

**Commercial Diving Competency Standard for Inland/Inshore  
Commercial Self Contained Underwater Breathing Apparatus  
(CSCUBA) Diver**

**and**

**Surface Supplied Diving Equipment (SSDE)  
Diver**

**The Ministry Of Manpower (MOM)**

**All rights reserved. This document is provided for explicit use and guidance of MOM Accredited Training Providers as information resource only. Any other use of this document or parts thereof, including reproduction, publication, distribution, transmission, re-transmission or public showing, or storage in a retrieval system in any form, electronic or otherwise, for purposes other than that expressly stated above without the expressed permission of MOM is strictly prohibited.**

## Version History

<b>Version</b>	<b>Effective Date</b>	<b>Changes</b>	<b>Author</b>
1.0	20 December 2010	First Issued	ICB, WSHC
2.0	1 February 2021	Reviewed	CPT, WSHC

## TABLE OF CONTENTS

1.0	INTRODUCTION AND SCOPE .....	4
1.1	Application .....	4
1.1.1	Certification .....	5
1.1.2	Definitions.....	5
1.3	Pre-Requisites for CSCUBA Diver .....	9
1.4	Working Categories for CSCUBA Divers (0 - 30metres) .....	9
1.5	Pre-Requisites for SSDE Diver .....	9
1.6	Working Categories for SSDE Divers (0 – 30 metres).....	10
1.7	Scope of Working Conditions.....	10
2.0	COMPETENCY STANDARD .....	11
2.1	Core Competency Units for CSCUBA and SSDE Diver .....	12
2.1.1	Legislation and Standards (CD-CCD-100A-0) .....	12
2.1.2	Diving Theory: Physics (CD-CCD-100B-0) .....	12
2.1.3	Diving Theory: Physiology (CD-CCD-100C-0).....	12
2.1.4	Diving Procedures (CD-CCD-100D-0) .....	12
2.1.5	Underwater and Surface Operational Hazards (CD-CCD-100E-0) .....	13
2.1.6	Documentation and Records (CD-CCD-100F-0) .....	13
2.2	Specific Competency Units .....	13
2.3	Specific Competency Units for CSCUBA Diver .....	13
2.3.1	CSCUBA Diving Equipment, Systems, Procedures and Practices (CD-SCD-101A-0) .....	13
2.3.2	CSCUBA Diving (CD-SCD-101B-0) .....	14
2.4	Specific Competency Units for SSDE Diver.....	14
2.4.1	SSDE - Diving Equipment, Systems, Procedures and Practices (CD-SSD-102A-0).....	14
2.4.2	SSDE Diving (CD-SSD-102B-0) .....	14
2.4.3	Deck Decompression Chamber Procedures (optional) .....	15
	(CD-SSD-102C-0) .....	15
2.4.4	Deck Decompression Chamber Operator (optional).....	15
	CD-SSD-102D-0) .....	15
3.0	INLAND/INSHORE DIVER COMPETENCY FLOW CHART .....	16
3.1	Core Competency Units - Subject Content .....	16
3.2	CSCUBA Diver Specific Competency Units - Subject Content.....	19
3.3	SSDE Diver Specific Competency Units - Subject Content .....	20
3.4	Diver Progression Flow Chart .....	22
4.0	INLAND/INSHORE DIVER CORE COMPETENCY UNITS.....	23
5.0	INLAND/INSHORE CSCUBA DIVER SPECIFIC COMPETENCY UNITS .....	50
6.0	INLAND/INSHORE SSDE DIVER SPECIFIC COMPETENCY UNITS.....	61

## 1.0 INTRODUCTION AND SCOPE

This standard specifies the competencies required for training and certification of divers for commercial diving operations using Commercial Self Contained Underwater Breathing Apparatus (CSCUBA) and Surface Supplied Diving Equipment (SSDE). The purpose of this Standard is to describe the competency requirements to train commercial divers to safely and competently carry out diving operations using CSCUBA and SSDE.

This standard outlines the competency and training requirements for the following two levels of commercial diver qualification:

- Level 1: Commercial SCUBA Diver (No decompression; maximum depth 30m)
- Level 2: SSDE Diver (Maximum depth 30m)

This standard is prepared by the Workplace Safety & Health Council (WSHC) in consultation with the Commercial Diving Association (Singapore). It should be understood by the user of this standard that the requirements contained herein are the **minimum** acceptable levels.

This competency standard adopts a unitised approach for both CSCUBA and SSDE diver training and certification. To be certified as a CSCUBA or SSDE the person must have completed all the relevant units for the level of training and certification awarded as outlined in this standard. It is the responsibility of the employer/contractor who engages the occupational diver to ensure the diving personnel are suitably trained and competent for the scope of work being carried out.

### 1.1 Application

This Competency Standard outlines the minimum requirements that must be achieved to ensure that occupational divers are trained / certified as competent commercial divers. This competency standard details the level of knowledge, theory requirements and practical application of the diving techniques needed by divers while using Commercial SCUBA (CSCUBA) to a maximum depth of 30m (99fsw) with no decompression diving, and SSDE diving to a maximum depth of 30m(99fsw).

This Standard is one part of (Part 1) of the standards relevant to the training and certification of commercial divers, where the requirements of authorities and industry demand a prescribed degree of training and competence to ensure an adequate degree of safety, performance and economy during occupational diving operations. The objective of this standard is to provide authorities, training providers and trainees with a summary of the minimum competencies for CSCUBA and SSDE Divers, and the minimum content of a training course for imparting these competencies to those divers.

The Accreditation Authority may utilize the Standard to:

- approve establishments to run courses and / or assessments to this Standard
- monitor courses to ensure standards are being maintained and compiled.
- issue or recognize certificates of competence to or from persons who have completed the specified training tasks and who have been assessed as having achieved the competencies described in this Standard

Training providers may utilize this Standard to:

- establish the course timetable, content and assessment
- establish training material and training aids / equipment required to conduct a course
- establish means of assessing the trainees for a suitable level of competence on completion of the course

### 1.1.1 Certification

Persons requiring commercial diver certification must meet all performance criteria specified in this standard for the particular level of certification being sought.

Note:

- This Standard does not apply to diving operations conducted within the Offshore Oil & Gas industry

### 1.1.2 Definitions

Item	Description
Accident	An undesired event giving rise to death, ill health, injury, damage or other loss
Acute Illness	An illness characterised by the symptoms having a rapid onset
AGE	Arterial gas embolism is a major cause of death in diving and the initiating cause (pulmonary barotrauma) usually goes undetected. Arterial Gas Embolism, is caused most often by the expansion of respiratory gases during ascent, it also occurs when the breath is held during ascent from a dive
Atmospheric Pressure	The atmosphere exerts a pressure on the earth's surface in the same way as water exerts pressure, i.e. it is produced by the weight of air above the earth
Absolute Pressure	Before a diver leaves the surface, he is already under a pressure of 1 Bar or 103000 N/m <sup>2</sup> (atmospheric pressure). For every meter he descends, the pressure on him will increase by 0.1 Bar. Thus, the total pressure on the diver at any depth will be the pressure of the water at that depth plus an atmospheric pressure, 1 Bar.
ALARP	As Low As Reasonably Practicable - for a risk to be ALARP it must be possible to demonstrate that the cost involved in reducing the risk further would be grossly disproportionate to the benefit gained
Ambient Pressure	The pressure of the surrounding medium, such as a gas or liquid, which comes into contact with an apparatus or with a reaction
BC / BCD	Buoyancy compensator, buoyancy compensator device
Barotraumas	Barotraumas (Pressure Injury) is physical damage to body tissues caused by a pressure differential between an air space inside the body and the ambient pressure
Bottom Time	The total elapsed time from when a diver leaves the surface to the time (next whole minute) at which ascent is commenced, measured in minutes.
Breathing Gas	The compressed gas intended for respiration by the diver.
Breathing Tubes	Umbilical attached to a regulator that are designed to: <ul style="list-style-type: none"> <li>a) supply air to the diver</li> <li>b) carry away expired air</li> <li>c) operate at near ambient pressure</li> </ul>
CDA (S)	Commercial Diving Association (Singapore) – a industry association established in January 2010
Certification Package	A folder or file that contains signed Certificates which show that the diving equipment has been tested and/or checked by competent personnel. In the case of the DDC, the testing will normally be Witnessed by a Surveyor acting on behalf of a Classification Society. DDC Hyperberic test will be witnessed by MOM Authorised Examiner.
Combined Dive	The bottom times of more than one dive, added together and

