IDRCF

Closed Bell Diver Training

International Diving Regulators and Certifiers Forum

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Prerequisites

The following list contains the minimum prerequisite requirements of a trainee attending Closed Bell Diver Training.

1. The applicant will hold a valid and approved surface supplied diving qualification to 50m and have held that qualification for a minimum period of 12 months. Prior to commencing closed bell training, the applicant will hold an offshore surface supplied diving qualification, that qualification will be as required in the country of training delivery e.g. the EDTC diving competency standards for offshore surface supplied diver qualification.

2. Hold a valid certificate of medical fitness to dive which remains in date for the duration of the training course.

3. Hold a valid certificate of competence in first aid at work which remains in date for the course, or undertake that training as part of the course of instruction. Where first aid training is undertaken during the course that training is not included in the minimum times outlined within the course guidance.

4. Have recorded in a daily record of diving since being qualified as an offshore surface supplied breathing apparatus (SSBA) diver as per section 1,
    a) At least 100 dives using SSBA, and
    b) At least 100 hours of bottom time.

NOTE 1:
The above dives and bottom time are to include 20 dives over 15 metres
The above dives and bottom time are not to include any dive time undertaken at a depth of less than 6 metres

NOTE 2:
The above mentioned dives and dive time can be made up of either onshore or offshore dives or a combination of both.

NOTE 3:
Training dives and dive time shall not be considered to fulfill the requirements of section 4.

Closed Bell Competencies

1. Apply first aid within a chamber and bell

Element	Performance Criteria	Knowledge / Scope
1. Assess the situation	1. Identify assess and minimise hazards 2. Evaluate the equipment to be held in the closed bell of a diving operation (DMAC15) 3. Minimise immediate risk to self and casualty's health and safety 4. Assess casualty and identify injuries, illnesses and conditions 5. Immediately recognise symptoms that may require the need for recompression treatment 6. Demonstrate the ability to recognise the cause, effect, signs and symptoms of diving related ill health conditions in others and self	**Theoretical knowledge:** • Awareness of the contents DMAC guidance notes including: ○ DMAC04 ○ DMAC15 ○ DMAC21 ○ DMAC26 ○ DMAC28. • Understanding of treatment methods for the range of ill health conditions. • Non diving related injuries: ○ Fractures, sprains, muscle trauma, shock, burns, stings, bites, bleeding, electric shocks, asphyxia, pulmonary oedema, respiratory arrest, cardiac arrest. • Diving related injuries: ○ Barotrauma including: sqeeze (face, body, and lung); dental; aural; sinuses; gastro-intestinal; and pulmonary (interstitial emphysema, pneumothorax, tension pneumothorax, mediastinal emphysema, subcutaneous emphysema, and arterial gas embolism) ○ Decompression illness ○ Primary and secondary drowning ○ Vomiting underwater ○ Carbon dioxide retention ○ Carbon dioxide and carbon monoxide poisoning ○ Oxygen toxicity; anoxia and hypoxia ○ Hypothermia and hyperthermia ○ Underwater blast injury ○ High pressure nervous syndrome

Element	Performance Criteria	Knowledge / Scope
		○ Compression arthralgia.
2. Apply first aid procedures	1. Reassure and seek consent from casualty 2. Maintain hygiene standards 3. Give elementary first aid and cardio-pulmonary resuscitation to an injured or unconscious person in a closed bell or chamber to stabilise the condition. 4. Administer therapeutic gases to the casualty where necessary 5. Provide first aid management 6. Assist a qualified person in the treatment of diving related ill health conditions / illness or provide such treatment until an appropriately qualified person is available 7. Follow instructions relayed by the dive/life support supervisor from the medical adviser to a patient under saturation and during decompression from saturation 8. Make the casualty comfortable with available resources 9. Use safe manual handling techniques when moving unconscious or incapacitated patients into the bell, or into and out of the chamber complex 10. Monitor casualty's condition and respond in accordance with effective first aid principles 11. Assist in casualty management	**Theoretical knowledge:** • Understanding of the structure and principle functions of musculo skeletal systems, central and peripheral nervous system, cardio vascular system, ears, sinuses, vestibular organs, respiratory system, gastro-intestinal system, and endocrine system. • Understanding causes and effects, and recognising symptoms of the range of injuries and ill health conditions described above. • Understanding means of giving artificial ventilation. • Understanding hygiene and infection control. • Understanding rates of and ratios between artificial ventilation and chest compressions. • Understanding the need for correct casualty positioning and maintenance of the airway. • Explaining direct pressure, indirect pressure and elevation to control bleeding. • Understanding importance of blood clotting. • Understanding major pressure points. • Understanding dressings, splinting and transporting. • Identifying types of burns and particular considerations. • Awareness of how to manoeuvre injured or unconscious person from a diving bell to a deck compression chamber complex or from a deck compression chamber complex into a hyperbaric evacuation chamber, recognising the possible dangers of damage to the nervous system. • Understanding the effects of high partial pressures of component gases of artificial breathing mixtures, and the applications and implication, of this in the care of divers. **Observed performance:**

