

## 24. KISS GEM Sidekick Instructor

### 24.1 Introduction

This is the instructor level certification course for instructors wishing to teach the TDI KISS GEM Sidekick rebreather course. The objective of this course is to train instructors to teach recreational rebreather diving, and to develop basic rebreather diving teaching skills for no decompression diving to 30 metres / 100 feet using between 32-40% Nitrox Gas.

### 24.2 Qualifications of Graduates

Upon successful completion of this course, graduates may teach the TDI KISS GEM Sidekick Rebreather course not to exceed the maximum depth of 30 metres / 100 feet with Nitrox Gases between 32-40%.

### 24.3 Who May Teach

1. Any active TDI KISS GEM Sidekick Instructor Trainer may teach this course.

### 24.4 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 4 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 4 students per instructor trainer; it is the instructor trainer's discretion to reduce this number as conditions dictate

### 24.5 Student Prerequisites

1. Minimum age 21
2. Provide proof of
  - a. Certified TDI KISS GEM Level 1 Diver
  - b. Certified TDI Nitrox Instructor, or equivalent
  - c. 200 verified logged dives, 50 using nitrox

3. Assist with at least one complete TDI KISS GEM Sidekick user course to the satisfaction of the instructor trainer
4. Provide proof of 50 logged rebreather dives on approved rebreathers, with a minimum of 50 accumulated hours; 25 dives and 25 hours must be on a KISS GEM or KISS GEM Sidekick diving system.
  - a. If the above GEM time is on the standard GEM then 10 dives and 10 hours must be on the GEM Sidekick

**Or**

5. If the candidate is already a certified TDI SCR or CCR instructor, in place of #4 above, provide proof of 25 verified logged KISS GEM rebreather dives with a minimum of 25 accumulated hours. Of this, 10 dives and 10 hours on the GEM Sidekick

**Or**

6. If the candidate is already a certified KISS GEM instructor; provide proof of 10 KISS GEM Sidekick dives with a minimum of 10 accumulated hours

## **24.6 Course Structure and Duration**

### **Confined Water Execution**

1. A minimum of 1 confined water session with a minimum of 60 accumulated minutes

### **Open Water Execution**

1. A minimum of 5 dives with a minimum of 200 accumulated minutes; two dives must be deeper than 15 metres / 50 feet

### **Course Structure**

1. TDI allows the instructor trainers to structure programs accordingly; adequate time to ensure comprehension and ability to perform skills required

### **Duration**

1. The minimum number of classroom and briefing hours is 6. The minimum course duration is 2 days. The minimum number of equipment overview hours is 2

## 24.7 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

## 24.8 Training Material

### **Required Material**

1. *KISS GEM Sidekick* owner's manual
2. *TDI KISS GEM* PowerPoint Slides
3. *TDI KISS GEM Sidekick* PowerPoint Slides
4. *TDI Standards and Procedures* Manual

### **Optional Material**

1. Richard Pyle - *A Learners Guide to Closed Circuit Rebreather Operations*
2. Kenneth Donald - *Oxygen & The Diver*
3. John Lamb – *Oxygen Measurement for Divers*
4. Barsky, Thurlow & Ward - *The Simple Guide to Rebreather Diving*
5. Bob Cole – *Rebreather Diving*
6. Jeffrey Bozanic – *Mastering Rebreathers*

## 24.9 Required Equipment

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

1. A complete KISS GEM Sidekick rebreather, the instructor candidate must own or have access to a KISS GEM Sidekick unit in order to take the course, and to teach it in the future
2. Printed checklists from the KISS GEM Sidekick owner's manual
3. GEM Sidekick rebreather owner's manual
4. A minimum of 1 integrated PO<sub>2</sub> monitoring for each GEM Sidekick

5. Access to oxygen analyzer (instructor may supply)
6. Appropriate CO<sub>2</sub> absorbent (ExtendAir™ cartridge or equivalent) for the dives to be conducted
7. Underwater slate
8. Depth gauge and automatic bottom timer AND/OR Nitrox dive computer
9. Mask and fins
10. Exposure suit, appropriate for the open water environment
11. Appropriate weight
12. Tool-kit with appropriate spares (instructor may supply)
13. Disinfectant (instructor may supply)
14. One line cutting device

## **24.10 Required Subject Areas**

**Instructor trainers must use the *TDI Diving Rebreathers Student Manual* or eLearning, 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 Units
3. Practical Mechanics of the GEM Sidekick Rebreather System
  - a. Assembly and disassembly of the GEM Sidekick rebreather
  - b. Layout and design
  - c. Scrubber replacement
  - d. Lung volume control system: Divers must understand how the lung volume control system works. By the end of the course, the diver should be familiar with the adjustment techniques of the lung volume control system.
  - e. Pre-dive safety check sequence
  - f. System maintenance and storage
  - g. Breathing loop decontamination procedures
4. Review of Nitrox
  - a. Dalton's Law (triangle)
  - b. Optimum nitrox mix
  - c. Oxygen tracking
  - d. Gas preparation and analysis

