SCUBA TECHNICIAN COURSES

Scuba Equipment Service Technicians are the industry's "unsung heroes". As scuba gear essentially allows divers to breathe underwater, the people providing equipment support in the background rarely get the credits they deserve. Here at Scuba Clinic, we see the importance of the role technicians play and are working to fulfil this gap. Our focus is to raise awareness by providing "standardised" education and training in our state-of-the-art facility for those wishing to get into the engineering side of the industry.

We can offer these courses as a "package" as the main advantage of such integration will benefit dive masters and instructors in their personal development and improve employment opportunities. We believe it will as well benefit dive store owners as they will be able to rely on an all-round solid background to run their operations and to service/maintain and operate their equipment. Ultimately it will benefit divers' safety and the community as a whole.

Why Scuba Clinic?

State-of-the-art Facility
Our training facility has been designed for the primary purpose of training. Our workshops are clearly designated for each purpose and can accommodate the maximum of 6 students. Our classroom is spacious and comfortable, with an impressive library collection where students have full access to.

Dedication to Service and Repair
At Scuba Clinic, our only business focus is scuba equipment service and repair. Students can take advantage of training and working in a real and professional workshop environment without any day-to-day disruption of a normal dive centre operation. We take great pride in what we do and genuinely hope to influence our students' attitude towards quality servicing as well.

Wide Range of General and Special Tools
Our workshop contains multiple sets of general and special tools to do proper service work. Students will get to learn and work in a real and professional environment using the industry's most advanced technology.

Courses are exclusive to Scuba Clinic
We are one of not many centres in the world who are dedicated to offer Scuba Technician courses. Our highlight course "Regulator Service Technician" has been exclusively developed for and offered at Scuba Clinic.
TQS Regulator Service Technician Level I

Course Objectives:

The demand for regulator service technicians by dive facilities and resorts is high, but individuals with specialized training in both the theoretical and practical aspects of servicing scuba life support systems and related equipment is low.

Often regulators from dive shops and individuals find their way to the repair/service facility in a poor condition, poorly serviced, lacking service, missing parts or disassembled.

It is critically important that technicians are properly trained to use standardized procedures in disassembly, inspection, parts repair/replacement, cleaning, assembly, testing, and final adjustment of diving equipment.

Manufacturers offer clinics and seminars to dealers, dive masters and dive instructors for certification to service their products. (Due to product liability, issuing certifications to work on different individual brands is the manufacturer's exclusive right.) Some seminars are very comprehensive and involve a couple of days, while others may only require a couple of hours.

Manufacturer’s programs or seminars are not designed to train the technician outright, but to make the technician familiar with a specific brand and specific procedures imposed by the equipment manufacturer. To get the most out of those seminars, any potential technician must have a certain level of equipment service knowledge to really benefit, which rather often is not the case.

That's where this course fits in, it is designed to bridge the gap between extensive programs and service clinics and to give aspiring technicians a solid knowledge base.

It cannot be emphasized enough that scuba equipment is LIFE SUPPORT EQUIPMENT. Therefore it is critically important that technicians are properly trained to use standardized procedures in disassembly, inspection, parts repair/replacement, cleaning, assembly, testing, and final adjustment of diving equipment.

The goals of the Regulator Service Technician Training Course are:

- To strengthen the basic mechanical knowledge of the technician including engineering concepts and materials used in all components of regulators.
- To describe and illustrate how regulators work based upon how the components respond to pressure differentials.
- To describe and illustrate factors that resists the mechanical movement of regulator components.
- To provide rational and sequential methods for diagnosing regulator problems.
- To instil rational insight that can be applied to all common regulator functions.
- To instil the participant with a rational facts as why regulator servicing is a necessity and cannot be ignored or overlooked.
- To familiarize the technician with appropriate service tools and diagnostic equipment.
• To familiarize the technician with appropriate standard bench procedures and methods for disassembly, cleaning, inspecting, reassembly and testing/adjusting of regulators.
• To prepare the technician for manufacturers service seminars.
• To familiarise the technician with applicable standards and codes, including creating and maintaining standardized service records for both business management and defensibility.

Prerequisites: 18 years old, Advanced Open Water Diver and Enriched Air Diver or equivalent, and employment through a recognized scuba related facility or manufacturer/distributor or show proof of intent to acquire such employment.