Element	Performance Criteria	Knowledge / Scope
		• Carrying out a systematic examination of an injured or ill diver. • Positioning casualty to facilitate ABC assessment. • Taking immediate actions to assure clear airway, restore breathing, including mouth to mouth resuscitation, assure heart function and stop massive bleeding. • Maintaining stability and protecting from further harm whilst assistance is obtained from more qualified persons. • Summoning additional help without undue delay. • Giving appropriate first aid to and responding to needs of person sustaining injuries. • maintaining acceptable standards of hygiene; • Using first aid equipment correctly including administering emergency therapeutic gases when required. • Use of DMAC15 kit in the confines of the bell. • Able to communicate with a medically trained person in the event of an injury or diving ill health matter relating to self or another diver. • Able to stabilise condition of unconscious or injured diver in diving bell until bell is locked onto chamber • Control of one of; major hemorrhaging, amputation, crush/impact injury, chemical burn or stabilization of unconscious person during bell transit to surface • Respond to needs of a diver who has asphyxia. • Checking of a pulse. • Following instructions from the surface to carry out overall visual checks, monitor vital signs, i.e. pulse, respiratory rate, temperature, and make simple neurological tests and to report the results. • Assisting in TUP or evacuation procedures. • Recognising signs and symptoms of ill health conditions in others whilst conducting closed bell diving operations; and • Responding to the needs of a diver who is drowning

Element	Performance Criteria	Knowledge / Scope
3. Communicate details of the incident	1. Explain the nature of casualty's injury/condition 2. Request support and/or appropriate medical assistance 3. Accurately convey assessment of casualty's condition and management activities 4. Accurately record details of casualty's physical condition 5. Prepare / contribute to reports	
4. Evaluate own performance	1. Seek feedback from clinical expert 2. Demonstrate an awareness of the possible psychological impacts on rescuers of involvement in critical incidents 3. Participate in debriefing/evaluation	

2. Work safely in closed bell diving operations

Element	Performance Criteria	Knowledge / Scope
1. Conform to statutory requirements	1. Identify and explain applicable legislative requirements 2. Identify duty of care requirements 3. Understand and observe the main duties of the employer and employee 4. Understand and apply permit to work systems	**Theoretical knowledge:** • Main duties, requirements and purposes across all relevant Regulations. **Observed performance:** • Recognition in assessment dives of the need for safe systems of work, safe plant and equipment, safe use of hazardous substances, safe access to and from workplace. • Recognition in assessment dives of the need for a properly supervisor and a properly constituted diving team under the control of that supervisor, including at least one standby diver.
2. Conform to general requirements	1. Understand the relevance, status and significance of the following that should or could be applied in closed bell diving: • Approved Codes of Practice (ACoP) • Guidance, official memoranda • International, European and National Standards • Industry codes and guidance • Requirements for testing and examination applicable to plant and equipment are understood. • Company safety management systems	**Theoretical knowledge:** • Main duties, requirements and purposes of general guidance, codes and official memoranda for diving operations and in particular specialised operations. • Technical information including IMCA guidance documents: ○ D010 ○ D018 ○ D024 ○ D032 ○ D041 ○ D050
3. Identify hazards and control measures	1. Demonstrate the basic principles of risk management 2. Identify and discuss common hazards 3. Identify measures for controlling hazards and risks	**Theoretical knowledge:** • Understanding of the requirements to maintain own health and safety and that of others. • Understanding of the hazards associated with: ○ working on or near water ○ electricity on the surface and underwater ○ lifting, slinging and rigging loads ○ pressurised systems (hydraulic and gas) including high pressure jetting systems

