

NOTICE:

The following items represent the most important changes of the Errata 2 change to the 5th edition of the *Consensus Standards For Commercial Diving and Underwater Operation*.

There are other changes which are reflected in the ADCI CS, such as the New Application for the Supervisor Certification Examination. It is important to remember that the Consensus Standards are an evergreen document, continually changing to increase the level of safety for all underwater operations.

Please be sure to download these items and include them in your hard copy of the *Consensus Standards for Commercial Diving and Underwater Operation*.

2.2 Entry-Level Qualifications

Personnel entering the profession of commercial diving or remote operated vehicle operations should be high school graduates or equivalent. The entry-level minimum skill designation on a diving crew is a Tender/Diver and on an ROV crew is a ROV Pilot/Technician. The entry-level Tender/Diver satisfies the minimum entry level qualifications of Diving Proficiency appropriate to his employment and mode of diving operation in which engaged, Technical Proficiency, and Experience by successfully completing a formal course of study.

Following formal training, the entry-level individual must then be engaged in field operations; participate in diving (or ROV) operations, or participate in activities related to a specialized field of endeavor, to gain actual experience necessary to advance beyond the entry-level status. That additional experience will be gained on-the-job, and an evaluation of individual competency made by that individuals' employer so as to request issuance of a more advanced certification.

ADCI recognizes that in many areas of the world that formal vocational training for commercial divers is not available or; that sending trainees to an overseas location is not an option due to the expense, language difficulties or other factors. Therefore, ADCI will support company training initiatives as long as the company has submitted and received approval of their training plan and curricula in advance, and can adequately demonstrate that the training provided at the company level is at least the equal to the Requirements set forth in 2.2.1 or 2.2.2 hereafter.

Under the current regulations of the United State Department of Labor (OSHA), and employer is in compliance with the diver training requirements of the Code of Federal Regulations for any employed diver with a valid "ADCI Commercial Diver Certification Card" for the appropriate training level.

2.2.1 ADCI Training Requirements – Entry-Level Tender/Diver

Subject: Entry Level-Tender/Diver	Standard Commercial
Principles of Diving Physics	12
Formula Application	12
Air Decompression Tables & Decompression Theory	30
Anatomy & Physiology Related to Diving	18
Diving Diseases, Injuries and Treatment	24
Diving at Altitude	4
The Hyperbaric Chamber & Associated Equipment	16
Trainee Participation in Chamber Operations (Practical)	24
First Aid/CPR/DAN O2	16
Noxious Gases in Enclosed Spaces	2
Environmental Hazards of Diving	12
Drysuit Diving (Classroom and Practical)	16
Seamanship & Rigging Fundamentals [Classroom & Practical]	24
Lightweight Diving Equipment Function & Nomenclature	12
Lightweight Diving Procedure & Techniques	40
Underwater Work Using Lightweight Diving Equipment	60
Maintenance of Diver's Umbilical	8
Commercial SCUBA Equipment and Procedures (Classroom & Practical)	16
Operations Planning	12

Diving Logs, Records, and Standards for Commercial Diving Operations	12
Underwater Tools	24
Hot Water Systems	2
Introduction to Contaminated Water Diving	4
Confined Space/Entanglement [Classroom & Practical]	8
Introduction to Mixed Gas	12
Marine Engines and Compressors	8
Industrial Safety	4
Drawings, Blueprint Reading, Report Writing	8
Introduction to Underwater *Welding and Burning/Cutting	24

Underwater Photography/Video *Optional
 Non-Destructive Testing (UT/MP) *Optional
 NHI Course #130091 Underwater Bridge Inspections [Engineer] *Optional
 Underwater Welding *Optional

TOTAL HOURS 464

2.2.2 ADCI Training Requirements – Entry Level ROV Pilot/Technician

First Aid/CPR	8
High Voltage	8
Industrial Hydraulics	45
Fiber Optics	8
Lock-Out/Tag Out	4
Sonar	4
Rigging	8
Policy/Standards	24
Mobilization/Demobilization	8
Field Training	50
Basic Electricity/Electronics	<u>20</u>
TOTAL HOURS	287

ADCI recognizes formal training certificates issued from within other nations to the extent that such certificates fully meet the training requirements of this Association. Certificates of such a nature may be presented together with a diploma of the school attended to verify whether the individual is eligible in all respects for issuance of an ADCI Commercial Diver or ROV Certification Card Entry-Level Certification Card.