Duration: 6 days

Course Outline:
The course consists of 18 sections. Most sections are followed by practical application labs. During the practical labs you will get the opportunity to work on regulators like Apeks, Scubapro, Mares, Aqualung, Sherwood, Poseidon, Dive Rite, Cressi and Oceanic.

1. SI system [International System of Units]
2. Physics of gases
3. Basic principles
4. Regulator performance and design
5. General workshop practices
6. Unbalanced piston first stages
7. Unbalanced diaphragm first stages
8. Balanced piston first stages
9. Balanced diaphragm first stages
10. Special first stage features
11. O-rings and high pressure seats
12. First stage inspection, setup, testing and troubleshooting
13. Introduction to second stages
14. Unbalanced downstream second stages
15. Balanced downstream second stages
16. Special second stages features
17. Second stage inspection, setup, testing and troubleshooting
18. Power inflators, BCD’s, cylinder valves and instruments
TDI Compressor Operator

Course Objectives:

The course is designed to give participants with little or no prior knowledge or experience of high pressure gas systems instruction in filling diving cylinders from high pressure gas sources, including relevant safety knowledge.

Compressors find their way into the repair shop too often in a poor condition. Cylinders fail a VIP due to corrosion, closely related too high moisture content in the breathing air. Divers complain about poor breathing air. Once in a while, a compressor related accident or cylinder explosion sadly makes the news highlights.

Finally let’s not forget that the breathing air compressor forms the heart of every dive operation and is a substantial investment that needs to be looked after.

A lot of the above mentioned can be prevented by a trained compressor operator with a sound knowledge who understand the operational and maintenance needs of the compressor, the legal implications and technicalities surrounding a cylinder fill station and who’s well aware of the ‘dangers’ involved.

This is an entry-level course which teaches individuals to operate and conduct routine maintenance on a breathing air compressor used to fill SCUBA Cylinders. This course covers proper handling and operation, health and safety aspects and filter changing in addition to the filling of SCUBA cylinders. Training is strictly in conjunction with the manufacturer’s operating manual for any equipment being used and also in accordance with local regulations governing the use of compressors.

Upon successful completion of this course, graduates may:

1. Operate breathing air compressors and engage in filling SCUBA cylinders.
2. Fill and utilize air bank systems.

*Additional Blender training and certification is required when filling SCUBA cylinders with breathing gases other than air.

Prerequisites: 18 years old and be employed by or affiliated with a facility offering SCUBA Cylinder fills

Duration: 2 days
Course Outline:

History of Compressed Air

Hazards
- Loose clothing
- Burns, fire and explosions

Physics
- Chemical reactions
- Compression rates and heat

Mechanical Operation
- Starting and stopping
- Bleeding and pressure releases

Tech Related
- Oxygen clean air creation
- DIN valve use
- Air bank systems

Logging
- Pre operation checks
- Monitoring filter life

Remote
- Using petrol powered engines
- Planning compressor size based on needs
- Estimating output based on compressors

Common Mixing Procedures
- Partial pressure blending
- Continuous blending
- Membrane separation system

Skill Performance
- Start and stop different compressors in a controlled manner
- Perform all pre run checks on each compressor
- Demonstrate correct use of a compressed air bank
- Demonstrate correct SCUBA tank logging and filling
- Complete at least 3 hours of actual running compressor/air bank operation
- Change a filter replacing the carbon and molecular sieve
- Identify the working parts and safety features of a compressor

In addition to the above ‘mandatory subjects’, additional topics will be covered:
- Compressor design
- Safe cylinder handling
- Daily and scheduled maintenance
- Prime movers and electricity (single and three phase starting method)
- Air quality testing
- Basic to intermediate trouble shooting
- Basic maintenance
- Designing your own system
- Proper handling of compressed gas cylinders
- An in-depth look into filtration
SDI Visual Inspection Procedures

This course is designed to promote safety in the care and maintenance of high-pressure scuba cylinders. The VIP program is intended to demonstrate to the scuba industry, a need to meet and exceed the minimum standards established by the Code of Federal Regulations on handling high-pressure cylinders. In addition, it is intended to train inspectors in the proper handling, filling, and inspection techniques, including the identification of the various defective conditions that can lead to cylinder rejection or condemnation. The course will also cover valve repairs, cleaning, maintenance, and the operation of high pressure compressor systems and is expanded well beyond minimum requirements to give students plenty of hands-on experience and confidence. This is why our course is conducted over 2 days instead of 6 contact hours required by the agency.