<b>Item</b>	<b>Description</b>
	treated as a bottom time for a single dive to the deepest depth for the purpose of determining the divers decompression requirements
Competent Person	A person who has acquired through training, qualification or experience, or a combination of these, the knowledge and skills to enable that person to perform a specified task in a safe and efficient manner
Chronic Illness	A chronic illness is defined as any disease/illness that develops slowly and lasts a long time
CTAG	Curriculum, Training and Assessment Guide
CS	Competency Standard
DDC	Deck decompression chamber (a Pressure Vessel for Human Occupation, certified by a Classification Society, used for divers surface decompression and/or decompression treatment) or by MOM Authorised Examiner.
Decompression Illness	A generic term for acute illness resulting from decompression. This term covers the condition known as decompression sickness (also known as bends) and arterial gas embolism
Decompression Table	A specific table of pre-determined depths and times used to calculate the decompression requirements for a particular dive
Decompression Sickness (bends)	Any physiological abnormality during or after diving which is a direct result of the formation of gas bubbles in the body because of rapid transition from a high-pressure environment to one of lower pressure. Any organ may be involved, and its presentation can vary from the acute to the chronic. (Note: It is common for decompression sickness to show up before or very soon after completion of the dive)
Decompression Stop	The specific length of time that a diver must hold his ascent at a specified depth to allow for the elimination of sufficient inert gas from the body in order to allow a safe ascent to the next decompression stop or the surface.
Demand Gas Supply Device	A device that provides breathing gas to the diver via a mechanism which provides a flow of breathing gas when the diver inhales (also known as a regulator)
Depth Gauge	Used to indicate the depth of a diver. The maximum depth attained during the dive can be measured in either feet of seawater or metres of seawater
Diving Operation	A diving operation identified in the diving project plan
Dive Control Position	A single, designated location on the surface, adjacent to / or nearby where a diver enters the water, from which it is possible to monitor all systems and functions which relate to the life support of a diver in the water
Dive Team	The group of people, including the diving supervisor, diver(s), attendant(s), and other personnel as required, who are: a) present at the dive site b) directly involved in the dive c) responsible for the safe conduct of the diving operation
Diver	A person who performs diving work underwater or is exposed to pressure greater than 100 millibar above atmospheric pressure in association with diving work
Divers Hose	Hose used in SSDE to carry breathing gas to the diver from a dive control panel (also called "Diving Hose")
Diving Contractor	A person or firm that undertakes a contract to provide materials or labour to perform diving related services.
Diving Work	Work in which diving is conducted using underwater breathing apparatus, including work by the dive team in direct support of the diver

<b>Item</b>	<b>Description</b>
Diving Supervisor	A person who supervises diving operations, he is responsible for the safety of the diver during any dive operation
DMT	Diver Medical Technician (a person who has received specialist medical training in the identification and treatment of diving illnesses, who is normally also a trained diver)
DMAC	Diving Medical Advisory Committee
DPP	Diving Project Plan; a detailed step by step plan that identifies each diving operation which makes up the diving project
Diving Project	The term used for the overall diving job. The diving project is made up of one or more diving operations
DOM	Diving Operations Manual
DSV	Diving Support Vessel
Employer	A corporation or individual employing or engaging a person or persons either under a contract of employment, apprenticeship or traineeship, or for work. This includes self-employed persons
ERP	Emergency Response Plan
Exceptional Exposure Dive	A dive where the maximum recommended dive time for a particular depth (sometimes shown by a limiting line in decompression tables) is exceeded by the diver at that depth
Float Line	A line connecting the diver to a high visibility float on the surface of the water enabling the approximate location of the diver to be known at all times
FMEA	Failure Mode Effects Analysis :- a systematic method of assessing equipment and systems to source any single point failure; and apply risk management to prevent the single point failure from materializing
FRC	Fast Rescue Craft
Free-flow system	A breathing method used in SSBE diving operations whereby breathing gas enters the full-face mask or incompressible helmet in a continuous flow and is not controlled by a demand gas supply device
fsw	feet of sea water (a measure of sea water depth)
Gauge Pressure	A pressure gauge is normally graduated to read ZERO when the gauge is at atmospheric pressure. This is because a pressure gauge normally records only „difference of pressure“; i.e the difference between that of the high-pressure source and atmospheric pressure.
Half-face Mask	A mask that covers the eyes and nose only, and does not incorporate an integral breathing system
Hazard	A hazard is something with the potential to cause harm. This may include water, environmental factors, equipment, methods of diving and other aspects of work organization
Hazard Identification	Process of recognizing that a hazard exists and defining its characteristics.
Inland Diving	Diving in areas that are accessible and surrounded by land, such as lakes, ponds, marsh and rivers. Inland diving may take place inside refineries, cooling towers, industrial collection poisonous water tanks
Inshore Diving	Diving at sea but close to shore. Some jurisdiction may further define Inshore Diving as diving within the area 12 nautical miles off the coastal waterline. Diving may take place in locations such as terminal piers, jetties, docks, anchorage and harbour.
Incident	An event that gave rise to an accident, or had the potential to lead to an accident
JHA	Job Hazard Analysis, a safety management tool that can be used to define and control the hazards associated with a job or procedure.

<b>Item</b>	<b>Description</b>
Lifeline	A line attached to a diver, which is capable of being used to haul the diver to the surface. It can also be used for Diver/Tender signaling.
Limiting Line	A line shown in some decompression tables, which indicates time limits (bottom times) beyond which the decompression schedules are less safe.
MOM	Ministry of Manpower (Singapore)
Must	Indicates that compliance with a statement is mandatory
msw	meters of sea water (a measure of sea water depth)
No Decompression Limits	The maximum time which can be spent at a given depth such that a safe ascent can be made directly to the surface at a prescribed rate with no decompression stops
PMS	Plant Maintenance System – a systematic, recorded and verifiable equipment maintenance regime, carried out by a competent person, to ensure that plant and equipment used in diving operations is properly maintained in accordance with the manufacturers' recommendations, in order to ensure that it is safe while being used.
PPE	Personal Protective Equipment
PTW	Permit To Work
Repetitive Dive	Any dive conducted within 12 hours of a previous dive
Residual Nitrogen	Nitrogen gas that is still dissolved in a divers tissues after surfacing
Risk	A risk is the possibility that someone or something will be harmed by an identified hazard. The extent of the risk includes the numbers of people who might be affected by the risk
Risk Assessment	The process of estimating the magnitude of risk and an evaluation of precautions that can be taken to prevent harm and deciding whether or not the level of risk is tolerable
Shall	Indicates that compliance with a statement is mandatory
Shot rope	A ropel running vertically from the dive control position and fixed to the worksite or bottom with a weight or attachment
SHMS	Safety and Health Management System
Should	Indicates a recommendation
Single Dive	Any dive conducted more than 12 hours after a previous dive
SS 511	SS 511 Singapore Standards Code of Practice for Diving at Work
SSDE	Surface Supplied Diving Equipment. Diving equipment that supplies breathing gas at the required pressure for depth, through a diver's hose to a diver from plant at the surface
SWL	Safe Working Load, the load which can be safely lifted. This term is being replaced with WLL (see below)
TA	Technical Advisory for Inland/ Inshore Commercial Diving Safety and Health
Tolerable Risk	Risk that has been reduced to a level that can be endured by the organization having regard to its legal obligations and its own OH&S Policy
Toolbox Talk	A meeting, involving a two-way dialogue, to ensure that everyone clearly understands what the job entails along with its hazards and the precautions to be put in place

Item	Description
WLL	The Working Load Limit (WLL) is the maximum load that may routinely be applied to an assembly or component in straight tension
WSHC	Workplace Safety & Health Council - The Workplace Safety and Health (WSH) Council was established on 1 April 2008. The Council works closely with the Ministry of Manpower and other Government agencies, industry, unions and professional associations to develop strategies to raise WSH standards in Singapore.

### 1.3 Pre-Requisites for CSCUBA Diver

The pre-requisites for a CSCUBA diver are:

- The trainee must be in possession of a valid certificate of medical fitness to dive (refer to Singapore Standards SS 511) issued, after examination, by a hyperbaric doctor who is suitability qualified and familiar with the medical problems of diving.
- Be at least 18 years of age.
- Be a competent swimmer.
- Be able to add, subtract, multiply and divide whole numbers, decimals and simple fractions
- Be able to calculate percentages; and transpose and solve simple formulas e.g. gas laws
- Understand written and verbal communications (using English), and communicate easily with other persons (Note: This is particularly important where trainees or instructors are of differing nationalities)
- Hold a certificate from a recognized first aid course (this may be included in the training / assessment process)
- Persons holding commercial diver certificates to this Standard may upgrade their diving qualifications by completion of all the remaining modules in this Standard to qualify for SSDE Diver certification.

### 1.4 Working Categories for CSCUBA Divers (0 - 30metres)

These categories include but are not limited to:

- Underwater inspection and photography
- Environmental management
- Scientific Diving
- Aquaculture
- Aquariums
- Underwater film production
- Police and emergency services rescue response

**Note:** All dives are to be No Decompression diving and shall conform with the requirements within the latest revision of the SS511 Code of Practice for Diving at Work.

### 1.5 Pre-Requisites for SSDE Diver

The pre-requisites for a SSDE diver are:

- The trainee must be in possession of a valid certificate of medical fitness to dive (refer to Singapore Standards SS 511) issued, after examination, by a hyperbaric doctor experienced in underwater medicine and who is trained and qualified in Underwater Medicine, basic and advanced courses in diving medicine or courses of a similar standard.
- Be a qualified CSCUBA Diver.