Element	Performance Criteria	Knowledge / Scope
		○ use of explosives and explosive activated systems. • Understand that there are a variety of configurations and layouts of closed bell diving systems using a variety of breathing apparatus and if the diver and dive team have not used the particular equipment fit recently or before then familiarisation training should be undertaken. **Observed performance:** • Understanding shown by diver that they must have the ability to carry out the task. • Informing the supervisor if diver feels unfit to dive. • Following diving rules as far as they apply to diver. • Maintaining daily record of diving (logbook) and recording all dives for presentation at medical examinations, and retaining for two years after last entry.
4. Identify workplace health and safety communication and reporting processes	1. Workplace health and safety communication processes, information and documentation are identified and discussed 2. Role of designated workplace health and safety personnel is identified and explained 3. Safety signs and symbols are identified and explained 4. Procedures and relevant authorities for reporting hazards, incidents and injuries are identified 5. Management of change procedures are understood	
5. Identify workplace health and safety incident response procedures	1. General procedures for responding to incidents and emergencies are identified and explained 2. Procedures for accessing first aid are identified 3. Selection and use of relevant personal protective equipment are identified and demonstrated 4. Fire safety equipment is identified and discussed	

3. Carry out pre-dive preparations in closed bell diving operations

Element	Performance Criteria	Knowledge / Scope
1. Understand the principles of physics and physiology applicable to closed bell diving	1. Apply knowledge of the relationship between pressure, volume and temperature of gases to diving operations 2. Apply knowledge of the effects of pressure, volume and temperature changes on the diver and their implications for diving operations 3. Apply knowledge of partial pressure and solubility of gasses and their effect on the diver 4. Understand and apply operational and therapeutic tables	
2. As a member of a dive team check the bell	1. Complete pre dive internal bell check in accordance with check list ensuring readiness for use 2. Complete pre dive external bell check in accordance with checklist ensuring readiness for use 3. Calculate gas requirements of the diver, chamber and closed bell systems	**Observed performance:** <u>Internal checks to include:</u> • Ensuring chamber is clean and free from extraneous materials • Checking BIBS is connected to appropriate gases, is in good condition and operational • Bringing on line appropriate primary and secondary gas supplies and checking pressures • Checking onboard gas and O2 supply pressures and percentages • Ensuring door seals and faces are undamaged • Ensuring door equalising valves are functioning • Checking primary and secondary lights are working • Checking primary and secondary communications are working • Ensuring emergency power is operational • Securing drop weight release mechanism if applicable • Checking view ports undamaged • Ensuring diver's seat harness is serviceable • Visually inspecting and function testing emergency man lift to ensure it is secured • Visually inspecting electrical wiring and gas pipe work for material integrity • Ensuring valves aligned in accordance with bell check list.

Element	Performance Criteria	Knowledge / Scope
		External checks to include; • Ensuring door seals undamaged • Ensuring primary and secondary lights working • Checking drop weight release mechanism is secure if applicable • Ensuring door equalising valves are functioning • Ensuring on board gas supply is at suitable pressure and percentage • Checking view ports are undamaged • Ensuring main lift wire attachment is secure • Ensuring umbilical attachment is secure • Ensuring guide wires to bell are secure • Checking bell location transponder is fitted • Ensuring strobe light is fitted and working • Visually inspecting electrical wiring and gas pipe work for material integrity • Ensuring valves set in correct sense • Checking that no equipment marked or tagged as defective is used for the diving project • If any faults are found in the equipment they are reported promptly to the supervisor • Checking security and condition of onboard gas cylinders is acceptable.
3. As a member of a dive team check and prepare closed bell systems	1. Check gas resources and mixture availability in accordance with requirements 2. Confirm the launch and recovery systems are operational in accordance with requirements 3. Check the environmental control unit in accordance with requirements 4. Ensure emergency response systems are checked and operative	**Observed performance:** Systems to include: • Basic gas and fluid flow paths • Electrical sources (J-Box/Penetrators) • Regulators • Drop weight appliances.

Element	Performance Criteria	Knowledge / Scope
4. As a member of a dive team check and prepare diver's equipment for a bell diving operation	1. Inspect all personal equipment carefully for signs of deterioration, damage or corrosion and function tested where appropriate 2. Prepare divers equipment in accordance with checklists ensuring readiness for use	**Theoretical knowledge:** • Function and methods of operation of personal diving equipment. • Common types of equipment fault. • Legal and regulatory requirements and procedures. **Observed performance:** Checked: • Diver's helmet • Independent and combined primary and secondary gas supply sources • Checking umbilical • Checking individual equipment • Checking that no equipment marked or tagged as defective is used for the diving project • If any faults are found in the equipment they are reported promptly to the supervisor.

