Syllabus Number: 3.B.36 / BOD n. 188 (09-06-2014)

CMAS CCR Diver diluent trimix Training Program
Minimum Training Program Content

1. Required theoretical knowledge

1.1 Subject Area 1: Introduction

1.1.1 The participant shall be provided with all such information, as provided for in Clause 4.2 of Chapter 1 in order to enable him to take an informed decision about his participation in the CMAS CCR Diver Diluent trimix Training Program.

1.1.2 The participant shall be provided with the information about the CMAS as provided for in Clause 4.3 of Chapter 1.

1.2 Subject Area 2: Equipment

1.2.1 The participant shall have an appropriate knowledge concerning the physical characteristics operating principles, maintenance and use of the following items of specific diving equipment.

1.2.1.1 Specific Equipment

1.2.1.1.1 A Closed Circuit Rebreather (M-CCR or E-CCR).

1.2.1.1.2 Appropriate stage(s)

Appropriate depends on:

- Depth and bottom time
- Type of gases
- Self-sufficient or team bailout

1.2.1.1.3 Regulator(s) with pressure gauge and inflator (where applicable)

1.2.1.1.4 Extra mask

1.2.1.1.5 Reel(s) and / or spool(s) – the length of the rope in function of the situation (depth)

1.2.1.1.6 At least one yellow DSMB and one red DSMB

1.2.1.1.7 Tanks and regulators need to be correct labelled.

Stages are provided with appropriate clips to attach them on the frame or the harness

1.2.1.1.8 If possible use: group material like deco-station, lift for divers, etc…

Note 1: Only the specific diving equipment is listed in article 1.2.

Note 2: Prior to the commencement of class, students should consult with a CMAS representative to verify equipment requirements

1.3 Subject Area 3: Land Drills and topics

1.3.1 Dive team protocols and procedures (briefing of the teams, personal team briefing, safety briefings).

1.3.2 Equipment fit and function

1.3.3 Pre-dive drills

1.3.4 Delayed surface marker deployment

1.4 Subject Area 4: Theory

By the end of the course, students will be able to:

1.4.1 Knowledge-related (Module 1):

1.4.1.1 Classroom 1:

1.4.1.1.1 Trimix (what is trimix)

1.4.1.1.2 History of diving trimix

1.4.1.1.3 Physical aspects of diving trimix

1.4.1.1.4 Physiological aspects of diving trimix

- Narcosis an toxicity
- Isobaric Counter Diffusion (IBCD)
- High Pressure Nervous Syndrome (HPNS)

1.4.1.1.5 Advantages of trimix

1.4.1.1.6 Disadvantages of trimix

1.4.1.1.7 Other breathing and non-breathing gasses

- Oxygen
- Nitrogen
- Helium
- Carbon dioxide
- Carbon monoxide
- Argon

1.4.2 Dive Planning and Procedures (Module 2):

1.4.2.1 Practical session (classroom 2):

1.4.2.1.1 Dive planning and dive procedures

- Gas consumption and decompression
- Metabolic oxygen consumption
- Decompression while diving a rebreather on diluent trimix
    - Using open circuit tables
    - Using constant partial pressure oxygen tables
    - Using dive computers (trimix)
    - Using planning software (trimix)

1.4.2.1.2 Dive planning and decompression in practice

- General approach
- What's the planned operational depth?
- How to plan the ideal gasses for a trimix dive
    - The diluent (maximum ppO2 = 1 bar)
    - The deep bailout gas (maximum ppO2 = 1,6 bar)
    - The intermediate gas (IBCD – Triox)
    - The decompression gas (maximum ppO2 = 1,6 bar)
    - Group bailout and involved gasses
    - Decompression stations
    - Diluent switches (yes or no)
    - Air breaks (yes or no)
    - On board and off board gasses

1.4.2.1.3 What are the conditions of the dive (temperature, current, visibility,…)

1.4.2.1.4 Emergency procedures

1.4.2.1.5 Manual control of the rebreather
(manual adding diluent in the loop)
(manual adding oxygen in the loop)
- Running the rebreather as a pure oxygen rebreather
- Running the rebreather as a semi closed rebreather

1.4.2.1.6 Briefings (general briefing, team briefing, briefing of the skippers, safety briefing)
1.4.2.1.7 DO's and DON'T's

1.4.2.2 Theoretical exam (module 1 and module 2): classroom 5

2 Required SCUBA skills

2.1 Subject Area 1: Skills on the rebreather (Module 3)

2.1.1 Workbench 1

2.1.1.1 Assembly/disassembly of system.
2.1.1.1.1 Demonstrate the elements of the basic structure and function, including
- Gas flow
- Components (i.e., sensors, orifices, etc.).
- Breathing loop.
- Electronic controls.