- Be at least 18 years of age.
- Be a competent swimmer (200-meter swim & tread water for 10 mins).
- Be able to add, subtract, multiply and divide whole numbers, decimals and simple fractions.
- Be able to calculate percentages and transpose and solve simple formulas e.g. gas laws.
- Understand written and verbal communications (using English), and be able to communicate easily with other persons.  
Note: This is particularly important where trainees or instructors are of differing nationalities.
- Hold a certificate from a recognized first aid course (this may be included in the training / assessment process)
- Persons holding commercial diver certificates to CSCUBA level may upgrade their diving qualifications by completion of all remaining modules in this Standard for full SSDE Diver certification.

## **1.6 Working Categories for SSDE Divers (0 – 30 meters)**

These categories include but are not limited to:

- All activities outlined in Section 1.4
- Underwater engineering and construction
- Decompression diving, including in-water and DDC decompression

## **1.7 Scope of Working Conditions**

The scope of environmental working conditions for the commercial diver is dependent on the geographic location where the work is carried out. Under this competency standard the training and assessment shall be undertaken within the waters and facilities available in Singapore. This environment provides for many variables such as: Good visibility; Poor visibility; Tides and Currents; rivers and reservoirs; warm water; water salinity/buoyancy; fresh water; marine life hazards; underwater hazards – pressure differentials; fishing nets; subsea structures, confined space / overhead obstructions, varied surface weather conditions; soft and hard sea bed conditions. Each of these variables when included during the training and assessment process provides for equivalent conditions for that of a diving project worksite.

## 2.0 COMPETENCY STANDARD

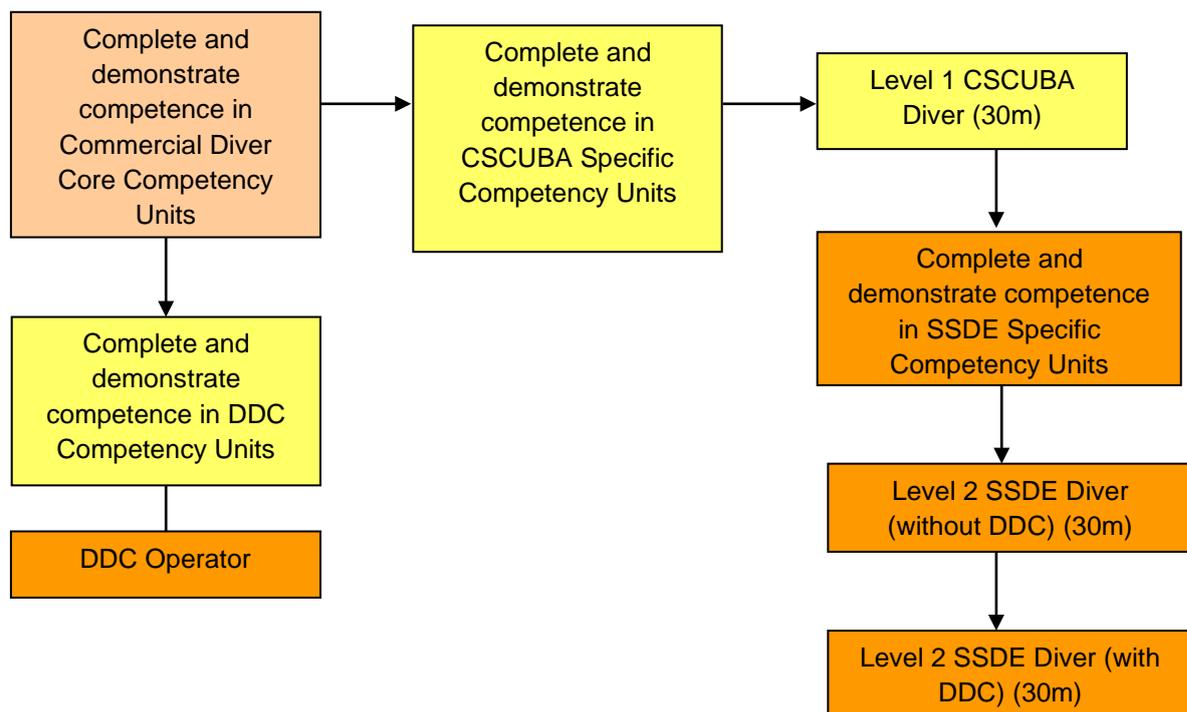
The Competency Standard for Commercial Diver consists of 12 Competency Units. The Competency Units describe what the trainee diver needs to perform on completion of the training and assessment and can be broadly classified into two groups:

- 6 Core Competency Units: Units which develop the trainees' basic foundation and competence in commercial diving work. These Units are common to both CSCUBA and SSDE.
- 6 Specific Competency Units: Units which develop the trainees' knowledge and competence with equipment and procedures specific to either CSCUBA or SSDE.

The Competency Units are structured so that the trainee CSCUBA or SSDE diver has to first complete the common Core Competency Units. Thereafter, the trainee diver may progress and obtain competencies as a CSCUBA Diver (Level 1) or directly as a SSDE Diver (Level 2) by completing the respective Specific Competency Units.

To prove competency, the trainee diver is required to meet the performance criteria for each of Competency Units, which are stated in Sections 4 to 6. The training and assessment methods and conditions are set out in the Curriculum, Training and Assessment Guides.

The diagram below outlines the competency flow chart for the trainee diver. The detailed Diver Competency Flow Charts in Section 3.4 outline the progression routes to gain competency.



## 2.1 Core Competency Units for CSCUBA and SSDE Diver

The Core Competency Units for CSCUBA and SSDE Divers are shown in the table below. The competency elements and performance criteria for each of the Core Competency Units are in Section 4.

Core Competency Unit	Competency Unit Code
Legislation and Standards	CD-CCD-100A-0
Diving Theory: Physics	CD-CCD-100B-0
Diving Theory: Physiology	CD-CCD-100C-0
Diving Procedures	CD-CCD-100D-0
Underwater and Surface Operational Hazards	CD-CCD-100E-0
Documentation and Records	CD-CCD-100F-0

### 2.1.1 Legislation and Standards (CD-CCD-100A-0)

The occupational diver shall have an understanding of the requirements that are outlined in the Singapore frame-work of legislation / codes of practices and Technical Advisory documents. This shall include the contents of the SS 511 Code of Practice for Diving at Work; Technical Advisory document for Inland / Inshore Commercial Diving; Work Place Safety and Health Act 2006, the supporting regulations and a basic understanding of marine signals / chart symbols. These requirements shall be applicable to all persons involved with occupational diving projects. The operational requirements that are expected to be followed by the client; contractor; diver and other personal involved in the diving projects, shall ensure the relevant standards are followed.

### 2.1.2 Diving Theory: Physics (CD-CCD-100B-0)

The occupational diver shall possess a working knowledge of the appropriate laws of physics and how they are applied in certain circumstances, including the relationship between pressure and volume and the potential physiological effects of this relationship on the diver, the principles of buoyancy, the behavior of gases under pressure, and properties of heat, light, and sound underwater.

### 2.1.3 Diving Theory: Physiology (CD-CCD-100C-0)

The occupational diver shall understand the physiological effects that pressure has on the body. The diver shall understand medical diving hazards, physiology, marine animal hazards and ailments, safety procedures associated with the physiological effects on the diver, physiological effects of decompression and treatment table usage as well as the importance of recognition and prevention of diving related ailments.

### 2.1.4 Diving Procedures (CD-CCD-100D-0)

The occupational diver shall understand the correct procedures for conducting diving operations safely and in accordance with legislation and standards. The diver shall understand decompression procedures and requirements.

### **2.1.5 Underwater and Surface Operational Hazards (CD-CCD-100E-0)**

The occupational diver shall be able to identify the subsea and surface related diving hazards and to have a basic knowledge of the risk management process. The diver shall have a thorough understanding regarding the actions to be taken to mitigate hazards on the surface and subsea.

### **2.1.6 Documentation and Records (CD-CCD-100F-0)**

The occupational diver shall understand the requirements and processes for project documentation and how the documentation is used to support a safe diving operation. This shall include a basic understanding of the permit to work process and company operating manuals and systems. They shall have a thorough understanding of the requirements to maintain accurate personal dive records.

## **2.2 Specific Competency Units**

There are 2 Specific Competency Units for the CSCUBA Diver and 2 Specific Competency Units for the SSDE Diver. The trainee diver is required to complete the Core Competency Units before he proceeds to attend the respective Specific Competency Units to achieve the relevant level of diver competency (CSCUBA Diver or SSDE Diver). There are 2 additional specific competency units for the use and operations of a Deck Decompression Chamber. These two (2) units are optional, however, divers shall be trained and certified in the DDC units for diving operations requiring a DDC onsite.

## **2.3 Specific Competency Units for CSCUBA Diver**

The Specific Competency Units for CSCUBA Diver are shown in the table below. The competency elements and performance criteria for the Specific Competency Units are stated in Section 5.