Element	Performance Criteria	Knowledge / Scope

5. As a member of a dive team understand the hazards and risk controls of diving from a dynamically positioned (DP) vessel	1. Understand how a vessel maintains its position using thrusters and navigational reference data; controlled by a computer system and the risks to diving operations
	2. Understand the hazards of dynamic positioning that can affect the safety of diving operations and participate appropriately in controlling the risk to divers
		Theoretical knowledge:
		• IMCA Guidance document D010
		• Function of a dynamically positioned system
		• Hazards effecting the diver
		  ○ Thrusters
		  ○ Loss of position
		  ○ Shallow water effects
		• Risk control procedures
		  ○ Control of umbilical
		  ○ Communications, dive control to bridge and dive control to diver.
		
		Observed performance:
		• Passive/Active tending techniques from the bell including diving through a basket or “golden gate” as used when operating from a DP vessel.

4. Complete closed bell and chamber surface procedures

Element	Performance Criteria	Knowledge / Scope
1. Follow routine chamber procedures	1. Observe chamber procedures in accordance with policy 2. Provide assistance in accordance with directions from the dive or life support supervisor 3. Assist in maintaining effective health and hygiene procedures in saturation	**Theoretical knowledge:** • The routine chamber procedures relating to gas quality, locks, fire risk and hygiene. • The selection of decompression schedules for a saturation dive, for therapeutic decompression, for excursions. • The causes and symptoms of anoxia, hypoxia and hyperoxia. • The procedure in the event that the correct decompression schedule cannot be followed. • All aspects of assisting in a decompression situation. • Prevention and remedy of skin fungus infections, cut and laceration management. • Suitability of medication and supplements under pressure. **Observed performance:** • Changing CO2 adsorbents in ECU and scrubbers as appropriate. • Using hand/equipment locks as appropriate. • Observing hygiene procedures, following correct procedures when using sanitary system and attending to personal hygiene, with particular attention to ear prophylactic regimes. • Checking chamber contents against check list at pre dive stage, keeping paper to a minimum, keeping clothing/materials away from hot surfaces to minimise risk of fire and maintaining awareness of fire zone implications. • Excluding inappropriate or unsafe substances from chamber including foodstuffs, cigarettes, matches, lighters, tobacco, hydrocarbon based chemicals, unauthorised drugs, alcohol, solvents and after-shaves, quantities of paper, books, magazines, fountain pens and similar, non fire retardant bedding, explosives, items likely to implode or explode,

Element	Performance Criteria	Knowledge / Scope
		mercury and alcohol thermometers, items of an electrical nature (see IMCA guidance note D041). • Assisting during decompression, following instructions to regulate chamber pressure, understanding oxygen make up system procedures, operating the BIBS system, understanding the effect of increased partial pressure of oxygen on the fire zone, selecting correct gas mixture on instruction of supervisor and maintaining environmental conditions.
2. Prepare chamber complex for use	1. Prepare chamber for use in accordance with checklist 2. Check the environmental control unit in accordance with requirements 3. Ensure emergency response systems are checked and operative	**Theoretical knowledge:** • Function, procedures and methods of operation of diving chamber equipment. • Legal and regulatory requirements and procedures. **Observed performance:** • Candidate correctly follows all procedures and instructions. • Ensuring chamber is clean and free from extraneous materials. • Checking door seals and sealing faces are undamaged. • Checking fire fighting and other internal equipment to inventory. • Ensuring sanitary system is working. • Ensuring valves on the chamber and control panel are free and aligned in accordance with DCC/panel checklist (open or closed to instructions/checklist). • Ensuring the BIBS are connected to the appropriate gases. • Ensuring primary and secondary gas supplies are analysed and gauged and connected to chamber. • Function testing BIBS. • Checking lights are working. • Ensuring primary and secondary communications are working. • Ensuring safety interlocks or hand locks/medical locks are operational. • Checking that no equipment marked or tagged as defective is used for the diving project.