Upon successful completion of this course graduates may:

1. Visually inspect high-pressure cylinders for defective conditions that could cause a cylinder failure.
2. Train fill station operators (FSO) in the safe methods of handling, transporting and filling of high-pressure scuba cylinders.

**Prerequisites:** 18 years old

**Duration:** 2 days

**Course Outline:**

**Purpose**
- Legal requirements, standards of the community

**Safe Handling of Cylinders**
- Fill station operator rules and recommendations
- Identification of the various cylinder markings
- Legal / illegal filling requirements
- Filling procedures
- Use of and interpretation of EOI stickers

**Tools and their uses**

**Visual inspection indications**
- Proper identification of the various defect conditions

**Criteria for rejection and condemnation of a cylinder**
- Define the criteria for cylinder rejection
- Define the criteria for condemning a cylinder

**Other services**
- Valve inspection and cleaning
• Compressor operations
• Oxygen cleaning
The basis for cylinder cleaning
Visual Inspection Procedure
• Step by step walk-through of the inspection process

Skill Performance
• Inspect a cylinder during the program
• Satisfactorily complete the SDI Visual Inspection written examination with a score of at least 80%
• Demonstrate the ability to identify those conditions in a cylinder that would reject or condemn it

The course is mainly focused upon the US – CGA norms. During the course we will expand our knowledge toward European and local legislation as well.

Who this course is for:
• Professionals who utilize high-pressure cylinders on a regular basis
• Dive professionals who inspect, fill, and utilize high pressure cylinders
• Fill station operators (FSO) who would like to learn the safe methods of handling, transporting and filling of high-pressure

What you can expect to learn:
• Types of high pressure cylinders; steel, aluminum, and composite
• Definition of compressed gas and when it becomes a safety risk
• Different uses for high pressure cylinders
• Rules and regulations for various types of high pressure cylinders
• Importance of hydrostatic testing of high pressure cylinders, how cylinders are marked for testing
• Safe handling and tools necessary for thorough visual inspections
• Conditions that reject or condemn cylinders

What’s in it for you?
• ISO approved course covering specific hazmat training
• Tools and knowledge to safely handle high-pressure cylinders
• Thorough supervised walk through of high-pressure cylinders
TDI Oxygen Service Technician

Course Objectives:
In this course, the participants will be able to expand upon the skills received in PADI Regulator Service Technician Distinctive Specialty. This course covers the techniques and procedures to properly prepare equipment for use with breathing gases other than air, covering oxygen compatible system components, cleaning chemicals, oxygen cleaning of cylinders valves and regulators.

Prerequisites: 18 years old and provide proof of the following:
- Certification as TDI Nitrox Gas Blender or equivalent
- VIP certification through a recognized agency*
- Certification through a recognized manufacturing company regulator clinic**
- Employment through a recognized scuba related facility, manufacturer/distributor or proof of intent to acquire such employment
*VIP certification may be offered in combination with this course.
**Not required if training as TDI Cylinder Oxygen Service Technician only.

Duration: 1 day

Course Outline:
1. Responsibility of the Service Technician
2. Oxygen Handling
   a. Oxygen compatible systems components
3. Equipment Servicing
   a. Materials for use in oxygen cleaned systems
   b. Procedures of oxygen cleaning
4. Gas Production Equipment
   a. Compressors
   b. Cylinders
   c. Filtration systems
   d. Gauges
5. Mixing Techniques
   a. General considerations
   b. Continuous blending systems
   c. Membrane separation systems
   d. Pre-mix systems
   e. Partial pressure blending
6. Oxygen Analysis
   a. Procedures
   b. Oxygen analyzers
7. Cylinder Handling and Sign Out
TDI Nitrox Gas Blender

Course Objectives:
This course provides the necessary knowledge for competent and safe blend of Nitrox gas for recreational use, including proper techniques, equipment requirements and hazards involved in blending nitrox gases which will allow graduate to engage in blending nitrox gases without direct supervision, upon completion of this course.