<b>Specific Competency Unit (CSCUBA)</b>	<b>Competency Unit Code</b>
CSCUBA Diving Equipment, Systems, Procedures and Practices	CD-SCD-101A-0
CSCUBA Diving	CD-SCD-101B-0

### **2.3.1 CSCUBA Diving Equipment, Systems, Procedures and Practices (CD-SCD-101A-0)**

The CSCUBA diver shall be competent in the correct set-up, operation, and maintenance of the various types of CSCUBA diving equipment, compressors and in the procedures used for occupational self-contained air diving projects. The CSCUBA diver shall have a basic understanding of the maintenance requirements of the CSCUBA diving equipment.

The CSCUBA diver shall understand the correct practices for conducting diving operations safely and in accordance with Singapore legislation and standards. The diver shall have the knowledge to be able to assemble, use and maintain CSCUBA diving equipment.

### 2.3.2 CSCUBA Diving (CD-SCD-101B-0)

The CSCUBA diver shall be competent in the practical use of various types of diving equipment, both on the surface and in water. The diver shall be able to dive safely and competently using CSCUBA diving equipment in both sheltered and open water of varying depths to a maximum depth of 30msw with varying bottom conditions and underwater visibility, as well as possess the knowledge to maintain such equipment. The CSCUBA diver shall be competent using CSCUBA while using a life line, through water communications and hard wire communications. Compression Chamber dives and/or recreational dives shall not be considered equivalent experience to in water training and shall not be used for accumulated dive time calculations.

### 2.4 Specific Competency Units for SSDE Diver

The Specific Competency Units for SSDE Diver are shown in the table below. The competency elements and performance criteria for the Specific Competency Units are stated in Section 6.

Specific Competency Unit (SSDE)	Competency Unit Code
SSDE – Diving Equipment, Systems, Procedures and Practices	CD-SSD-102A-0
SSDE Diving	CD-SSD-102B-0
Deck Decompression Chamber Procedures (optional)	CD-SSD-102C-0
Deck Decompression Chamber Operator (optional)	CD-SSD-102D-0

#### 2.4.1 SSDE - Diving Equipment, Systems, Procedures and Practices (CD-SSD-102A-0)

The SSDE diver shall be competent in the correct set-up, operation, and maintenance and use of the surface supplied diving equipment, compressors and in the procedures used for surface supplied diving. The SSDE diver shall have a basic understanding of the maintenance requirements of the SSDE diving equipment.

The SSDE diver shall understand the correct practices for conducting diving operations safely and in accordance with Singapore legislation and standards. The diver shall have the knowledge to be able to assemble, use and maintain SSDE diving equipment.

#### 2.4.2 SSDE Diving (CD-SSD-102B-0)

The SSDE diver shall have a detailed understanding and be competent to correctly set up; operate; maintain and use of SSDE Diving equipment, compressors, High Pressure / Low Pressure Air supplies and the procedures for surface supplied air diving. The Surface Supply Breathing Equipment Diver shall have the knowledge required for safe underwater operations and procedures.

### **2.4.3 Deck Decompression Chamber Procedures (optional) (CD-SSD-102C-0)**

The DDC procedures will provide detailed instructions for the DDC equipment set up, use, and maintenance of the DDC.

Along with CD-SSD-102D-0, this unit may be attended as a „stand-alone“ Chamber Procedures Competency Unit and Deck Decompression Chamber Operator Unit. The 3 Core Competency Units “Standards and Legislation”, “Diving Theory: Physics” and “Diving Theory: Physiology” must be completed and passed prior to attending this Unit. If completed with the relevant additional units as „standalone“ training the certification awarded will be that for Deck Decompression Chamber Operator.

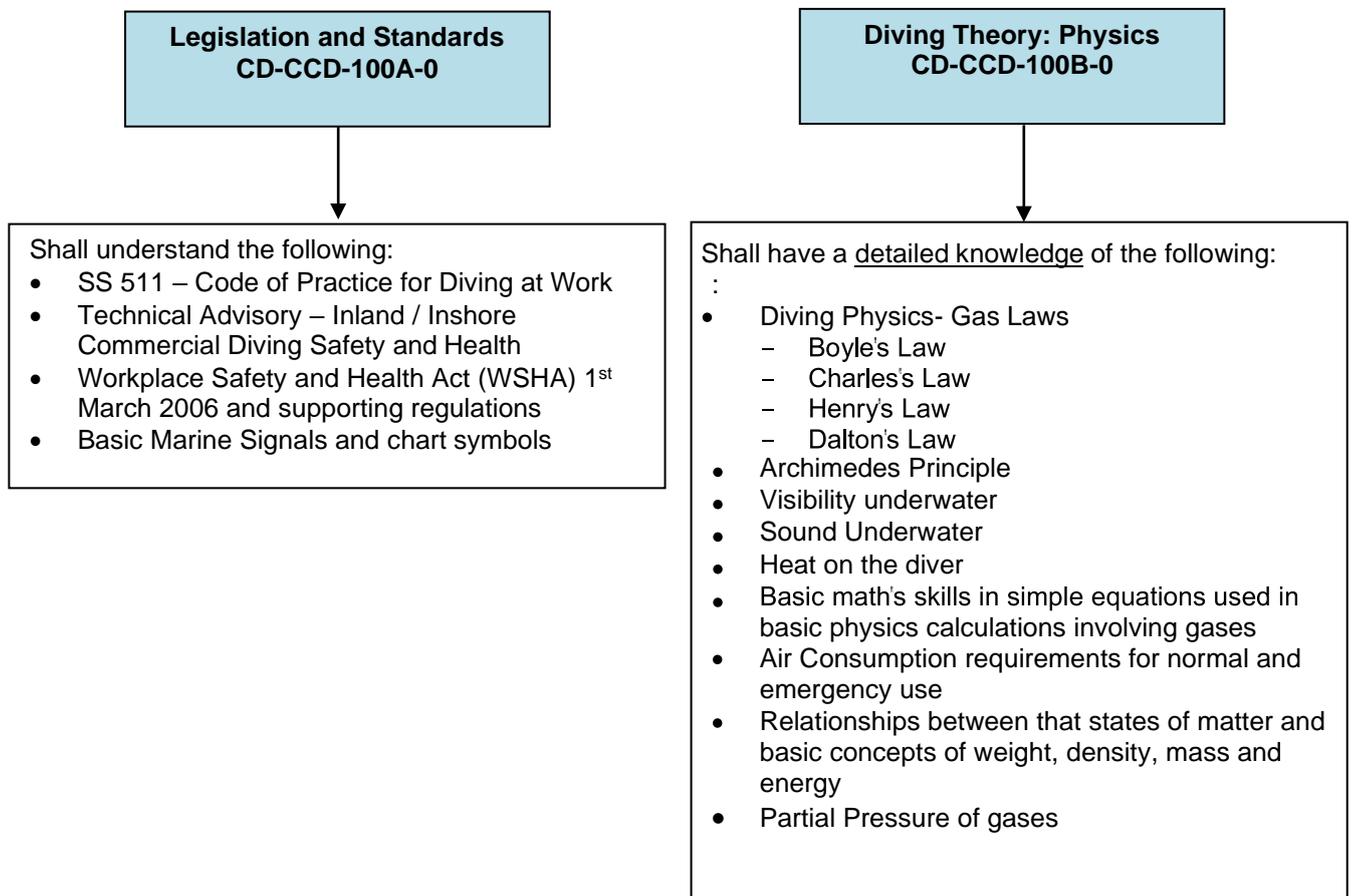
### **2.4.4 Deck Decompression Chamber Operator (optional) CD-SSD-102D-0)**

The diver shall have an understanding of operational requirements and procedures to use the deck decompression chamber, as a panel operator and as a tender inside the chamber.

In order to be competent as a “Deck Decompression Chamber Operator”, a person only needs to attend this Unit and the Unit DDC Procedures (CD-SSD-102C-0). Prior to attending these 2 Units, the trainee shall have to be competent in the 3 Core Competency Units “Standards and Legislation”, “Diving Theory: Physics” and “Diving Theory: Physiology”. The certification awarded will be that for Deck Decompression Chamber Operator.

