

## **36. Rebreather Intro to Cave**

### **36.1 *Introduction***

This course is an introduction to the basic principles of rebreather cave diving utilizing a single primary guideline. The TDI Rebreather Intro to Cave is the second level in the development of safe techniques for rebreather cave diving, directly building upon the TDI Rebreather Cavern Diver course. This introduction to cave diving is not intended to train divers for all facets of rebreather cave diving. The objective of this course is the perfection of skills taught in the TDI Rebreather Cavern Diver program, in addition to the adoption of additional techniques and procedures required for elementary rebreather cave dives.

### **36.2 *Qualifications of Graduates***

Upon successful completion of this course, graduates may engage in single guideline rebreather cave diving activities without direct supervision provided the graduates adhere to the following limits:

1. Diver carries adequate bailout to safely exit from the furthest point of penetration using a minimum SAC rate of 30 litres per minute/1 cubic foot per minute OR the student's calculated elevated SAC rate to account for a CO<sub>2</sub> event, whichever is greater.
2. 40 Metres/130 Feet maximum depth.
3. No decompression diving.
4. Maintain a continuous guideline (no jumps, no gaps).
5. Proper cave diving equipment is used in conjunction with a TDI approved rebreather.

Upon successful completion of this course, graduates are qualified to enroll in:

1. TDI Rebreather Full Cave course.

### **36.3 *Who May Teach***

Any active TDI Rebreather Full Cave Diver Instructor.

The instructor must be qualified as an instructor on the TDI approved rebreather they are diving, and as an Air Diluent Diver (or equivalent) on the TDI approved rebreather the student is diving.

### **36.4    *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.

#### **Open Water:**

1. A maximum of 3 students per active TDI Instructor are allowed.
2. The ratio should be reduced as required due to environmental or operational constraints.

#### **Cave Dives:**

1. A maximum of 3 students per active TDI Instructor are allowed.
2. The ratio should be reduced as required due to environmental or operational constraints.

### **36.5    *Student Prerequisites***

1. Minimum age 18.
2. Minimum certification requirement; TDI CCR Air Diluent Diver or equivalent.
3. Provide proof of certification as a:
  - a. TDI Rebreather Cavern Diver or equivalent.

**OR**

  - b. TDI Introductory Cave Diver or equivalent.
4. Provide proof of a minimum of 50 logged dives and 30 hours on the rebreather unit used.

### **36.6    *Course Structure and Duration***

#### **Water Execution:**

1. One open water evaluation dive must be conducted if students are new to the instructor, or a period of 6 months has passed since their last cavern dive.
2. A minimum of 4 single guideline cave dives with a total bottom time of 160 minutes conducted at 2 different sites.

3. Only 2 dives from the TDI Introductory Rebreather Cave Diver course may be credited towards the total dives required for TDI CCR Air Diluent Decompression Procedures course.

**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 4.
2. The course must be taught over a minimum of 2 days.

### **36.7 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 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.

### **36.8 Training Material**

**Required Material:**

1. *TDI Diving in Overhead Environments* Manual or eLearning.
2. *TDI Diving in Overhead Environments* Instructor Guide.
3. *TDI Diving in Overhead Environments* Instructor Resource CD (Optional).
4. *TDI Diving Rebreathers* Student Manual or eLearning.
5. *TDI Diving Rebreathers* PowerPoint Presentation (optional).
6. CCR Manufacturer's manual and updates.

7. Manufacturer's Build Checklist.
8. *TDI CCR Preflight* Checklist.

**Optional Material:**

1. NACD Art of Safe Cave Diving.
2. Basic Cave Diving – A Blueprint for Survival.
3. CDAA - Cavern/Sinkhole Manual.
4. NSS-CDS Cave Diving Manual.
5. The Darkness Beckons – Martyn Farr.
6. Cavern Measureless to Man.

### **36.9 Required Equipment**

**The following equipment is required for each student:**

1. A complete TDI approved Rebreather.
2. Minimum of 1 rebreather enabled computer or PO<sub>2</sub> monitoring device.
3. Off board bailout cylinder(s) – volume appropriate for planned dive.
4. Bailout regulator(s) equipped with pressure gauge and low pressure off board (quick connect) gas supply hose.
5. Buoyancy compensator device (BCD) with power inflator.
6. Exposure suit adequate for diving environment.
7. Access to an oxygen analyzer (instructor may supply).
8. Mask and fins.
9. Minimum of 2 cutting devices.
10. Slate and pencil.
11. Three battery powered lights; 1 primary and 2 back-ups, each with a with burn time suitable for the planned dive time.
12. Safety reel with a minimum of 37 Metres/125 Feet of guideline.
13. One primary cave-diving reel with length appropriate for intended dive.
14. Computer, watch or bottom timer and depth gauge.
15. Slate or wet notes with a pencil.
16. Submersible dive tables or backup dive computer.

