CCR DIVER

INTENT

The CCR Diver program provides divers with the knowledge and training necessary to independently plan and conduct unit specific no decompression closed-circuit rebreather (CCR) dives to a maximum depth of 30 meters/98 feet, using a manufacturer approved CCR unit with air as diluent utilizing CCR Diving procedures with a dive buddy diving on a rebreather or diving open circuit.

REQUIRED INSTRUCTOR RATING

An active status unit-specific CCR Instructor or higher may conduct the unit-specific CCR Diver program.

TEACHING RATIOS

- The maximum number of students for CCR training is 3:1
- The maximum number of students for no-decompression CCR training where one (1) student is making a crossover or doing a refresher is 4:1

These ratios should be reduced as required if the situation and/or environmental conditions call for it.

STUDENT PREREQUISITES

- Nitrox certification
- Have logged 20 open water dives
- Minimum age: 18

DURATION

- Recommended hours for course completion: 40
- Minimum number of days: 4
- Minimum number of hours for Academics and Dry practical: 8

MATERIALS AND EQUIPMENT

The minimum required student and Instructor equipment for this program includes:

A complete DT Go CCR Unit that:

- Is compliant to local laws, is approved by the training agency and is properly functioning
- Has no non-manufacturer approved modifications
- Depth gauge & bottom timer, or dive computer
- A single off-board bailout gas suitable for a safe return to the surface from the planned maximum depth including all safety and decompression stops in the event of an emergency
- For Open water and lake environments with the exception of cave/overhead environments a Delayed Surface Marker Buoy (DSMB) and a spool / reel appropriate for the planned dive depth.
- cutting device
- Access to an appropriate gas analyzer

The minimum required student and instructor materials for this program includes:

- DT Go Rebreather unit specific user manual
- Agency student training manual or online training course
- Agency instructor manual (electronic instructor manuals meet this requirement)
- Course liability release and assumption of risk (in accordance with local laws)
- Training agency approved medical document
- Unit specific checklist (units equipped with a built in electronic checklist, meet this requirement)

edit: May 8, 2024

- Manufacturer's sign off sheet/course completion document

All skills must be demonstrated by the instructor on the specific unit being trained

REQUIREMENTS FOR COMPLETION

Academics

Students shall have sufficient understanding and knowledge in the following subject areas listed. They should be capable of planning dives in the typical local conditions and environment and be able to plan for typical emergency situations.

1. Practical mechanics of a CCR
   - Assembly and disassembly specific to DT Go rebreather being used. Use unit specific manual as a guide
   - Unit Specific Check list
   - Design and overview of the DT Go unit
   - Insert O-rings where required
   - O-ring location and condition
   - Absorbent canister
   - Breathing loop
   - Automatic Diluent Valve: automatic and manual use
   - Manufacturer's supported add-ons: BOV, etc

2. Loop volume - minimum / optimum
   - Determine the correct counterlung size, & understand how to attain and maintain proper loop volume

3. Gas Physiology
   - Oxygen risks, Hypoxia, Hyperoxia
   - Carbon dioxide (CO_2) toxicity, Hypercapnia
   - Nitrogen absorption

4. Proper scrubber filling; in accordance with DT Go recommendations
   - Manufacturer's recommended scrubber medium, & procedures according to DT Go user manual

5. Electronic or Manual or Mechanical Systems Design and Maintenance
   - Oxygen (O_2) metabolizing calculations
   - Oxygen Sensors, limitations, care and replacement regime
   - System electronics functionality and calibration procedures
   - DT Go manual gas addition valve design and function. (raising and lowering of constant flow; determining correct flow rate for each individual)

6. Dive Tables
   - Constant partial pressure of oxygen (PPO_2) theory
   - Central nervous system (CNS) and Oxygen Tolerance Unit (OTU) tracking and awareness

7. Dive Computers
   - Mix adjustable
   - Constant PO_2
   - Decompression conservatism / Gradient factor selection
   - Oxygen (O_2) integrated