Element	Performance Criteria	Knowledge / Scope
		• If any faults are found in the equipment they are reported promptly to the supervisor.
3. Monitor internal chamber operations	1. Monitor chamber environment and take appropriate actions to keep the supervisor informed 2. Recognise abnormal readings and their significance and inform supervisor 3. Monitor closed bell and chamber gas quality and gas system quality	**Theoretical knowledge:** • Significance of abnormal readings during chamber operation. • The effects of high pressure oxygen on combustible materials. • The importance of ensuring that no oils or greases are present in oxygen systems. • The effects of impurities in diver's breathing gas chamber and bell atmospheres, BIBS gas. • How gas systems can become contaminated and likely points of contamination. **Observed performance:** • Monitoring chamber environment and reporting readings to supervisor as instructed re. depth, temperature, humidity, oxygen and carbon dioxide levels, time. • Immediate reporting to the supervisor when previously determined levels are reached. • Identifying gases and gas percentages in mixed gases by colour coding and markings. • Using continuous read-out oxygen and carbon dioxide monitors. • Using gas sample test kits to determine impurities in gases used.

Element	Performance Criteria	Knowledge / Scope
4. As a member of a dive team operate the built in breathing system (BIBS)	1. Operate the BIBS in accordance with instructions and operational procedures	**Theoretical knowledge:** • Awareness of the function and method of operating BIBS supply systems. **Observed performance:** • Bringing on line correct gas for the BIBS, on instruction from the supervisor. • Setting correct pressure and opening up supply from the control panel. • Checking overboard dump system and back pressure regulator are operational.

5. Undertake underwater deployment in closed bell diving operations

Element	Performance Criteria	Knowledge / Scope
1. As a diver undertake a closed bell dive	1. Undertake closed bell dives in accordance with pre-determined plans. 2. Undertake lock-outs and re-entry to closed bell in accordance with operational procedures 3. Conduct transfer under pressure (TUP) operation in accordance with the supervisor's surface instructions	**Theoretical knowledge:** • Awareness of operational procedures for bell divers, including lock outs and re-entry. • Awareness of procedures for TUP operations. • Understand the theory associated with air bounce diving in a closed bell. **Observed performance:** • Undertaking bell dives to varied pre determined depths. • Undertaking lock outs and re entries in a safe manner. • Following supervisor's surface instructions to safely carry out a TUP operation. • Undertake an air bounce dive.
2. Act as a bellman	1. Assist diver to don equipment before leaving the bell 2. Assist diver to exit and re-enter the closed bell and tend the diver's umbilical 3. Act in accordance with operational and safety procedures 4. Maintain appropriate checks and controls 5. Manage gas reclaim systems demonstrating an understanding of the set up and operating principles 6. Conduct post dive checks	**Theoretical knowledge:** • Awareness of function and methods of operation of diving bell and of individual items of personal diving equipment. • Common types of equipment fault. • Legal and regulatory requirements and procedures. • Understand gas sampling using gas sample tubes in the internal bell environment (Carbon Dioxide and common trace contaminates of hydro-carbon distillate). • Fundamental understanding, practical set-up and operation of the diver’s gas reclaim systems. **Observed performance:** • Performing through water communication checks on instruction of the supervisor. • Assisting diver to don equipment before leaving the bell, ensuring diving helmet is fitted correctly, bail out cylinder valve

Element	Performance Criteria	Knowledge / Scope

		is open if applicable, side block valve is closed if applicable, and pressure reported to surface, helmet locking devices and all hose connections are secured, diver's umbilical free for exit, communications cable connection is secure, hot water and gas mixture are supplied to diver and diver has checked for leaks in trunking.
		• At dive depth, assisting diver to exit and enter the bell.
		• Tending diver's umbilical.
		• On instructions from the supervisor controlling bell environment throughout duration of dive by:
		  ○ monitoring O2 as per company policy
		  ○ monitoring CO2
		  ○ changing CO2 scrubber charge where necessary
		  ○ monitoring and regulating bell temperature
		  ○ monitoring hot water temperature to diver.
		• Monitoring internal and external depth gauges.
		• Operating bell gas system and monitoring diver's breathing.
		• Conducting post dive checks on diver's equipment.
		• Undertake gas sampling using gas sample tubes in the internal bell environment (Carbon Dioxide and common trace contaminates of hydro-carbon distillate).

3. As a member of the surface team support a closed bell diving operation	1. Observe surface procedures to ensure safety of diver(s) during a bell run 2. Maintain diving operations log	**Theoretical knowledge:** • Have a basic understanding of programmable logic controllers (PLC) used in diving operations. • Awareness of surface procedures during a bell run. • Maintenance of diving operations log. **Observed performance:** • Locking and unlocking bell onto the chamber. • Operating locks during saturation to lock materials in and out of the chamber. • Operating chamber sanitation system safely. • Maintaining diving operations log for the diving supervisor's signature.