5. Gas Physiology
  - a. Oxygen toxicity
  - b. Hyperoxia
  - c. Hypoxia
  - d. Asphyxia
  - e. Hypercapnia
  - f. Nitrogen absorption
  - g. CO<sub>2</sub> toxicity
  - h. Gas consumption
    - i. Cylinder sizes
    - ii. Depth and workload
6. Formula Work
  - a. Cylinder size/duration equation
  - b. Equivalent air depth
7. Dive Tables
  - a. Equivalent air depth
  - b. CNS toxicity tables
  - c. NDL tables
8. Dive Computers
  - a. Mix adjustable
  - b. Oxygen integrated
  - c. PO<sub>2</sub> monitoring devices
9. Dive Planning
  - a. Operational planning
  - b. Gas requirements including bailout scenarios
  - c. Oxygen limitations
  - d. Nitrogen limitations
  - e. PSCR and FO<sub>2</sub> drop
10. Problem Solving
  - a. Canister flooding
  - b. Mouthpiece loss
  - c. Scrubber exhaustion
  - d. Battery or sensor failure
  - e. Breathing bag rupture
  - f. Open circuit bailout
  - g. Hyperoxia scenario
  - h. Hypoxia scenario
  - i. Hypercapnia scenario
  - j. Post problem maintenance of equipment

## 24.11 Required Skill Performance and Graduation Requirements

The dive depth shall not exceed 1.4 ATM PO<sub>2</sub>. The following skills must be demonstrated to Instructor quality by all instructor candidates.

### Equipment Skills

1. Mouthpiece servicing skills

### Confined Water Skills

1. Complete GEM SIDEKICK pre-dive checklist
2. Pre-dive checks
  - a. Scrubber packing
  - b. Unit assembly
  - c. One-way valve check
  - d. Positive and negative pressure tests
3. Properly analyze supply cylinder
4. Properly calibrate and verify oxygen sensors
5. Proper fitting and adjustment of counter-lung system
6. Lung volume control system adjustment
7. Correct starting orientation of mouthpiece, readjust underwater
8. Perform in water bubble check
9. Open-loop breathing
10. Demonstrate proper PO<sub>2</sub> monitoring
11. Perform 1 bail-out ascent from a depth not shallower than 1.5 metres / 5 feet
12. Disconnect and re-connect the gas supply underwater.
13. Practice breathing in different positions and note the change in the work of breathing in each position.
14. Demonstrate the proper adjustment and rigging of the counter-lung system, prior to diving and underwater.
  - a. Proper placement of attachment clips to the GEM Sidekick and proper securing of the diving system to the diver while underwater.
  - b. Remove and replace diving system; ensure that proper placement can be achieved while underwater.
15. Flood recovery
16. Perform a complete unit disassembly and cleaning

**Note:** All pool dives must be conducted with a minimum of 40% (+/- 1%) oxygen in the source cylinder.

**Open Water Skills**

1. Properly analyze gas mixture
2. Properly calibrate and verify oxygen sensors
3. Perform pre-dive check sequence with use of manufacturer's checklist before every dive
4. Demonstrate a leak check and repair scenario
5. Properly pack scrubber canister (minimum of 2 times)
6. Properly execute set-up and breakdown of the GEM Sidekick a minimum of 5 times
7. Demonstrate adequate pre-dive planning
  - a. Limits based on system performance
  - b. Limits based upon oxygen exposures at planned depth with mix
  - c. Limits based upon nitrogen absorption at planned depth with mix
8. Perform in water bubble check
9. Properly execute the planned dives within all pre-determined limits
10. Demonstrate the proper procedures for:
  - a. Hypoxia
  - b. Hyperoxia
  - c. Hypercapnia
  - d. Gas loss
  - e. Sensor failure
  - f. Dive computer failure
  - g. PO<sub>2</sub> display failure
  - h. Water in the loop
11. Demonstrate the proper adjustment and rigging of the counter-lung system, prior to diving and underwater.
  - a. Proper placement of attachment clips to the GEM Sidekick and proper securing of the diving system to the diver while underwater.
  - b. Remove and replace diving system; ensure that proper placement can be achieved while underwater.
12. Lung volume control system adjustment on the surface and underwater
13. Properly execute a recovery from a system failure and switch to bail-out stationary
14. Properly execute a recovery from a system failure and switch to bail-out hovering a minimum of 2 times, one of the bail-out scenarios the diver must switch to open circuit and complete dive and safety stop on open circuit; direct ascent must begin when diver switches to open circuit, this scenario should be conducted no deeper than 18 metres / 60 feet

15. Properly demonstrate hose clearing technique after each bail-out scenario
16. Demonstrate proper PO<sub>2</sub> monitoring
17. Properly execute a mask clearing exercise with emphasis on minimal gas loss
18. Open-loop or OC from 6 metres / 20 feet to surface
19. Demonstrate comfort setting up and diving the unit
20. Demonstrate good buoyancy control during the dive
21. Safely and properly execute a buddy out of air scenario; it is preferable the buddy be on a SCR unit also
22. Diver will demonstrate actual safety stops at pre-determined depths
23. Properly execute cleaning and maintenance of the GEM Sidekick rebreather, including breathing loop decontamination

**In order to complete this course, students must: Complete all open water requirements safely and efficiently**

1. Demonstrate mature, sound judgment concerning dive planning and execution
2. Pass the diver exam with 80% answered correctly and 100% remediation

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

1. Satisfactorily complete the TDI KISS GEM Sidekick course written examination with a minimum score of 100 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 KISS GEM Sidekick Diver Program
5. Present a minimum of 1 graded presentation on a KISS GEM Sidekick topic