25. Air Diluent Closed Circuit Rebreather Instructor - Unit Specific

25.1 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 no decompression diving to 30 metres / 100 feet using oxygen (O_2) and an air diluent.

25.2 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 30 metres / 100 feet with air diluent. This course is manufacturer specific.

25.3 Who May Teach

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

25.4 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. A maximum of 2 students per instructor trainer; it is the instructor trainer's discretion to reduce this number as conditions dictate

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

1. A maximum of 2 students per instructor trainer; it is the instructor trainer's discretion to reduce this number as conditions dictate

25.5 Student Prerequisites

1. Minimum age 21
2. Certified TDI unit specific Rebreather Diver, or equivalent
3. Certified TDI Advanced Nitrox Instructor, or equivalent
4. Provide proof of 250 verified logged dives with 100 being on nitrox
5. Provide proof of a minimum of 100 logged dives and a minimum of 100 hours on the specific unit
6. Be a certified rebreather diver (not unit specific) for a minimum of 12 months.
7. Assist on at least one complete unit specific user course to the satisfaction of the instructor trainer
8. If the rebreather is a TDI approved sidemount rebreather, the student must hold the TDI Sidemount Instructor certification or equivalent.

25.6 Course Structure and Duration

Open Water Execution

1. Four dives

Course Structure

1. TDI allows instructor trainers 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

25.7 Administrative Requirements

The following are the administrative tasks:

1. Collect the course fees from all the instructor candidates
2. Ensure that the instructor candidates have the required equipment
3. Communicate the training schedule to the instructor candidates
4. Have the instructor candidates:
    a. Complete the *TDI Liability Release and Express Assumption of Risk form*
    b. Submit the *TDI Medical Statement* form signed by a licensed physician

Upon successful completion of the course the instructor trainer must:

1. Issue the appropriate TDI certification by submitting the appropriate *TDI Dive Leader Registration* form to TDI Headquarters

25.8 Training Material

Required material

1. *TDI Diving Rebreathers* Student Manual or eLearning course
2. *TDI Diving Rebreathers* Instructor Guide
3. *TDI Standards and Procedures* Manual

Optional Material

1. *TDI Diving Rebreather* PowerPoint Presentation
2. TDI Rebreather Work Slate
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*

25.9 Required Equipment

The following equipment is required for each student:

1. Closed circuit rebreather; the student must own or have access to their own CCR 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 cylinder with a minimum capacity of 3 litres / 18 cubic feet
8. Ascent reel with lift bag / surface marker buoy, appropriate for maximum planned depth, minimum of 12 kg 25 lbs

25.10 Required Subject Areas

Instructor trainers must use the *TDI Diving Rebreathers* Student Manual, instructor guide, manufacturer's manual and the current *TDI Standards and Procedures* 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 CCR
    b. Layout and design of the unit
    c. Absorbent canister design and maintenance
    d. Breathing loop decontamination procedures
    e. Manufacturer supported additional fittings, automatic diluent valve (ADV)
    f. Keying valve to individuals metabolic rate, if unit is equipped with this valve
    g. Valve maintenance
    h. DSV (mouthpiece) use, design and limitations
4. Gas Physiology
    a. Oxygen (O_2) toxicity
    b. Nitrogen absorption
    c. Carbon dioxide (CO_2) toxicity
    d. Gas consumption
5. Electronic Systems Design and Maintenance
    a. Oxygen (O_2) metabolizing calculations
    b. Equivalent air depth (EAD) 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 partial pressure of oxygen (PPO_2) theory
    c. Central nervous system (CNS) and awareness of oxygen tracking units (OTU)
7. Dive Computers
    a. Mix adjustable
    b. Constant percentage of oxygen (PO_2)
    c. Oxygen (O_2) integrated

8. Dive Planning
    a. Operational planning
    b. Gas requirements including open circuit bailout scenarios / limitations
    c. Oxygen limitations
    d. Nitrogen limitations
    e. 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

25.11 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 proper analysis of all gas mixtures to be used
2. Demonstrate a complete systems check and rebreather configuration
3. Demonstrate appropriate pre-dive planning limits based on:
    a. Personal gas consumption
    b. Oxygen consumption and exposures at planned depth
    c. 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

7. Post dive clean of unit
    a. Mouth piece and hoses
    b. Clean and disinfect unit
    c. Inspect components of unit
8. Diver maintenance of unit
    a. Cell remove and replace
    b. Mouthpiece strip and rebuild
    c. Replacing batteries

In order to complete this course, students must:

1. Satisfactorily complete the TDI Diving Rebreathers course written examination with a minimum score of 80 percent, 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 Diving Rebreathers Diver Program
5. Present a minimum of 1 graded presentation on a closed circuit rebreather topic