8. Dive Planning
   - Operational planning
   - Gas consumption
   - Scrubber duration
   - Gas requirements including bailout scenarios
   - Oxygen limitations
   - Nitrogen limitations

9. Emergency Procedures
   - Flooded loop
   - Cell warnings
   - Battery warnings
   - Electronic failures

Skills

1. Pre-dive checks
   - Specific Unit Checklist
   - Verify diluent and oxygen (O_2) cylinder contents using gas analyzers
   - Unit build-up
   - Scrubber canister filling
   - Breathing loop check including mouthpiece one-way valves and positive and negative check
   - Sensor calibration in oxygen, with verification in air
   - 5 minute pre-breathe
   - Bailout bottle/stage cylinder rigging

2. Demonstrate correct pre-dive planning procedures including
   - Limits based on system performance
   - Limits based on oxygen exposures at chosen PO_2 levels
   - Limits based on nitrogen absorption at planned depth and PO_2 set point
   - Appropriate selection of decompression conservatism / gradient factors for the planned dive
   - Thermal constraints

3. Underwater verification
   - Stop at 3-6 meters/9-19 feet on descent for leak bubble check
   - Counterlung & Over Pressure Valve adjustment, if necessary

4. Mouthpiece familiarity skills
   - BOV: switch between open and closed circuit
   - DSV: switch to bailout system

5. Adding diluent gas/ADV familiarity skills
   - ADV: Adding diluent gas and understand how it works
   - BOV: Use BOV to add diluent gas to the loop – 2 ways
   - Bail out second stage: Use to add diluent gas to the loop
   - Dual button MAV: Adding diluent gas (if unit is shipped with this item)

6. Emergency procedures: demonstrate appropriate response to the following; each dive should have a minimum of 2 “diver emergencies” that the student must react to.

- Practical bailout skills: including 2 open circuit ascents from approximately 18 meter/59 feet.
- Gas shutdowns and loss of gas
- Broken hoses
- Flooded absorbent canister
- Carbon dioxide (CO_2) breakthrough
- Low oxygen drills
- High oxygen drills
- Flooding loop
- Electronics, sensor, and battery failure

7. Practice transferring to open circuit bailout
8. Rescue skill session as outlined by the training agency
9. Use of a buoyancy control system
   - Buoyancy/trim control during dive
   - Buoyancy/trim control at safety stop
10. Controlling and monitoring for PPO2 levels:
    - Raising/lowering PPO2
    - Starting PPO2
    - PPO2 monitoring every minute
    - Manual Add Valve verification: static at constant depth, monitor change over several minutes
    - Electronics systems monitoring for PPO2 levels (SETPOINT) and setpoint switching using manual and pre-programmed methods when available (when the unit is equipped with an on board decompression computer that monitors sensors)
11. Electronic systems use:
    - Use and adjustment of Heads Up Display, position, brightness, colour
    - Use and adjustment of PPO2/depth/time display, position, brightness, colour
    - Use and adjustment of decompression computer, set up/gas switching, battery verification, etc
12. Use of lift bag / DSMB and reel (where relevant and applicable)
13. Mask removal and replacement
14. Proper execution of the dive within all pre-determined dive limits
15. Demonstration of safety stops at pre-determined depths (on all dives)
16. Constant loop volume management
17. Cell validation checks with appropriate use of diluent and oxygen
    - Oxygen sensor verification at depth
    - Do voltage limited test on sensors at approximately 5 meter/16 feet on pure oxygen
18. Post dive clean of unit
    - Mouth piece and hoses
    - Clean and disinfect unit
    - Inspect components of unit
19. Diver maintenance of unit

- Cell removal and replacement
- Mouthpiece care
- Replacing or re-charging of batteries

