teach the TDI Closed Circuit rebreather course not to exceed the manufacturers designed depth maximum of 40 metres (130 fsw) with air diluent. This course is manufacturer specific.

### **18.3 Who May Teach**

Who may teach this course:

1. Any active TDI CCR Rebreather Instructor Trainer with a unit specific qualification may teach this course.

### **18.4 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. A maximum of two (2) students per Instructor. However, it is the instructor's discretion to reduce this number as conditions dictate

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

1. A maximum of two (2) students per Instructor. However, it is the instructor's discretion to reduce this number as conditions dictate.



## **18.5 Student Pre-Requisites**

The student must:

1. Be a minimum age of twenty one (21).
2. Show proof of minimum certification of TDI unit specific Rebreather Diver.
3. Show proof of minimum certification of TDI Advanced Nitrox Instructor (or equivalent).
4. Show proof of 250 verified logged dives with 100 being on nitrox.
5. Show proof of minimum of one hundred (100) unit specific Closed Circuit Rebreather logged dives to a minimum of 100 hours duration.
6. Assist on at least one complete unit specific user course to the satisfaction of the course leader (I.T.).

## **18.6 Course Structure and Duration**

Open Water Execution:

1. Four (4) dives.

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 six (6).

## **18.7 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 must 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.

## **18.8 Training Material**

Required material

1. Closed Circuit Rebreather Instructor Guide.



2. Closed Circuit Rebreather Diver Manual.
3. TDI Standards and Procedures Instructor Manual.

Optional Material

1. TDI Rebreather PowerPoint Presentation Series.
2. TDI Rebreather Workslate
3. TDI Scenario Slates (14)
4. Richard Pyle - A Learners Guide to Closed Circuit Rebreather Operations.
5. Kenneth Donald - Oxygen & The Diver.
6. John Lamb – Oxygen Measurement for Divers.
7. Barsky, Thurlow & Ward - The Simple Guide to Rebreather Diving.
8. Bob Cole – Rebreather Diving.
9. Jeffrey Bozanic – Mastering Rebreathers.

## **18.9 Required Equipment**

The following equipment is required for each student:

1. Closed circuit Rebreather. The student must own or have access to their own C.C.R unit specific.
2. Depth gauge and automatic bottom timer and / or dive computer.
3. Mask, fins.
4. Exposure suit suitable for the diving environment.
5. Knife.
6. Slate and pencil.
7. Bailout bottle with a minimum capacity of three (3) litres/ twenty one (21) cubic feet
8. ascent reel with lift bag / surface marker buoy
  - A. appropriate for maximum planned depth
  - B. minimum of twelve (12) kg / twenty five (25) lbs

## **18.10 Required Subject Areas**

Instructor Trainers must use the TDI Closed Circuit Rebreather Student manual, Instructor Guide, manufactures manual and the current TDI Standards and Procedures Instructor Manual, but may also use any additional text or materials that they feel help present these topics. The following topics must be covered during this course:

1. History and evolution of Rebreathers.
2. Comparison of Open Circuit, Closed Circuit and Semi Closed Circuit Rebreather systems and the benefits/problems with each.
3. Practical Mechanics of the System.
  - A. Assembly and disassembly of the unit specific C.C.R.
  - B. Layout and design of the unit.
  - C. Absorbent canister design and maintenance.
  - D. Breathing loop de-contamination procedures.
  - E. Manufacturer supported additional fittings (Automatic Diluent Valve or ADV)
  - F. Keying valve to individuals metabolic rate (if unit is equipped with this valve)
    - I. Valve maintenance
  - G. DSV (mouthpiece) use, design and limitations.



4. Gas Physiology.
  - A. Oxygen toxicity.
  - B. Nitrogen absorption.
  - C. CO<sub>2</sub> toxicity.
  - D. Gas consumption.
5. Electronic Systems Design and Maintenance.
  - A. O<sub>2</sub> metabolizing calculations.
  - B. Equivalent Air Depth theory revision.
  - C. Fuel Cells.
  - D. System electronics functionality and calibration procedures.
  - E. Battery condition / testing.
6. Dive Tables.
  - A. Equivalent Air Depth operation.
  - B. Constant PPO<sub>2</sub> theory.
  - C. CNS and awareness of OTU tracking.
7. Dive Computers.
  - A. Mix adjustable.
  - B. Constant PO<sub>2</sub>.
  - C. O<sub>2</sub> integrated.
8. Dive Planning.
  - A. Operational Planning.
  - B. Gas requirements including open circuit bailout scenarios / limitations.
  - C. Oxygen limitations.
  - D. Nitrogen limitations.
  - F. Off board open circuit bailout.
9. Emergency Procedures.
  - A. Use of B.A.D.D.A.S.S.
  - B. Three H's problems.
  - C. Flooded Loop.
  - D. Cell Warnings
  - E. Battery warnings / failure

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

The following skills must be completed by the Instructor candidate. The maximum training depth shall not exceed the manufacturers design limit.

1. Demonstrate properly analysis of all gas mixtures to be used.
2. Demonstrate a complete systems check and Rebreather configuration.
3. Demonstrate appropriate pre-dive planning.
  - A. Limits based on personal gas consumption.
  - B. Limits based on oxygen consumption and exposures at planned depth.
  - C. Limits based on nitrogen absorption at planned depth.
4. Properly execute the planned dive within all pre-determined limits.
5. Demonstrate the proper procedures for
  - A. Buoyancy control.
  - B. ADV use



- C. Bail-out.
  - D. Mouthpiece removal.
  - E. Ascent techniques.
  - F. Safety stops.
  - G. Buddy checks.
  - H. Simulated emergency.
6. Properly execute the break down and maintenance of Rebreather

In order to complete this course, students must:

1. Satisfactorily complete (90% pass) the TDI Closed Circuit Rebreather Course written examination **without reference** and be able to adequately explain each answer to a prospective student.
2. Demonstrate mature, sound judgment concerning training, dive planning and execution.
3. Complete all open water requirements safely and efficiently.
4. Demonstrate proficiency in teaching the TDI Closed Circuit Rebreather Diver Program.
5. Undertake one (1) graded presentation on a Closed Circuit Rebreather topic.