### 3.0 INLAND/INSHORE DIVER COMPETENCY FLOW CHART

#### 3.1 Core Competency Units - Subject Content



**Diving Theory: Physiology  
CD-CCD-100C-0**

**Diving Procedures  
CD-CCD-100D-0**

Shall have a detailed knowledge of the following:

- Physiology of Diving
  - Body Anatomy and Systems
  - Effects of breathing various gases at elevated pressures
  - Temperature effects – thermal balance for the diver
  - Pressure Injury and effects to the body
    - Barotraumas; Ear; Sinus; Lung
    - Arterial gas Embolism
- Gas Toxicity
  - Oxygen (Chronic / Acute)
  - Hypercapnia
  - Carbon Monoxide
  - Hydrocarbons
  - Nitrogen Narcosis
- Decompression Physiology
  - Principles governing compression and decompression, the uptake, distribution, and elimination of gases
  - Effects of breathing various gases at elevated pressures
- Management of Diving Emergencies
  - Causes manifestations and treatment of decompression illness
  - In water diver emergencies
  - Emergency response planning
- Marine Animals
  - Types of marine life that can injure a diver
  - The signs and symptoms of marine life injuries
  - Treatment protocols of marine life injuries
- Flying after diving
  - Effects of and Restrictions of flying after diving
- Drowning
  - Wet drowning
  - Dry drowning
- Medical Emergencies signs, symptoms and treatments
  - Asphyxia
  - Pulmonary Edema
  - Respiratory arrest
  - Cardiac arrest
  - Administration of Oxygen in emergency

Shall have an operational knowledge of the following:

- Roles and Responsibilities of the dive team members and others supporting the dive operation
- Minimum dive Team size
- The (dive procedures) documentation required
- Dive check lists
- Dive Briefing / Toolbox meetings
- Actively engage with identification and mitigation of hazards during the toolbox talk
- Acting as a diver recorder under supervision of the dive supervisor, required to fill up logs and tables.
- Basic marine chart reading skills
- Basic meteorology skills
- Dive Check Lists
  - Pre dive Checks
  - Post Dive Checks
- Decompression Procedures
  - No decompression diving
  - Decompression diving
  - Omitted decompression
  - Decompression treatment requirements
  - Use of appropriate decompression tables

**Underwater and Surface  
Operational Hazards  
CD-CCD-100E-0**

**Documentation and Records  
CD-CCD-100F-0**

Shall have an operational knowledge of the following:

- Identification of hazards for diving operations
- HAZIDS/ Job Safety Assessments / Risk Assessment for the dive operation
- Underwater Hazards
  - Known hazards when diving from vessels
  - Tides, Currents, underwater entrapment
  - Hazardous marine life- review from
  - Physiology
  - Confined space / overhead environments
  - Contaminated environments
  - Differential Pressures
  - Use of tools; hand tools; hydraulic tools; cutting equipment
  - Simultaneous operations
  - Structures on the seabed
- Surface related hazards
  - Known hazards when diving from vessels- surface related i.e positioning; other marine craft; loss of power
  - Surface Visibility
  - Weather – rain, heat, wind
  - Fire in control room/ onboard vessel
  - Vessel Collision
  - Lifting objects
  - Other contractors working in area
  - Simultaneous operations
  - Security of the dive site

Shall have an understanding of the following:

- Permit to Work systems
- Record keeping
  - Diver certification and medicals
  - Personal Dive Records and log books
  - Project documentation

### 3.2 CSCUBA Diver Specific Competency Units - Subject Content

#### CSCUBA Diving Equipment, Systems, Procedures and Practices CD-SCD-1010A-0

Shall have an operational knowledge of the following:

- Minimum CSCUBA Diving equipment required: half mask, full face mask and communications systems and their use
- Equipment limitations
- Lifeline Management
- Dry session assembly of equipment and Pre dive checks
- Personnel diving equipment
- Safe Means to access / egress of the water
- The theory & understanding of confined water diver basic exercises using CSCUBA Skills
  - Buoyancy Exercises
  - Sharing Air source (Buddy Breathing)
  - Rescue Skills
  - Navigation skills
  - CSCUBA (With full-face mask; lifeline and hard wire communications)
  - Confined space / overhead environments
  - Use of Buoyancy control device, Wet suit and Dry Suit
- Dive team personal roles and responsibilities
- Understanding the methods of Communications
  - Hard wire and through water
  - Lifeline signals
- Handling High pressure Air cylinders, hoses and fittings
- Understanding of the Emergency Situations and drills
  - Uncontrolled Ascent
  - Equipment malfunction;- Loss of air; loss of communications
  - Trapped Diver
  - Unconscious / injured diver in the water recovery
  - Contaminated air supply
  - Vomiting Underwater
  - No visibility
- The duties as a Standby diver
  - Standby diver Drills and Training
- Compressors: LP and HP Compressors
  - Air Purity Test
  - Fault Finding
  - Cylinders, regulators, valves, hoses and pipe work
- Planned Maintenance of diving equipment
  - Personnel Diving equipment
  - Compressors
  - Communication systems
  - Cylinders (HP and LP Supplies)

#### CSCUBA Diving CD-SCD-1010B-0

Complete and demonstrate safe use and operations during the following:

- Use of Self-Contained Underwater Breathing Apparatus (CSCUBA)
- Handling of High-Pressure Air cylinders, hoses and fittings
- Basic knots and rigging
- Dry session assembly of equipment and pre-dive checks
- Confined water dive basic CSCUBA Skills
  - Buoyancy Exercises
  - Sharing Air source (Buddy Breathing)
  - Emergency drills (as outlined below)
  - Rescue Skills
  - Navigation skills
- CSCUBA (With full-face mask; life line and hard wire communications)
- Confined space / overhead environments
- Open water dive skills
- Diving in other environments such as quarry, lake, river, open water and conducting the skills learnt during the pool training period
- Use of Buoyancy control device, Wet suit and Dry Suit
- Tender role and responsibilities
- Use of full face mask – AGA; Kirby Band Mask; EXO Mask
- Communications
  - Hard wire communications
  - Life line signals
- Emergency Drills
  - Uncontrolled Ascent
  - Equipment malfunction;- Loss of air; loss of communications
  - Trapped Diver
  - Unconscious / injured diver in the water recovery
  - Contaminated air supply
  - Vomiting Underwater
  - No visibility
- Act as a Stand By diver
  - Standby diver Drills and Training
- Compression Chamber Dive to 30m
- Basic marine chart reading skills (practical)
- Basic meteorology skills (practical)

### 3.3 SSDE Diver Specific Competency Units - Subject Content

#### SSDE - Diving Equipment, Systems, Procedures and Practices CD-SCD-102A-0

Shall have a detailed operational knowledge of the following:

- Equipment Standards and Minimum requirements of personnel and equipment
- SSDE (CSCUBA) Replacement System
  - Equipment components
  - Limitations
  - Equipment set up and use
  - Pre / Post dive checks
- Means to access and egress of the water
- Surface Supplied Diving Equipment / systems
- Equipment limitations
- Umbilical management
- Personnel diving equipment
- Planned Maintenance of diving equipment
  - Basic Maintenance systems
  - Personnel Diving equipment
    - Helmets / Masks
    - Bailout cylinders
    - Regulators
    - Divers Umbilical's
    - LP and HP Hoses
  - Compressors
  - Control panels
  - Communication systems
  - Cylinders (HP and LP Supplies)
- The theory & understanding of confined water dive basic exercises using SSDE Skills
  - Buoyancy Exercises
  - Sharing Air source (Buddy Breathing)
  - Rescue Skills
  - Navigation skills
  - SSDE (With helmet / mask; life line and hard wire communications, air supply hose, pneumo)
  - Confined space / overhead environments
  - Use of Buoyancy control device, Wet suit and Dry Suit
- Dive team personal roles and responsibilities
- The duties as a Stand By diver
  - Standby diver Drills and Training

#### SSDE Diving CD-SCD-102B-0

Complete and demonstrate safe use and operations during the following dives:

- Use of full set of Surface Supplied Diving Equipment (SSDE)
- Dry session assembly of equipment and Pre dive checks
- Confined water dive basic SSDE Skills
  - Buoyancy Exercises
  - Emergency Drills (as outlined below)
  - Bailout Drills
  - Rescue Skills
- Use of Buoyancy control device, Wet suit, Dry Suit, Hot water suit
- Open water dive skills
- Tender role and responsibilities
- Use of mask and helmets –Industry Approved Helmets and Masks
- Diving in other environments such as quarry, lake, river, open water and conducting the skills learnt during the pool training period
- Communications
  - Hard wire communications
  - Life line signals
- Emergency Drills
  - Uncontrolled Ascent
  - Equipment malfunction
  - Trapped Diver
  - Unconscious / injured diver in the water
  - Contaminated air supply
  - Vomiting Underwater
  - No visibility
- SSDE (CSCUBA) Replacement diving systems
- Act as a Stand By diver
  - Standby diver Drills and Training
- Compression Chamber Dive to 30m

**Deck Decompression Chamber Procedures  
CD-SCD-102C-0 (OPTIONAL)**

Shall have a detailed knowledge of the following:

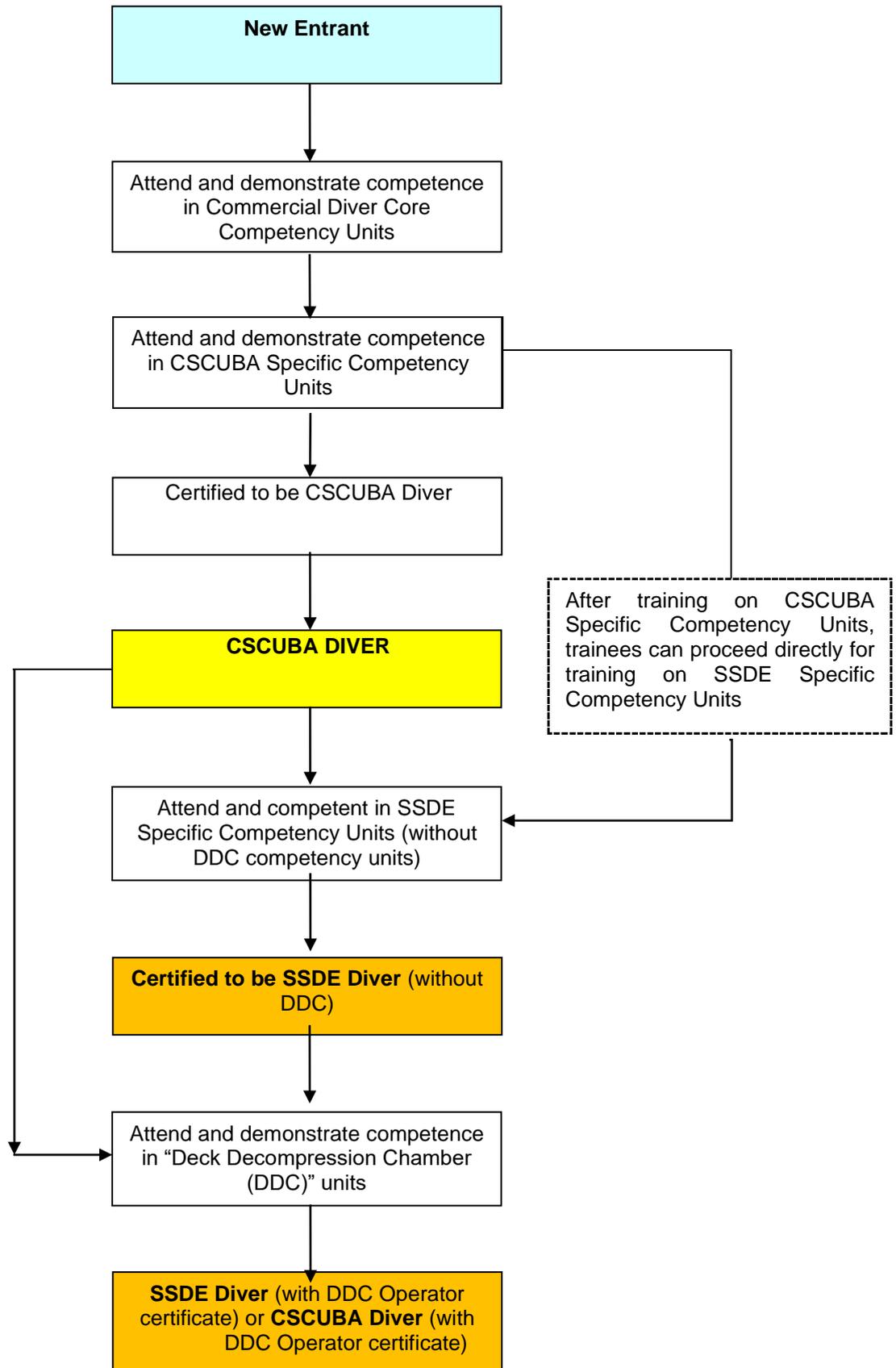
- Deck Decompression Chamber – Pressure Vessel for Human Occupancy (PVHO) standards and requirements
- The components of a compression chamber and its operation/use
- DDC Operating procedures and chamber checks prior to diving and use
- DDC equipment and support services
  - Air supplies – main and emergency
  - Oxygen / Mix Gas supplies
  - Pipe work, Gauges, valves, regulators
  - Analysis of chamber atmosphere and air / gas supplies
  - Fire Fighting equipment
  - Built in Breathing systems (BIBS)
- Hazards when using a DDC
- Risks Assessment for DDC use
- Items prohibited in the DDC
- DDC records and chamber logs
- Roles & Responsibilities' of panel operator and inside tender
- DDC Emergency situations and procedures

**Deck Decompression Chamber Operator  
CD-SCD-102D-0 (OPTIONAL)**

Shall have a detailed knowledge of the following operational and uses for:

- Preparing the DDC and supporting equipment and systems ready for use
- DDC checks prior to diving and use
- Use and operate the DDC equipment and support services
  - Air supplies – main and emergency
  - Oxygen / Mix Gas supplies
  - Pipe work, Gauges, valves, regulators
  - Analysis of chamber atmosphere and air / gas supplies
  - Fire Fighting equipment
  - Built in Breathing systems (BIBS)
- Risk control measures for DDC use
- Items prohibited to be taken in the DDC
- Maintaining DDC records and chamber logs
- Use of a stop watch
- Duties of panel operator and inside tender
- Conduct emergency response drills as the operator and tender during a chamber dive
- Complete „dry dive' to maximum depth of 50m as the panel operator and tender inside the DDC

### 3.4 Diver Progression Flow Chart



## 4.0 INLAND/INSHORE DIVER CORE COMPETENCY UNITS

<b>Competency Unit</b> : Legislation and Standards
<b>Summary of this Competency Unit</b>  This Competency Unit consists of the following elements:  <ol style="list-style-type: none"><li>1. Describe requirements of the Singapore Standard SS 511 Code of Practice for Diving at Work</li><li>2. Describe requirements of the Singapore Technical Advisory for Inland/Inshore Commercial Diving Safety and Health</li><li>3. Describe legislation requirements of the Singapore Workplace Safety and Health Act (WSHA) and supporting regulations</li></ol>
<b>Assumed Skills and Knowledge</b>  The required skills and knowledge criteria for this Unit are as follows:  <ul style="list-style-type: none"><li>• Be able to understand written and verbal communications in English, and be able to communicate easily with other persons</li><li>• Be able to access relevant legal information online</li><li>• Be able to have an understanding of the basic diving terminology and how it is implemented in diving operations</li></ul>

<b>Competency Unit Code</b> CD-CCD-100A-0	<b>Competency Level</b> Inland/Inshore Diver (CSCUBA and SSDE)
<b>Competency Unit Title</b> Legislation and Standards	

### Description of Competency Element

<p><b>Competency Element Title</b></p> <p>1. Describe requirements of the Singapore Standard SS 511 Code of Practice for Diving at Work</p>
<p><b>Performance Criteria</b></p> <p>A competent commercial diver must be able to perform the following:</p> <p>1.1 Describe the relevant provisions of the Singapore Standard SS 511, Code of Practice for Diving at Work, with regards the responsibilities of:</p> <ul style="list-style-type: none"> <li>• a diver</li> <li>• a diver's tender</li> <li>• a standby diver</li> <li>• a diving contractor</li> <li>• other personnel and bodies associated with the diving operation</li> </ul>
<p><b>Underpinning Knowledge</b></p> <p>A competent diver must know and understand:</p> <ul style="list-style-type: none"> <li>• The sections of the Singapore Standard SS 511, Code of Practice for Diving at work, that are applicable to his diving operation, diving plant and equipment</li> <li>• A sound knowledge of the legal responsibilities of being a diver, a diver's tender, and a standby diver on a dive site</li> <li>• A sound knowledge of the legal responsibilities of the diving contractor, diving supervisor and other personnel / companies that maybe associated with the diving operation.</li> <li>• The sections of the operational and emergency contingency plans applicable to his duties</li> <li>• The limitations of different types of diving and diving equipment for commercial diving works</li> <li>• Minimum manning levels of a dive team and the role of each team member in normal and emergency situations</li> <li>• The basic requirement for a Planned Maintenance System for diving equipment</li> <li>• The requirement for a Permit to Work for diving operations</li> </ul>
<p><b>Range and Context</b></p> <p>The competent diver shall have a detailed understanding of the responsibilities of:</p> <ul style="list-style-type: none"> <li>• The Diver</li> <li>• The Standby diver</li> <li>• The Diver's Tender</li> </ul> <p>The competent diver shall have a understanding of the responsibilities of:</p> <ul style="list-style-type: none"> <li>• The diving contractor</li> <li>• The diving supervisor</li> <li>• Other personnel and companies who are involved in the diving operation</li> </ul> <p>The competent diver shall understand the requirements for:</p> <ul style="list-style-type: none"> <li>• A Permit to Work system</li> </ul>

- Risk Assessments
- Incident reporting and Investigations
- Safety Management System
- The Dive Plan
- Equipment Limitations
- Toolbox Talks
- Project Briefings
- Dive Briefings
- Equipment Planned Maintenance Systems
- Emergency Response requirements / plans

The competent diver shall understand the requirements for the employer to provide;

- Safe systems of work
- Duty of Care
- Safe plant and equipment
- Arrangements ensuring safe use of hazardous substances
- Instruction, information and training for safety and safe working
- Safe access and egress to the workplace
- Emergency Plans and procedures
- Clean and healthy environment
- Safe place of work

The competent diver understands his obligations are:

- To take care of his health and safety and that of other persons working with him, or in the vicinity of the worksite
- To co-operate with the employer in ensuring health and safety

The competent diver shall understand the penalties for failure to implement the requirements outlined in the code of practice and technical advisory document

- Legal action that maybe taken and penalties

### **Evidence Sources**

Listed below are a few examples of the type of evidence that would provide a guide as to whether a diver is meeting the core standards required for him to be considered competent;

#### **Work activities**

- The diver has participated in a group activities identifying the requirements of the Code of Practice and other regulations that affect the diving operation

#### **Written reports**

- Outline the Dive Team composition required for his level of diving and the roles and responsibilities in normal and emergency situations
- Outline the contents of the Singapore Standard SS 511, Code of Practice for Diving at work.
- A multi choice examination should be established with questions related to the items listed in the Underpinning Knowledge section.