Prerequisites: 18 years old

Duration: 1 day

Course Outline:

1. The Responsibility of the Gas Blender
2. Gases of Diving
   a. Air
   b. Oxygen
   c. Nitrogen
3. Oxygen Handling
   a. Oxygen hazards
   b. Causes and prevention of oxygen fire
   c. Oxygen system design
   d. Local regulations for gas blending and handling
4. Gas Production Equipment
   a. Compressors
   b. Cylinders
   c. Filtration systems
   d. Analog gauges
5. Mixing Techniques
   a. General considerations
   b. Continuous blending systems
   c. De-nitrogenated air systems
   d. Pre-mix systems
   e. Partial pressure blending mathematics
6. Oxygen Analysis
   a. Procedures
   b. Oxygen analyzers
7. Cylinder Handling and Sign Out
TDI Advanced Gas Blender

Course Objectives:

With the background knowledge acquired in the previous Nitrox Gas Blender course, in this course you will further develop practical and theoretical proficiency in custom gas blending for technical divers which includes helium. The subjects discussed in this course will cover formulas, gas analysis, blending equipment, blending systems and oxygen handling.

Upon the completion of this course, candidate will be able to safely and competently prepare high-quality oxygen and helium based gases, suitable for technical diving.

Prerequisites: 18 years old and TDI Nitrox Gas Blender or equivalent

Duration: 1 day

Course Outline:

1. Responsibility of the Gas Blender
2. Gases of Diving
   a. Oxygen
   b. Nitrogen
   c. Helium
   d. Other gases
3. Oxygen Handling
   a. Oxygen hazards
   b. Causes and prevention of fire
   c. Oxygen system design
   d. Local regulations
   e. Oxygen compatible components
4. Gas Production Equipment
   a. Compressors
   b. Cylinders
   c. Filtration systems
   d. Gauges
5. Mixing Techniques
   a. General considerations
   b. Continuous blending systems
   c. Membrane separation systems
   d. Pre-mix systems
   e. Partial pressure blending
6. Oxygen Analysis
   a. Procedure
   b. Oxygen analyzers
7. Cylinder Handling and Sign Out
Advanced Compressor Operator

Course Objectives:

The course is designed to give participants with some knowledge or experience with high pressure gas systems in troubleshooting and repair of compressors. This course takes a different approach as it is expanded to focus on management of the compressed air system as a whole, including all components that it consists of.

In the compressor operator course, basic principles have been presented. In the advanced course, participants have the opportunity to expand on the previously-gained knowledge and under supervision learn the more in depth skills of system design, maintenance and troubleshooting. The majority of the course will be spent on conducting diagnostic tests, stripping down a compressor, technical inspection of the components, rebuilding the compressor and commissioning of the refurbished unit, in other words, a hands-on experience. Extensive background knowledge on topics such as filtration, electricity and maintenance strategies on a variety of brands and models are also covered.

Upon successful completion of this course, students will be able service, repair and troubleshoot high pressure air compressors and be able to make informed decisions with regards to selection, design, purchase and maintenance of compressors and filling station as a whole. In-house certification will be presented at the end of the course.

Prerequisites: 18 years old and have successfully completed TDI Compressor Operator at Scuba Clinic

Duration: 4 days

Theory Outline:
- Review of basic safety principles in working with compressors and compressed air
- Theory of gas compression and filtration systems.
- Design of air compressors.
- In depth review of single phase and 3-phase start-stop mechanisms.
- Theory behind troubleshooting, a practical approach.
- Maintenance planning and strategies

Practical Outline:
- Remove and replace protective guards.
- Remove and replace intercooler pipes.
- Remove and replace cylinder heads.
- Remove and replace cylinder barrels.
- Examine cylinder barrels for wear.
- Examine bearings for wear.
- Strip down and adjust safety valves – if allowed by the manufacturer -.
- Strip down and adjust PMV.
- Strip down and service Interstage condensate trap replace filter.
- Strip down and repack of filter tower / filter cartridge.
- Adjust high pressure oil Pump setting of Bauer final stage lubrication system.
- Setup and use of Bauer B-timer Automatic filter monitor.
- Use of interstage pressure gauges for fault finding.
- Test compressor to 330bars to confirm integrity and lack of leaks.
- Power consumption measurement – use of Voltmeter & clip on ammeter.
- Rpm measurement methods.
- Heat measurement of heads and intercooler functionality checks.
- 3-phase wiring basics – Changing rotation direction of 3-phase electric motor.
- 3-phase star-delta starter / 6 wire 3-phase motor basics. Adjusting Star-delta switch time.
- Petrol engine rpm regulator adjustment for correct rpm.
- Alignment of drive motor and fan belt adjustment
- Pumping efficiency tests.
- Compressor Log sheets use.
- Introduction of faults to the compressor and technician booby traps.
- EN12021 Air purity testing – preparation and test workshop following rebuild.