EXTRA REQUIREMENTS FOR COMPLETION

- Demonstrate an adequate level of fitness by completing a minimum of a 50m/164 feet surface diver tow with both the rescuer and the victim wearing a complete CCR diving system and bailout cylinder(s) applicable to their specific program.
- Complete all academic sessions and unit specific assessments as specified in the training material of the Training Agency and the Manufacturer.
- Complete a minimum of seven (7) training dives, including confined water skill development of at least one (1) hour, and six (6) core open water training dives with a minimum run time of 30 minutes each.
- Complete at least a minimum of 420 minutes of total in-water time on the applicable CCR unit.
- Be able to independently complete a full dive plan
- Complete a final course exam as set out by the training agency and / or manufacturer with a required minimum pass rate of 80% with 100% remediation.
- When the feature is available on a rebreather, download the student's dive logs of all training dives and retain for a minimum of seven years.
- If the feature is not available on a rebreather, download the dive logs from the students dive computer and retain for a minimum of seven years
- Fill in and sign a course completion form confirming all academics and practical sessions have been completed

Dive logs and student-signed course completion form are to submitted to the manufacturer of the specific unit on request

DEPTH LIMITATIONS

- Open Water Training Dives shall be initially shallow, progressively increasing in depth.
- Two (2) dives must be deeper than 20 meters/65 feet for certification
- All dives must be conducted at a depth shallower than 30 meters/98 feet.

NOTES

- All training dives must be planned within the no-decompression limits of the Combined Air/EAN Tables or the student's personal dive computer or computer-generated decompression profiles.
- Bailout cylinder gas is to be based on a maximum PPO_2 of 1.6 at the maximum depth of the dive.
- Divers should not carry an on-board diluent gas with a PPO_2 higher than 1.1 bar at the bottom.
- The maximum loop set point is 1.3 bar.
- It is recommended that the student finish the training course within 6 weeks of the starting date.
- It is recommended that the student have access to, or purchase a unit within 3 months of completing the training program.
- Only approved training agencies and instructors may teach a DT Go rebreather course.

Diving in an overhead environment

This course shall not be conducted in an overhead environment. Subject to training agency approval certain dive sites can be deemed suitable for the CCR Diver course under the following conditions:

- The student must remain in the daylight zone where there is no need for the use of a dive light
- The student must never be a distance of more than 132 linear feet / 40 linear meters from the surface

SEQUENCE

Open Water Training Dives 1 and 2 may only be conducted after completing the equipment configuration section, the surface diver tow and all confined water sessions.

CERTIFICATION

The unit specific CCR Diver certification entitles the holder to dive with a buddy, diving on a rebreather or diving open circuit, utilizing CCR diving procedures to make non decompression dives to depths of up to 30 meters/98 feet, providing that dives are conducted in

environments similar to those of the diver's training and experience.

CCR DIVER CROSSOVER

INTENT

The intent of the program is to provide divers already certified on a unit with additional unit specific training to get certified on an additional unit, following RESA minimum training standards.

REQUIRED INSTRUCTOR RATING

An active status unit specific CCR instructor at the level the candidate is crossing over for

ADMINISTRATIVE REQUIREMENTS

- Course liability release and assumption of risk (in accordance with local laws)
- Health screening document
- Anything else as required by the Training Agency or manufacturer

STUDENT PREREQUISITES

- Be certified as a CCR Diver from a RESA recognized training agency
- Show proof of 10 logged CCR dives in the last 12 months
- Minimum age 18 years

NOTE

- Crossover is not allowed for certifications on SCR or PSCR, or for CCR certifications that only allow a lesser dive depth: in all these cases a full course is mandatory
- Crossover applies to rebreathers of different brand/manufacturers
- Crossovers between similar units of the same brand/manufacturer may require an upgrade course as specified by the manufacturer

MATERIALS AND EQUIPMENT

- As specified in the specific diver level course standard

DURATION

- Recommended hours for course completion: 16 to 24
- The number of classes, hours and sessions per day are set by the training agency.

REQUIREMENTS FOR COMPLETION

The crossover course will include:

- CCR assembly workshop.
- A 60 minute water skills evaluation in a confined skill session. All skills from the level the candidate is crossing over at must be demonstrated successfully prior to open water dives.
- Complete a minimum of 4 open water dives and a total accumulated dive time of minimum 240 minutes, demonstrating proficiency in all skills from the level the diver is crossing over at
- Complete a final exam with a passing score as specified by the Training Agency and the Manufacturer.