<b>Competency Unit Code</b> CD-CCD-100A-0	<b>Competency Level</b> Inland/Inshore Diver (CSCUBA and SSDE)
<b>Competency Unit Title</b> Legislation and Standards	

### Description of Competency Element

<b>Competency Element Title</b> 2. Describe requirements of the Singapore Technical Advisory for Inland/Inshore Commercial Diving Safety and Health
<b>Performance Criteria</b>  A competent commercial diver must be able to perform the following: 2.1 Describe requirements of the Singapore Technical Advisory for Inland/Inshore Commercial Diving Safety and Health.
<b>Underpinning Knowledge</b>  A competent diver needs to understand: <ul style="list-style-type: none"> <li>• The diver's responsibilities</li> <li>• The diver tender's duties</li> <li>• The Standby Diver's duties</li> <li>• Hazards in commercial diving work</li> <li>• The minimum equipment required for carrying out a diving operation</li> <li>• Maintenance requirement for diving equipment</li> <li>• The diver must be aware of the requirement for Dive Planning, and the use of pre and Post dive checklists</li> <li>• Training and certification requirements</li> <li>• Emergency management and contingency plans</li> </ul>
<b>Range and Context</b>  <b>The diver shall fully understand his duties as a diver; stand by diver and diver attendant:</b>  <b>The divers shall:</b> <ul style="list-style-type: none"> <li>• Inform the diving supervisor if there is any medical or other reason why they cannot dive</li> <li>• Ensure that their personal diving equipment is working correctly and is suitable for the planned dive</li> <li>• Ensure that they fully understand the dive plan / dive project plan and are competent to carry out the planned task</li> <li>• Know the routine and emergency procedures</li> <li>• Report any medical problems or symptoms that they experience during or after the dive</li> <li>• Report any equipment faults, other potential hazards, near misses or accidents</li> <li>• Understand the requirement for personal and project documentation</li> </ul> <b>The divers attendant shall:</b>  Assist the diver in preparation and during the diving operation. The divers attendant <b>MUST:</b> <ul style="list-style-type: none"> <li>• Be briefed by the diving supervisor on the diving task to be carried out by the diver</li> <li>• Fully understand the actions required in the event of an emergency</li> <li>• Be trained in First Aid</li> </ul>

- Understand the requirements of underwater work
- Understand diving signals and communications; verbal and line signals
- Understand decompression procedures
- Have a working knowledge of diving plant and equipment

In normal circumstances the diver's attendant will be a qualified diver, in the event the diver's attendant has no formal training in the duties and responsibilities required, such training **MUST** be provided before the divers' attendant can be permitted to carry out their his duties.

**The stand by diver shall:**

- Be trained and has passed relevant courses by an approved organisation, and have experience commensurate with the required diving mode (i.e he knows what to do and how to do it)
- Be dressed and equipped to enable immediate entry into the water to provide aid or assistance to the working diver

**The diver shall understand the requirement for dive planning, including;**

- The planned method of performing the task
- The duties of every person involved in the task
- The diving equipment to be used
- Equipment Limitations
- Equipment check lists (pre dive/ post dive)
- The breathing gases to be used
- The method of safe deployment and recovery for diver and standby diver
- The diving procedures to be used, including the planned bottom times & decompression profiles
- Step by step work procedures
- Equipment and tools for the work task
- Specific task hazards and the measures to mitigate (reduce/remove) those hazards
- The Emergency Response Plan (what we do if things go wrong)
- Equipment Planned Maintenance Systems

The competent diver shall understand the requirements for the employer to provide:

- Safe systems of work
- Safe plant and equipment
- Arrangements ensuring safe use of hazardous substances
- Instruction, information and training for safety and safe working
- Safe access and egress to the workplace
- Emergency Response procedures and plans
- Clean and healthy environment
- Safe place of work

The competent diver understands his obligations are:

- To take care of his health and safety and that of other persons working with him, or in the vicinity of the worksite
- To co-operate with the employer in ensuring health and safety

**Evidence Sources**

Listed below are a few examples of the type of evidence that would provide a guide as to whether a diver is meeting the core standards required for him to be considered competent.

**Written reports**

- The diver would be able to outline the Dive Team composition required for his level of diving and the roles and responsibilities in normal and emergency situations
- Outline the contents of the Singapore Technical Advisory for Inland/Inshore Commercial Diving Safety and Health.
- A multi choice examination should be established with questions related to the items listed in the Underpinning Knowledge section.

<b>Competency Unit Code</b> CD-CCD-100A-0	<b>Competency Level</b> Inland/Inshore Diver (CSCUBA and SSDE)
<b>Competency Unit Title</b> Legislation and Standards	

**Description of Competency Element**

<b>Competency Element Title</b> 3. Describe legislation requirements of the Singapore Workplace Safety and Health Act (WSHA) and supporting regulations
<b>Performance Criteria</b>  A competent commercial diver must be able to perform the following: 3.1 Describe legislation requirements of the Singapore Workplace Safety and Health Act (WSHA) and supporting regulations, which include: <ul style="list-style-type: none"> <li>• Workplace Safety and Health (Incident Reporting) Regulations</li> <li>• Workplace Safety and Health ( Risk Management) Regulations</li> </ul> 3.2 Recognize Marine Signals and Chart Symbols (Singapore Marine Port Authority requirements).
<b>Underpinning Knowledge</b>  A competent diver needs to know and understand: Any person at work, including an employee, must comply with their obligations under the Workplace Safety and Health Act (WSHA) 1 <sup>st</sup> March 2006 that cover commercial diving activities. <ul style="list-style-type: none"> <li>• Adhere to safe working procedures and principles introduced at the workplace</li> <li>• Not endanger themselves or others working around them through unsafe behavior</li> <li>• Not tamper with any safety device or undertake any willful or reckless acts</li> <li>• Always correctly use any personal protective equipment provided at work</li> <li>• The requirement for a Risk Assessment for each and every diving task and who should carry out the Risk Assessment</li> <li>• The requirement for incident reporting and who should conduct incident investigations</li> </ul>
<b>Range and Context</b>  Understanding the extent of The Workplace Safety and Health Act (WSHA) 1 <sup>st</sup> March 2006 and where it is applicable to:  Annex A: <ul style="list-style-type: none"> <li>• Any premises which is a factory. This would include any inlet, outlet, reservoir or other body of water that is associated with the factory</li> <li>• Any ship in a harbor where the following is carried out; <ul style="list-style-type: none"> <li>• Cleaning of any tanks bilges or holds in the ship</li> <li>• Construction, reconstruction, repair, fitting, furnishing or breaking up</li> </ul> </li> <li>• Any dock, wharf or quay where loading, unloading or bunkering of a ship is carried out by persons other than the crew of the ship</li> <li>• Any premises, other than domestic premises, in which a steam boiler, steam receiver or air receiver is used</li> </ul>

Annex B:

The following premises within which persons are employed are considered to be factories;

- Any yard, including **any dock, wharf, jetty, quay** and the area within its boundaries, where the construction, reconstruction, repair, refitting, finishing or breaking up of ships is carried out. **This includes the water next to any such yard** where similar shipbuilding activities are carried out by the occupier of that yard or by other on his behalf.

The competent diver shall understand the requirements for the employer to provide;

- Safe systems of work
- Safe plant and equipment
- Arrangements ensuring safe use of hazardous substances
- Instruction, information and training for safety and safe working
- Safe access and egress to the workplace
- Clean and healthy environment
- Safe place of work
- Emergency response procedures and plans

The competent diver shall understand the risk assessment process and requirements under the Risk Management Regulations.

The competent diver shall understand the incident reporting process and requirements under the Incident Reporting Regulations.

The competent diver shall understand the marine signs and signals and marine chart symbols

The competent diver understands his obligations are:

- To take care of his health and safety and that of other persons working with him, or in the vicinity of the worksite
- To co-operate with the employer in ensuring health and safety

**Evidence Sources**

Listed below are a few examples about the kinds of evidence that would provide a guide as to whether an individual is meeting the standards required to be competent.

**Written reports**

- Outline the provisions of the Workplace Safety and Health Act (WSHA) 1<sup>st</sup> March 2006
- Outline the provisions of the Risk Management Regulations
- Outline the provisions of the Incident Reporting Regulations
- Identify marine signals and basic chart symbols
- A multi choice examination should be established with questions related to the items listed in the Underpinning Knowledge section

**Competency Unit:** Diving Theory: Physics

**Summary of this Competency Element**

This Competency Unit consists of the following element:

1. Explain Diving Physics

The CSCUBA and SSDE diver shall know, understand and have a working knowledge of the physical laws governing diving operations, including the states of matter, the units of measurement, the principles of buoyancy and the properties of gases, liquids, heat, light and sound underwater and how they affect the diver.