If an ADCI Certification Card is requested for a level above that of an Entry Level individual, the application form must be supported by documented evidence of actual field and working experience, and must be consistent with the requirements established for issue of such a Certification Card as set forth in Section 3 hereafter.

The Association of Diving Contractors International does not perform as an educational organization and, as such, does not endorse, certify, or accredit any school participating in the training of personnel. ADCI will evaluate documents utilized by a school to determine whether the curricula and procedures of that school generally are consistent with these Standards and will offer any comments appropriate to the evaluation.

Personnel previously employed in commercial diving or ROV operations who do not meet the training qualifications set forth herein, and who seek ADCI Certification, must have an endorsement by their employer(s) as having achieved an equivalent degree of training through combination of field experience and operational activity; all of which must be supported by appropriate documentation.

2.3 Minimum Required Experience and Proficiency

1. **Advancement** beyond the designation of Entry Level requires completion of actual participation in operations and demonstrated proficiency during working dives or ROV activities. Additional required qualifications are detailed separately in Paragraph 6.28, Specific Operations Procedures, under the heading Minimum Qualifications of Personnel.
2. **Field Experience** is defined as those days spend directly participating in operations at the level of competency determined by prior training and demonstrated proficiency.
3. **Diving Proficiency** establishes the required minimum number of working dives required to obtain various higher designations of Certification. All dives or ROV pilot/technician operations must be performed during a 24-month period immediately prior to issuance of the requested higher level of certification. Work must be performed during each dive with proper supervision and properly completed log book entries. Any working dive must be of a minimum of 20 minutes bottom time. A number of shorter duration dives may be combined to equal one dive of the required 20 minute bottom time.
4. **Advancement** to higher levels of certification requires completion of training and experience for all lower levels of certification.
5. **ROV Pilot/Technicians** must, in general terms, shall be required to follow a like program leading to a determination of competency for advancement to higher levels of certification.

Minimum Qualifications:

- a. Entry-Level Tender/Diver
Formal training of at least 464 documented hours of formal instruction in the subjects set forth above.
- b. Entry-Level ROV Pilot/Technician
Formal training of at least 287 documented hours of formal instruction in the subjects set forth above.

2.4 Surface Supplied Mixed-Gas Diving and Bell/Saturation Diving

1. Individuals who possess Certification at the Entry-Level Tender/Diver level may enter industry and through job requirements of the employer or in some other manner, transition to the conduct of operations using Mixed-Gas or become involved in Bell/Saturation Diving. In doing so they are expected to gain Technical Proficiency as outlined in Section 3 (Certification) of these Standards.
2. To advance beyond the Entry-Level Certification Status to Surface Supplied, Mixed-Gas Diver or Bell/Saturation Diver the individual will be required to:
 - a. Perform a minimum of 100 field days as an Air Diver plus 50 field days of Mixed-Gas operations.
 - b. Perform a minimum of 30 working dives as an Air Diver or, a minimum of 50 working dives on air plus 10 Mixed-Gas.
 - c. Be determined as recommended by their employer as competent to perform at the higher level of Certification as set forth herein.

2.5 Supervisors

1. Individuals who possess Certification at the Air Diver, Mixed-Gas Diver, or Bell/Saturation Diver level shall be required to meet the following parameters in order to be advanced to a level of Supervisor Certification:

- a. For Surface Supplied Air Diving Supervisor: have a minimum of 200 field days and 80 working dives plus at least 30 working days as an Air Diving Supervisor under instruction.
- b. For Mixed Gas Diving Supervisor: have a minimum of 450 field days and 150 working dives of which at least 30 must be mixed-gas dives, and have a minimum of at least 30 working days as a Mixed Gas Supervisor under instruction.
- c. For Bell/Saturation Supervisor: have a minimum of 550 Field days of which at least 100 must have been performed as a Mixed-Gas Diving Supervisor plus a minimum of 250 working dives, and have a minimum of at least 60 days as a Bell/Saturation Supervisor under instruction.