Element	Performance Criteria	Knowledge / Scope
4. As a member of a dive team establish and maintain effective communications	1. Follow correct communications procedure ensuring voice communications are passed, received and acknowledged as diver, bellman or member of surface team and keeping line open for emergencies 2. Use emergency communication and helium unscramblers where appropriate	**Theoretical knowledge:** • Testing through water communications systems. • Communications procedures for bell diving. • Emergency communications procedures. **Observed performance:** • Passing, receiving, and acknowledging voice communications as diver, bellman or member of surface team, following correct communication procedure. • Keeping line open for emergencies. • Operating communications equipment using helium unscrambler where necessary. • Using emergency communications, testing through water communication systems on instructions from surface, using line signals and emergency bell tapping code both to give and receive messages.

6. Implement emergency procedures in closed bell diving operations

Element	Performance Criteria	Knowledge / Scope
1. As a diver act in a rescue emergency situation	1. Maintain communication with surface 2. Follow procedures for switching to reserve supplies when necessary and for returning to bell where appropriate 3. Take appropriate actions in accordance with operational procedures as a rescue diver in a lost bell situation	**Theoretical knowledge:** • How and when a closed bell might be lost. • Relocation procedures and various methods of bell recovery. • How a wet transfer is achieved when a bell is lost. • Actions to be taken by divers in a lost bell and by the surface team. • Lost bell survival strategies. • Awareness of bailout durations. **Observed performance:** • Informing surface of a problem and returning to bell. • On failure of main gas supply, switching to bail out bottle and returning immediately to bell. • If fouled, advising surface and requesting assistance if unable to clear.

2. As a bellman, implement bell emergency procedures	1. Maintain communication with surface to ensure they are informed of problems and actions taken
	2. Follow bell emergency procedures
	3. Understand the theory of bell to bell (wet) transfers
		Theoretical knowledge:
		• The various secondary recovery methods in common use.
		• The purpose and methods of bell ballasting and ballast release systems.
		• The procedures for slipping ballast in emergencies and the associated dangers.
		• The principles of bell survival equipment.
		• responding to the supervisor's request to prepare bell to be recovered using secondary recovery system on failure of primary bell recovery system;
		• The procedures used during and the hazards of wet transfers, including:
		  ○ bell to basket
		  ○ bell to surface
		  ○ bell to bell

Element	Performance Criteria	Knowledge / Scope

		Observed performance:
		• Reporting switching to on-board gas.
		• Advising surface using through water communication system.
		• Preparing bell for recovery on simultaneous loss of surface supplied gas and/or communications to diver and/or bell, or bell and surface.
		• Recovering diver to bell, informing supervisor and preparing bell for recovery on failure of the heating system.
		• Understanding instructions/company procedures on:
		  ○ failure of secondary recovery system
		  ○ making a wet transfer to a rescue bell
		  ○ slipping attached remnants of hoisting wire
		  ○ umbilical and guide wires
		  ○ ensuring bottom doors are closed
		  ○ preparing to slip ballast weights if fitted
		  ○ donning and utilising survival equipment
		  ○ using lung powered scrubbers
		  ○ as a last resort, if communication not established, slipping ballast weights (if fitted) in accordance with written instructions
		  ○ recognising dangers of surfacing under a vessel.
		• On loss of bell and secondary communications failure:
		  ○ understanding actions to be taken by surface team
		  ○ following procedures for loss of primary gas, heat and communication
		  ○ responding to external assistance
		  ○ using lost bell emergency tapping code.
		• Assisting diver in difficulties including:
		  ○ switching to on-board gas
		  ○ deploying diver recovery device (man lift)
		  ○ venting the bell to raise water level so recovered diver can be floated in
		  ○ informing surface of intention, and locking out
		  ○ following diver's umbilical