17. Three directional line arrows.

**Instructor must use full cave diving equipment during all water exercises.**

### ***36.10 Required Subject Areas***

**The following topics must be covered during this course:**

1. Policy for Cave Diving.
2. Psychological Considerations.
3. Equipment Considerations:
  - a. Bailout cylinder options:
    - i. Single bailout cylinder vs redundant.
    - ii. Long hose vs short hose on bailout.
  - b. Rebreather configuration options.
  - c. Scrubber options.
  - d. Buoyancy compensator device (BCD)/harness options.
  - e. Reel options.
  - f. Proper weighting.
  - g. Equipment configurations.
4. Communication:
  - a. Hand signals.
  - b. Light signals.
  - c. Touch contact signals.
5. Swimming Techniques:
  - a. Body posture/ trim.
  - b. Buoyancy control and rebreather weighting.
  - c. Line following.
  - d. Propulsion techniques.
6. Physiology:
  - a. Breathing techniques.
  - b. Stress management.
7. Cave Environment:

- a. Geology:
    - i. Bottom.
    - ii. Ceiling.
  - b. Local access requirements.
  - c. Landowner relations.
- 8. Conservation
  - 9. Problem Solving:
    - a. Emergency procedures.
    - b. Equipment failure.
    - c. Silting conditions.
  - 10. Accident Analysis.
  - 11. Review of Dive Tables and Decompression Theory.
  - 12. Cave Diving with Open Circuit Divers:
    - a. Bailout equipment requirements
    - b. Out of air emergencies
  - 13. Cave Diving Etiquette.

### ***36.11 Required Skill Performance and Graduation Requirements***

At NO point is the student to be unable to monitor their PO<sub>2</sub> while on the loop. Zero visibility drills must be performed in a way that the student may monitor the status of the breathing loop, i.e., no mask but able to monitor HUD, lights out but able to use display lighting to view PO<sub>2</sub>, etc. **Or** the drill must be done on bailout.

#### **The following land drills must be covered during this course:**

- 1. How to properly:
  - a. Deploy a guideline.
  - b. Follow a guideline.
  - c. Conduct bail out exit including gas sharing while following a guideline.
  - d. Conduct bail out exit including gas sharing simulating zero visibility and using touch contact while following a guideline.
- 2. Use of safety reel in:

- a. Lost diver procedures.
- b. Lost line drill.

**The student must perform the following S-drill and skills during all dives:**

1. Demonstrate:
  - a. Adequate pre-dive planning.
  - b. Equipment check and equipment matching.
  - c. Bubble check.
  - d. Specialized propulsion techniques in varying types of flow.
  - e. Proper:
    - i. Buoyancy control.
    - ii. Body posture.
    - iii. Stress analysis (detection and management).
    - iv. Oxygen partial pressure management.
    - v. Overall rebreather instruments analysis.

**The student must perform the following in-water skills during cave dives:**

1. Properly:
  - a. Deploy a guideline.
  - b. Use line markers.
  - c. Follow a guideline.
  - d. Follow a guideline simulating loss of visibility.
2. Perform bailout exit practicing gas sharing with teammates, following the guideline.
3. Perform bailout exit practicing gas sharing with teammates simulating zero visibility and using touch contact, following the guideline.
4. Remove and replace mask while in contact with guideline.
5. Demonstrate light/hand signals and touch contact.
6. Conservation and awareness techniques.
7. Using referencing as back-up navigation.
8. Demonstrate adequate anti-silting techniques.

9. Simulate a primary light failure and use back-up light to exit the cave.
10. Demonstrate lost line drills using instrumentation lighting only.
11. Demonstrate lost diver drills.
12. Demonstrate rebreather unit specific skills in compliance with current level of rebreather certification as outlined in the TDI course curriculum.

**In order to complete this course, students must:**

1. Satisfactorily complete the TDI Introductory Cave Diver Course written examination.
2. Perform all land drills and cave dive requirements safely and efficiently.
3. Demonstrate mature, sound judgment concerning dive planning and execution.
4. Maintain an appropriate level of awareness and respect for the cavern environment.
5. Log all dives.