2.1.1.1.2 Perform the pre-dive check
2.1.1.1.3 Draw the basic gas flow diagram
2.1.1.1.4 Perform the proper monitoring procedures of the displays:
- During descent.
- On bottom.
- During ascent.

2.1.1.1.5 Perform the proper use of the computer and downloading procedures.
2.1.1.2 Cleaning of system.
2.1.1.3 Refill of canister and gas.

2.1.2 Workbench 2

2.1.2.1 Demonstrate the proper post-dive check.
2.1.2.2 Perform the efficient disassembly of the system.
2.1.2.3 Demonstrate the proper cleaning of the system's components.
2.1.2.3.1 Breathing hoses.
2.1.2.3.2 Canister.
2.1.2.3.3 Breathing bag.
2.1.2.4 Perform the safe filling and added of the gas cylinders.
2.1.2.5 Perform the safe loading of the canister.

2.2 Shallow Water Drills (SWD) - (Module 4)

2.2.1 Session 1

2.2.1.1 Prepare unit for an open water dive.
2.2.1.2 Explain and demonstrate the actions on the machine before diving
2.2.1.2.1 Properly filling of the canister
2.2.1.2.2 Analyzing the content of the diluent and oxygen and bailout tanks
(4 eyes principle)
2.2.1.2.3 Checking the pressure of the diluent and oxygen tanks
2.2.1.2.4 Positive check
2.2.1.2.5 Negative check
2.2.1.2.6 Pre-breathing
2.2.1.3 Demonstrate proper trim in the water while swimming

2.2.1.4 Briefing of the dive (performed by the student)
2.2.1.5 Briefing of the exercises (performed by the instructor)
2.2.1.6 Briefing of the safety team (performed by the instructor and the student)
2.2.1.7 Exercises performed by the student
2.2.1.7.1 Signs
2.2.1.7.2 Plasticized instruction cards (short action exercises)
2.2.1.7.3 Bailout scenario's
2.2.1.8 Evaluation by the instructor
2.2.1.9 Debriefing and feedback (performed by the instructor and the student)
2.2.1.10 Post diving actions

2.2.2 Session 2

If needed - see session 1

2.3 Deep water dives (Module 5)

During the deep dives at least 5 small exercises (instruction cards) and at least 1 bailout exercise have to be performed.

2.3.1 Dive 1

2.3.1.1 Prepare unit for an open water dive.
2.3.1.2 Explain and demonstrate the actions on the machine before diving
2.3.1.2.1 Properly filling of the canister
2.3.1.2.2 Analyzing the content of the diluent and oxygen and bailout tanks (4 eyes principle)
2.3.1.2.3 Checking the pressure of the diluent and oxygen tanks
2.3.1.2.4 Positive check
2.3.1.2.5 Negative check
2.3.1.2.6 Pre-breathing
2.3.1.3 Demonstrate proper trimming in the water while swimming
2.3.1.4 Briefing of the dive (performed by the student)
2.3.1.5 Briefing of the exercises (performed by the instructor)
2.3.1.6 Briefing of the safety team (performed by the instructor and the student)
2.3.1.7 Exercises performed by the student
2.3.1.7.1 Signs
2.3.1.7.2 Plasticized instruction cards (short action exercises) maximum 2
2.3.1.7.3 Bailout scenario maximum 1
2.3.1.8 Evaluation by the instructor
2.3.1.9 Debriefing and feedback (performed by the instructor and the student)
2.3.1.10 Post diving actions

2.3.2 Dive 2 – 5: see dive 1