Element	Performance Criteria	Knowledge / Scope
		○ checking diver's breathing gas by flushing through helmet ○ diver switching to independent and combined primary and secondary gas supply sources (if necessary) ○ returning to bell on bellman's umbilical ○ assisting diver into bell, using buoyancy and the man lift ○ taking off diver's breathing apparatus ○ applying expired air resuscitation and closed chest cardiac massage (simulated).
3. As a diver act from inside chamber in an emergency situation	1. Deal with chamber complex emergencies in accordance with written procedures 2. Evacuate chamber occupants to another chamber or hyperbaric lifeboat if an emergency cannot be controlled	**Theoretical knowledge:** • Emergencies which might occur in chambers and the procedures to be followed. • Use of fire fighting equipment in a saturation diving system and the necessary pre and post diving checks and safety precautions. • The role of the surface team in a fire in chamber situation. • Understand procedures for hyperbaric evacuation including: ○ HEU launch systems (access to and manning including transfer of injured diver) ○ HEU equipment (Helmets, neck restraints, body harness restraints, entry positions) ○ HEU survival techniques ○ SPHL life support and boat auxiliary systems ○ SPHL considerations including, dehydration, seasickness, effluent contamination, ergonomics, DVT ○ HRC life support systems ○ Life Support Packages (LSP, Flyaway Pack) services ○ Hyperbaric Reception Facility (HRF) ○ Sequence of events for launching, stabilizing, transfer and decompression. **Observed performance:** • Handling chamber complex emergency in accordance with authorised procedures.

Element	Performance Criteria	Knowledge / Scope
		• Handling isolation procedures in accordance with written procedures. • Carrying out a chamber evacuation and isolation procedure in simulated conditions
4. As a member of the support team act in a chamber complex emergency situation	1. Undertake actions in various emergency situations in accordance with company, operational or communications procedures 2. Assist in a chamber evacuation to ensure safety of diver(s)	**Theoretical knowledge:** • Effects of pure oxygen supply in contact with combustible material. • Use of fire fighting equipment in association with a saturation diving system. • Emergencies that may occur in a chamber and procedures to be followed. **Observed performance:** • Operating standby communications systems if main system fails. • Understanding procedure for fighting a fire and using a deluge system if fitted. • Using hand signals or written communications if standby system fails. • Understanding procedure in event of loss of chamber pressure. • Assisting in chamber evacuation.

7. Conduct post dive procedures in closed bell diving operations

Element	Performance Criteria	Knowledge / Scope
1. As a member of a dive team carry out post dive checks on chamber and closed bell complex	1. Check chamber and closed bell and prepare for next use using checklists 2. Undertake routine maintenance	**Theoretical knowledge:** • Legal and regulatory post dive requirements and procedures for chamber/bell complexes. • Awareness of closed bell/chamber complex maintenance requirements in accordance with the manufacturers or organisations instructions and procedures. **Observed performance:** • Cleaning closed bell/chamber ensuring no extraneous materials left inside and without undue damage or deterioration. • Equipping bell to inventory. • Making good and recording any deficiencies, and reporting any problems. • Completing maintenance checklist. • Changing CO2 scrubber cartridge. • Under close supervision tightening gas fittings as necessary. • Under close supervision lubricate fittings with correct lubricants. • Inspecting door/bell, mating/medical lock seals and replacing where necessary. • Inspecting BIBS masks and replacing where necessary. • Cleaning bell and chamber using non toxic chemical cleaners. • Calibrating gas analysis monitors.

8. Maintain effective working relationships in closed bell diving operations

Element	Performance Criteria	Knowledge / Scope

1. As a member of a dive team establish and maintain effective working relationships with dive team	1. Establish and maintain constructive relationships with colleagues and demonstrate capability to live in an enclosed environment with other people under saturation conditions
	2. Meet commitments to colleagues within agreed time-scales
	3. Offer appropriate assistance to colleagues where difficulties arise
	4. Provide colleagues with information and support to meet identified needs
	5. Give and receive feedback constructively to contribute to a positive framework for improving future performance
		Theoretical knowledge:
		• Own work role and responsibilities.
		• Colleagues roles and responsibilities.
		• Ways of establishing constructive relationships.
		• Ways of seeking and exchanging information, advice and support.
		• Use of different styles of approach in different situations.
		• Ways of informing and consulting with others about problems and/or proposals.
		• Relevant legal and regulatory requirements
		• Ways of dealing with disagreements and conflict.
		• Methods of motivating people.
		
		Observed performance:
		• Agreeing actions and meeting commitments;
		• Offering and supplying support and essential information to team and colleagues.
		• Identifying and providing essential information to colleagues.
		• Co-ordinating own work with that of colleagues.
		• Contributing fully to team discussions, planning and conveying of information, and to the minimisation of interpersonal conflict.
		• Discussion with colleagues on work activities and plans.
		• Identifying issues which affect team relationships and taking appropriate action.
		• Work products:
		  ○ work plans
		  ○ records of meetings
		  ○ records of discussions.