<p>Candidates for all levels of diving supervisor must successfully complete the ADCI Supervisor Certification Examination in conjunction with having the required certifications and field experience.</p>
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2. Individuals who possess Certification at the ROV Pilot/Technician level who desire to advance to ROV Supervisor must:

- a. Have field experience as set forth in the Matrix contained in Section 3.8 of these Standards for the Call of ROV for which the Supervisor Certification is sought.

2.6 Divers' Personal Log Books-----As previously inclusive

This type of card will be issued by ADC International to graduates of accredited schools or member company training programs intended to furnish the entry-level individual with not less than 320 hours of formal instruction. Of that formal instruction, credit may be given for recognized courses in hydraulics, electronics, electrical, or other courses appropriate for the education required of such personnel.

4. Surface-supplied Air Diver

This type of card will be issued by ADC International to applicants who have:

- a. Completed a formal course of instruction at a recognized commercial diving school, military training, or equivalent consisting of at least 464 hours of instruction.
- b. Completed at least an additional 308 hours of documented on-the-job training as set forth in the *ADCI Consensus Standards for Commercial Diving and Underwater Operations* unless earlier completed as a portion of formal training at an accredited commercial diving school, military dive school, or equivalent.
- c. Completed at least 100 field days participating in commercial diving operations.
- d. Completed at least 30 working dives.

5. ROV Pilot/Technician

This type of card will be issued by ADC International to applicants who have:

- a. Completed a formal course of instruction as noted above,
- b. Performed not less than 150 field days participating in ROV operations, and c. Completed 60 piloting hours on either Class I, II, IV, or V ROV's.

Note: If Class IV and/or Class V; these would be for Class I or Class II ROV's suitably adapted to that class.

- d. Performed not less than 150 field days and 100 piloting hours on either Class III, IV, or V ROV's.

6. Surface-Supplied Air Diving Supervisor

This type of card will be issued by ADC International to certified Air Divers who have:

- a. Successfully completed the ADCI Supervisor's Certification Examination
- b. Completed an additional 100 field days participating in commercial diving operations during which they shall have:
 - Performed at least 50 working dives and performed a minimum of 30 days as an Assistant Surface-Supplied Air Diving Supervisor.

7. Mixed-Gas Diver

This type of card will be issued by ADC International to certified Air Divers who have:

- a. Completed at least 100 field days as an Air Diver,
- b. Completed at least 50 working dives as an Air Diver, and
- c. Completed at least 50 field days participating in surface mixed-gas diving operations during which they shall have:
 - Performed at least 10 working mixed-gas dives.

8. Senior ROV Pilot/Technician

This type of card will be issued by ADC International to ROV Pilot/Technicians who have:

- a. Achieved the status of ROV Pilot/Technician,
- b. Completed a total of 300 field days participating in ROV operations, and
- c. Completed at least 60 piloting hours (if Class I, II, IV, or V – with Classes IV or V on Class I or II vehicles); or completed at least 100 piloting hours (if Class III, IV, or V).

9. Mixed-Gas Diving Supervisor

This type of card will be issued by ADC International to certified Mixed Gas Divers who have:



- a. Successfully passed the ADCI Supervisor's Certification Examination,
- b. Completed at least 350 field days as an Air or Mixed-Gas Diver,
- c. Completed at least 150 working dives as an Air or Mixed-Gas Diver, and
- d. Completed at least 30 working days as an Assistant Mixed-Gas Diving Supervisor. d. Individual is also qualified to work as an Air Diving Supervisor.

10. Bell/Saturation Diver

This type of card will be issued by ADC International to certified divers who have:

- a. Completed at least 200 field days as an Air or Mixed-Gas Diver,
- b. Completed at least 100 working dives as an Air or Mixed-Gas Diver, and
- c. Performed for at least 30 working days in support of Bell/Saturation Diving operations.

11. Bell/Saturation Diving Supervisor

This type of card will be issued by ADC International to certified divers who have:

- a. Successfully completed the ADCI Supervisor's Certification Examination,
- b. Completed at least 100 field days as a Mixed-Gas Diving Supervisor, and
- c. Performed for at least 60 days as an Assistant Bell/Saturation Diving Supervisor.

12. ROV Supervisor

This type of card will be issued by ADC International to certified ROV Senior Pilot/Technicians who have completed 150 field days as an ROV Senior Pilot/Technician and 60 piloting hours on their assigned class of ROV.

13. Life Support Technician

This type of card will be issued by ADC International to personnel who have: a. Performed at least 100 field days as an assistant Life Support Technician.

Note: It is preferred but not mandatory that this individual shall have been previously certified to at least the level of an Air Diver.

14. Non-Diving Supervisor

This type of card will be issued by ADC International to personnel who have:

- a. Previously been qualified as a Diving Supervisor (Air, Mixed Gas, Bell/Sat) within the category achieved as set forth in the preceding portions of this standard. Non-Diving Supervisors cards will be issued only to persons who have been continually active in the commercial diving industry without a "lapse" from participation for a period of one year prior to request for issue. Renewal of such a card shall be made to personnel who have performed in the Non-Diving Supervisor role during at least three of the four years of prior certification card validity.

15. Diver Medical Technician

This type of card will be issued by ADC International upon receipt of confirmation from an acknowledged accreditation agency that the individual for whom the application is submitted has completed all necessary prerequisites. Any training agency making such submission must be recognized by ADC International as a member company in good standing.

3.4 DOCUMENTATION ACCEPTED

- 1. ADC International certification cards may be requested by ADCI member companies by certifying that the person for whom the card is requested fully qualifies to perform duties in the diver or ROV classification requested. Member companies are required to have on file, and to retain for a period of four years, copies of information that show evidence that the individual for whom the card is requested does, in fact, possess the necessary training, field experience, and required number of working dives or piloting hours.



2. Personnel are required to properly maintain a Commercial Diver's Logbook or ROV Logbook as appropriate.
3. Individual personnel seeking to obtain an ADC International certification card (other than Entry-Level Tender/Diver) are required to have verifiable evidence in the forms necessary to support the application and will, in the case of the Diving Supervisor or ROV Supervisor levels, be required to obtain and provide verifiable endorsements from ADCI or IMCA member companies for whom they shall have records of performance as an Assistant Diving Supervisor or Diving Supervisor.
4. ADC International member companies resident outside of the United States must obtain an endorsement from another ADCI member company or from an IMCA member company for applications for certification cards for personnel in their employ. This endorsement can be in the form of a letter or other document that verifies that the ADCI member or IMCA member has worked with or employed personnel, or observed that operations of the nonresident company member are in full compliance with the ADCI or IMCA minimum Standards/Codes.

5. ADCI Member Commercial Diving, ROV Pilot/Technician or Diver Medical Technician Schools

Application for the Entry-Level Certification Cards may be made by filing with ADCI a listing of the members of each class together with their social security number or other identifying number, their date of birth, and a photograph meeting the requirements of this standard. Certification cards will be prepared for each individual identified and returned to the requestor. The cards may be issued ONLY to individuals who actually graduate. Any card furnished to the school for issue to an individual who DOES NOT graduate will be returned to ADCI for disposal and removal of information from the master database.

6. Non-ADCI Member Commercial or Government/Military Diving Schools

Application for Entry-Level Certification Cards for non-ADCI member commercial diving schools will be accepted under the following provisions:

- a. That they be formally recognized as an accredited school by a government body.
- b. That the course of instruction offered generally parallels that of the Association of Commercial Diving Educators as recognized in the *ADCI Consensus Standards for Commercial Diving and Underwater Operations* to comprise not less than 317 hours of formal instruction in the subjects set forth therein or, as appropriate, the contents of this standard addressed to training and education.
- c. That the course of instruction offered will in all cases parallel that established in the American National Standards Institute document ANSI/ACDE-01-1998; the Secretariat, the Association of Commercial Diving Educators (ACDE) or formal procedures recognized by this association and consideration to be at least equal to the procedures necessary for application by a member company of ADC International.
- d. That the application for issue of an ADC International Entry-Level Tender/Diver Certification Card will require the payment of a \$25.00 USD fee for each card that must accompany the request application.

In all cases a completed Diver's, ROV Pilots/Technician, or Diver Medical Technician Logbook will be a requirement of the application process with entries therein properly attested to by signature of a responsible Company Officer or Diving Supervisor.