2. As a member of a dive team	1. Participate in discussion and planning activities involving team members	

contribute to effective teamwork	2. Ensure sufficient information about proposed activities, progress, emerging threats and opportunities is conveyed to and by all team members at all times 3. Identify, minimise and resolve interpersonal conflict in a way that maintains respect.	

Minimum Course Requirements

In addition to the competencies outlined, the following list contains the minimum requirements of a trainee attending Closed Bell Diver Training:

1. 29 bell lockouts as diver.
   Lockouts undertaken as a diver should incorporate an expected diver activity or a rescue procedure. Lockouts undertaken as a diver should be of a suitable duration to accomplish the proposed activity for the lockout. Excursions and umbilical lengths should be such that both the diver and bellman must consider and apply effective umbilical management.
2. 29 bell lockouts acting as bell-man (standby diver).
3. The trainee diver may make only one lockout from the bell at any one depth during each bell run. The diver and bellman may change roles so that each carries out a lockout at a particular depth.
4. 14 complete bell-runs including transfer under pressure.
5. The trainee diver must undergo practical training and assessment in the following bell emergency procedures:
   a) Simulated rescues of unconscious diver (at least 5).
   b) Loss of gas to the bell.
   c) Loss of gas to the diver.
   d) Loss of communications.
   e) Loss of umbilical (communications, gas, hot water, power and internal pressure).
   f) Communicating with a lost bell.
   g) Lifting an unconscious diver into the bell sealing the bell and monitoring the diver during the ascent.
   h) Transferring an unconscious diver through the TUP trunking to the chamber. Performing CPR and then placing on BIBS.
   i) Donning survival equipment.
6. The trainee diver must undergo theoretical training and assessment in the following bell emergency procedures:
   a) Loss of main lift to the bell.
   b) Loss of main and secondary lift, umbilical attached.
   c) Total loss of the bell.
   d) Ways of locating a lost bell.
   e) Loss of internal pressure in the bell.
   f) Bell contaminated atmosphere.
   g) Loss of electrical power to a chamber.
   h) Hyperbaric evacuation systems.
   i) Therapeutic and abort decompression tables.
   j) Breakdown of the main ECU.
7. The trainee diver must undergo practical training and assessment in the following chamber emergency procedures:
   a) Emergency evacuation of a chamber with a fire inside the chamber.
   b) Emergency evacuation of a chamber with a loss of pressure.
   c) Simulated evacuation to HLB.
   d) Using secondary communications with a chamber.
   e) Use of BIBS.

8. Trainees must be supervised by an instructor in the bell until the trainee is deemed competent at the lockout and bellman procedures. As a minimum the instructor is to be in the bell for at least the first three bell lockouts. These supervised runs may be made from "deck to deck" without "transfer under pressure" (TUP). All subsequent bell runs should be made using full TUP procedures.
9. Perform at least 4 chamber pressurisations, including pre-dive checks of living- and transfer chamber.
10. Under supervision, monitor the chamber atmosphere while occupants are in saturation.
11. Undertake bell pre-dive checks on at least 4 separate days.
12. Operate the bell panel under supervision.
13. Operate the chamber panel under supervision.
14. Undertake training in the process associated with hyperbaric evacuation and launch procedures.
15. Act as a diver during 3 bell lockouts at a depth of 55 metres, 70 metres and one deeper than 80 metres.
16. Act as a diver from a storage depth deeper than 50 metres on two bell runs. The lockout for these bell runs should be at least 15 minutes for each dive on each occasion. During these runs the diver should swim away from the closed bell to the full extent of the divers umbilical.
17. Act as a bellman from a storage depth deeper than 50 metres on two bell runs.
18. Activate secondary life support during at least one of the shallow dives.
19. Undertake decompression from a living depth deeper than 50 metres.

Course Duration

Due to the nature of closed bell training, the duration of the training program may be dependent on the number of students undertaking the training program. As a rule of thumb, the course duration (for the closed bell competencies) should be approximately 18 days. First aid or Diver Medic Training (DMT) courses may be added to this.

The training may be undertaken in conjunction with other training programs such as DMT, however the course content or duration for each course should not be compromised by the combination.

Whilst distance learning options may be used to refresh existing knowledge or provide initial knowledge, the face to face component of the course should not be shortened by the availability of that training.