ERRATA 2 TO ADCI CONSENSUS STANDARDS FOR COMMERCIAL DIVING AND UNDERWATER OPERATIONS

Section 4.33 [Emergency Procedures]

Add: 4.33.12 Hydrocarbon Contamination of Class 1 Diving Bells

The possibility of hydrocarbon contaminant introduction to the atmosphere of a Class 1 Diving Bell should be evaluated at any time operations are to be conducted in an area where such a source of contamination may be present. If operations are to be conducted in an area of known, or potential contamination by hydrocarbon compounds then, the provisions of 4.28.9 [Contaminated Water Diving Operations] shall be taken into consideration during the Job Safety Analysis prior to commencement of operations or, at any time there is a change in working conditions where such an eventuality may arise.

Decontamination of personnel and equipment engaged in Class 1 Diving Bells presents a unique set of circumstances and requires special consideration. The first and most obvious concern is that the occupants of the diving bell take immediate action to mitigate the effects of inhalation of volatile fumes that can present themselves in a manner to cause narcosis or sudden unconsciousness of divers due to the anesthetic levels of such contaminants.

Contamination of the Diving Bell environment can be caused by a number of factors such as, but not limited to:

1. Off-gassing from the divers' umbilical.
2. Off-gassing from the divers' helmet or diving dress.
3. Off-gassing from the water interface between the bell hatch and water surface.

Where a possibility of hydrocarbon contamination during the conduct of Class 1 Diving Bell operations is present, the diving bell shall be outfitted with a field proven sampling pump and gas detection tubes suitable for testing of Petroleum Hydrocarbon content in an increased atmospheric pressure environment. These tubes shall be the primary monitoring system for all operations conducted by ADCI member companies.

If diving operations are conducted in an area of known or suspected hydrocarbon presence, then the following measures shall be discussed and applied during the conduct of the Job Safety Analysis.

1. Bell occupants should don positive pressure respirators (with communication) before arrival at the working depth and opening of the access hatch. Note: it may be necessary to temporarily hold the bell descent some 20 feet or so above working depth to permit donning of these masks and when completed, continue lowering of bell to working depth.
2. Bell Tender shall be instructed to take a sample prior to deployment of the Diver at the work site. If the sample is negative, commence diving operations in a normal manner. If the sample is positive, abort the diving operation.
3. Bell Tender shall be instructed to take a sample prior to returning the Diver to the bell atmosphere. If negative, continue tending the Diver to the Bell. If positive, advise the Diving Supervisor and Diver of the circumstance, don a BIBS mask, and return the Diver to the Bell.

4. On return of the Diver to the Bell, continue supplying the Diver breathing media via his helmet and meanwhile begin removal of all possible Diver worn equipment to the outside of the Bell.
5. When ready, remove the Divers' helmet and place the Diver on BIBS.
6. Flush the Diving Bell with at least two volumes of breathing gas. Note: consideration could also be made to raising the bell to its' upward excursion limit so as to cause the bell to 'burp' helping to flush the atmosphere and also move it away from the source of contamination. At this point 2 flushes maybe sufficient, taking less time. If diving from a DSV or other moored vessel, the vessel should be moved away from the source of contamination.
7. Upon completion of Step 5 take a sample of the Diving Bell atmosphere and report results to the Diving Supervisor.
8. On confirmation that the Diving Bell environment is cleared of noxious contaminants all Divers may remove their BIBBS masks.
9. Retrieve the Diving Bell to the Surface and commence a wash down of the Diving Bell and associated Umbilical following the general procedures of 4.28.9.
10. Following Step 10 above perform a wash down of all equipment and, when affected by contaminants all personnel, again following the general procedures of 4.28.9.

4.33.13

Description and Purpose of Various O₂ and Air Treatment Tables

Preface

Advantages of O₂ Treatment Tables vs. Air Treatment Tables

- Shorter
- More effective (especially in cases of delayed treatment)
- Fewer recurrences (recurrence of original symptoms of decompression sickness or other diving related illness)
- Decreased incidence of bends of assisting personnel in chamber
- Maximal tissue oxygenation (treats local hypoxia)
- Control / Reduction of cerebral and spinal edema
- Speeds up the off-gassing process by delivering a greater amount of oxygen to the tissues and body

Air Treatment Tables 1A, 2A, 3 (when oxygen is not available)

- Air Treatment Table 1A is used if pain is relieved at a depth less than 66 fsw
- Air Treatment Table 2A is used if pain is relieved at depth greater than 66 fsw
- Air Treatment Table 3 is used if symptoms are relieved within 30 minutes at 165

Important Terms
Asymptomatic – No symptoms
Omitted – Missed
Recompression - Definitive treatment for bubble related diving diseases (bends). Pressure reduces bubble size, relieving obstruction of blood flow and eliminating tissue distortion.
Hypoxia – Oxygen deficiency
Edema – Swelling
DCS – Decompression Sickness
Cutis Marmorata – Marbling of the skin

Treatment Table 5 (USN)

Purpose:

- **For relief of Type I Decompression sickness (DCS), if relief is achieved within 10 minutes of 1st (Oxygen) O₂ period. (Exception to this is if signs and symptoms of Cutis Marmorata (marbling of the skin) and certain parameters of omitted decompression**
- **Asymptomatic omitted decompression of shallow surfacing (20 fsw or less)**
- **Asymptomatic omitted decompression of rapid ascent (from deeper than 20 fsw) if the missed decompression is less than 30 minutes.**
- **Asymptomatic divers who have exceeded their surface interval limits following a surface decompression dive (Sur-D)**
- **Treatment of resolved symptoms following in-water recompression**
- **Follow up treatments for residual symptoms**
- **Carbon Monoxide (CO) poisoning**
- **Gas gangrene**

Treatment Table 6 (USN)

Purpose:

- **For Type I decompression sickness not relieved within 10 min. of 1st Oxygen breathing period @ 60 fsw, or where a neurological exam is not complete**
- **Type II decompression sickness symptoms**
- **Cutis Marmorata (marbling of the skin)**
- **Severe carbon monoxide (CO) poisoning, cyanide poisoning, or smoke inhalation**
- **Arterial Gas Embolism**
- **Symptomatic uncontrolled ascent**
- **Asymptomatic divers with omitted decompression greater than 30 minutes**
- **Treatment of unresolved symptoms following in-water treatment**
- **Recurrence of symptoms shallower than 60 fsw in the chamber**

Treatment Table 6A (USN)

For Arterial Gas Embolism or severe decompression symptoms that are initially treated @ 60 fsw. If symptoms improve, complete TT6. If symptoms are unchanged or worsen, assess the patient upon descent and compress to depth of relief of symptoms, not to exceed 165 fsw.

- Patient must be off treatment gas when compressing below 60 fsw.
- At depth of relief of symptoms, patient may be administered treatment gas, (N²O² or HeO²)-50%/50% with a Partial Pressure not exceeding 3.0 ATA.

NOTE:

A CERTIFIED DIVE PHYSICIAN MUST BE CONSULTED PRIOR TO COMMITTING A PATIENT TO A TREATMENT TABLE 6A

Treatment Table 4 (USN)

For Arterial Gas Embolism or severe decompression sickness symptoms. **A certified Diving Physician must make the determination** that the patient requires more time at depth of relief of symptoms, deeper than 60 fsw, but not exceeding 165 fsw. Time at this depth would be from 30-120 minutes, based on the patient's response.

Treatment Table 7 (USN)

This is **only used when a Certified Diving Physician has determined** that TT 4 is not adequate towards treating a non-responding severe gas embolism or life-threatening decompression sickness. Committing a patient to a TT 7 is considered a heroic measure of treatment. It involves isolating the patient in a chamber and administering to his medical needs for a period of 48 hrs.

Treatment Table 7 is used usually after TT 6, TT 6A, and TT 4 has already been administered. TT 7 is an extension @ 60 fsw of TT 6.

Treatment Table 8 (USN)

This treatment table is an adaptation of a Royal Navy Treatment Table 65 mainly for treating deep uncontrolled ascents when more than 60 minutes of decompression have been missed.

- Compress symptomatic patient to depth of relief of symptoms, not to exceed 225 fsw. TT 8 schedule @ 60 fsw is the same as TT 7.

Treatment Table 9 (USN)

This is a hyperbaric oxygen treatment table, which uses 90 minutes of O² @ 60 fsw.

NOTE: **This treatment table is recommended by a Certified Diving Physician** that is aware of the patient's condition.

- Residual symptoms of Arterial gas Embolism or DCS
- Carbon monoxide (CO) or cyanide poisoning
- Smoke inhalation
- Medical hyperbaric oxygen therapy