**Assumed Skills and Knowledge**

The required skills and knowledge criteria for this unit are as follows:

Personnel are required to be able to:

- add, subtract, multiply and divide whole numbers, imperial and decimals and carry out simple arithmetic calculations
- calculate percentages; and transpose and solve simple formulas, e.g. gas laws
- Use a calculator
- be able to understand written and verbal communications in English, and be able to communicate easily with other persons

<b>Competency Unit Code</b> CD-CCD-100B-0	<b>Competency Level</b> Inland/Inshore Diver (CSCUBA and SSDE)
<b>Competency Unit Title</b> Diving Theory: Physics	

### Description of Competency Element

<b>Competency Element Title</b> 1. Explain Diving Physics
<b>Performance Criteria</b>  A competent commercial diver must be able to perform the following: 1.1 Apply basic math skills in simple equations found in physics calculations involving gases, liquids, and solids, in units of metric and imperial measurements 1.2 Describe the relationship of the behavior of gases in changing pressures and temperatures. 1.3 Describe the gas laws and perform basic calculations related to these laws 1.4 Describe the partial pressure of gases, the solubility of gases in a solution , and the solubility effect of gases on a diver 1.5 Describe the effect of visibility and light underwater 1.6 Describe the effect of sound underwater 1.7 Describe the basic concept and principles of buoyancy and how this affects the diver and requirements when lifting an object underwater and carryout basic buoyancy calculations 1.8 Describe the basic principles of thermal balance and the effects on the diver and the divers equipment
<b>Underpinning Knowledge</b>  A competent diver needs to know and understand: <ul style="list-style-type: none"> <li>• The ability to apply basic math skills in simple equations / fractions found in diving physics calculations involving gases, liquids, and solids, in units of metric and imperial measurements</li> <li>• The relationship between pressure and volume (Boyle's Law)</li> <li>• The relationship between pressure and temperature (Charles's Law)</li> <li>• The solubility effects of gases in solution within a diver's tissues (Henry's Law)</li> <li>• The relationship of partial pressure of gases as applied to diving (Dalton's Law)</li> <li>• The Archimedes Principle of Buoyancy as applied to diving operations</li> <li>• Describe the effects of pressure when applied to a diver during diving operations</li> <li>• An understanding of the effect of diving at altitude</li> <li>• An understanding of the effect of visibility and light underwater</li> <li>• An understanding of the effect of sound underwater</li> <li>• A detailed understanding of the principles of thermal balance and the effects on the diver and the divers equipment</li> </ul>
<b>Range and Context</b>  <b>Gas Laws and how they affect the diver:</b> <ul style="list-style-type: none"> <li>• Boyle's Law - For a fixed amount of a gas kept at a fixed temperature, <math>P</math> [pressure] and <math>V</math> [volume] are inversely proportional (while one increases, the other decreases).</li> <li>• Perform basic calculations showing the volume change changes with changing depths</li> <li>• Charles Law - At constant pressure, the volume of a given mass of an ideal gas</li> </ul>

increases or decreases by the same factor as its temperature on the absolute temperature scale (i.e. the gas expands as the temperature increases).

- Henry's Law - At a constant temperature, the amount of a given gas dissolved in a given type and volume of liquid is directly proportional to the partial pressure of that gas
- Describe the solubility effects of gases in solution within a diver's tissues and liquids and the need for decompression
- Dalton's Law - the total pressure exerted by a gaseous mixture is equal to the sum of the partial pressures of each individual component in a gas mixture
- Perform basic calculations determining the partial pressure of gases in different mixes at different depths
- General Gas Law - The product of the initial pressure, initial volume, and new temperature (absolute scale) of an enclosed gas is equal to the product of the new pressure, new volume, and initial temperature
- Perform basic calculations showing the pressure changes with changes in temperature and volume (General Gas Law)

### **Buoyancy**

- Archimedes Principle - Any object, wholly or partially immersed in a fluid, is buoyed up by a force equal to the weight of the fluid displaced by the object
- Perform basic calculations determining the buoyancy of various objects at different depths
- Describe the effects of salt water and fresh water on buoyancy

### **Formulas and calculations (Metric and Imperial methods)**

- Determine pressure and absolute pressure with regards to divers depth
- Perform basic calculations determining a diver's over-bottom pressure requirements for demand type breathing helmets and masks
- Perform basic calculations determining the amount of air in a high pressure bottle or flask – Free Gas Volume
- Perform basic calculations converting metric and imperial measurements as applied to diving
- Air consumption of a diver at surface and at depth
- Air consumption of a diver in an emergency
- Bailout duration
- High Pressure and Low Pressure compressor deliver rates (pressure and volume)
- Temperature change- and change in pressure (Charles Law)
- Have an understanding of the gas laws formula
- Boyle's Law; Henry's Law; Dalton's Law; Charles's Law and General Gas Law
- A basic understanding of the body cavities affected by pressure and the results of the change of pressure within those cavity's
- Archimedes Principle and how the state of buoyancy is determined;- Positively Buoyant; Neutrally Buoyant; Negatively Buoyant.
- The means of heat transference – Conductivity; Radiance; Convection
- High Pressure and Low Pressure delivery rates and the capabilities of compressors.
- Divers calculated breathing rates during normal and emergency dives

### **Evidence Sources**

Listed below are a few examples about the kinds of evidence that would provide a guide as to whether an individual is meeting the standards required to be competent.

### **Written reports**

- A multi choice examination should be established with questions related to the performance criteria
- State the following Gas laws and outline their relationship to the divers activities
  - Boyle's Law
  - Charles's Law
  - Henry's Law

- Dalton's Law

- State Archimedes Principle and outline how it affects the diver and moving an object under water- conduct a risk assessment for moving an object of a weight of 75kg and negatively buoyant underwater.
- State how visibility effects the diver operations
- Calculate the air requirement for a diver to work at a given depth when using CSCUBA and SSDE
- Basic Calculations of the endurance of a air supply and emergency air requirements
- Basic Calculations for the endurance of the divers bailout cylinder with an understanding of the effects of temperature change, ambient pressure and breathing rate

**Competency Unit : Diving Theory: Physiology**

**Summary of this Competency Element**

This Competency Unit consists of the following element:

1. Explain Diving Physiology

The commercial diver shall have an understanding of the physiological effects that pressure has on the body, medical diving hazards and decompression and how they affect the diver. The diver shall be able to recognize the signs and symptoms of diving related injuries and understand the means of prevention and treatment of such injuries.

**Assumed Skills and Knowledge**

The assumed skills and knowledge for learners for this unit are:

- be able to understand written and verbal communications in English, and be able to communicate easily with other persons;
- be able to understand basic commercial diving terminology
- be able to understand basic medical terms

<b>Competency Unit Code</b> CD-CCD-100C-0	<b>Competency Level</b> Inland / Inshore Diver (CSCUBA and SSDE)
<b>Competency Unit Title</b> Diving Theory: Physiology	

### Description of Competency Element

<b>Competency Element Title</b> 1. Explain Diving Physiology
<b>Performance Criteria</b>  A competent commercial diver must be able to perform the following: 1.1 Identify the anatomy of the human body and the basic functions of those parts that are affected by pressure while diving 1.2 Describe the effects of respired gases on the body, and the effects of breathing various gases at elevated pressure 1.3 Describe the direct and mechanical effects of pressure on a diver (barotrauma) 1.4 Describe the effects and types of gas toxicity 1.5 Describe the indirect effects of pressure on a diver 1.6 Identify the problems associated with maintaining the diver in thermal balance 1.7 Recognize diving related injuries and ailments 1.8 Describe the prevention of diving related injuries, marine life injuries and ailments 1.9 Describe the management of a diving casualty 1.10 Recognize marine life related injuries 1.11 Describe the effects of flying after diving 1.12 List the contents of the diving medical equipment required on site 1.13 Proficiently use Oxygen Provider equipment system
<b>Underpinning Knowledge</b>  A competent individual needs to know and understand: <ul style="list-style-type: none"> <li>• The relevant anatomy and physiology of the human body, in particular the respiratory, circulatory, and central nervous systems</li> <li>• The effects on the diver of breathing gases at different depths/pressures</li> <li>• The principles governing compression and decompression that affect divers, and the implications for routine operations, emergencies and therapeutic recompression</li> <li>• The causes, manifestations, and treatment of decompression illness</li> <li>• The uptake, distribution, and elimination of gases</li> <li>• The causes, manifestations, and treatment of pressure-related diseases(pulmonary barotrauma, gas embolism) and the effects of pressure on body cavities</li> <li>• The types and effects that Marine life can have on the diver</li> <li>• The physiology of the thermal balance for the diver</li> <li>• The basics of caring for and managing a diving emergency in the field</li> <li>• The limitations of flying and going to altitude after diving and the physiological effects on the diver</li> <li>• A basic knowledge of the effects of toxic gases on the body</li> <li>• A basic knowledge of the indirect effects of pressure on a diver</li> <li>• The causes, manifestations, and treatment of decompression illness</li> <li>• How to care for and manage a diving emergency in the field, and importance of emergency evacuation procedures</li> <li>• How to set up and use an Oxygen Provider equipment system</li> </ul>
<b>Range and Context</b>  Describe the respiratory system, including; <ul style="list-style-type: none"> <li>• Constitution of the blood</li> </ul>

- The lungs and airways
- The process of respiration and simple gas exchange

Describe the circulatory system, including;

- The function and components of the heart
- Blood vessels and circulation of the blood

Describe the basic musculoskeletal system

Describe the basic components and function of the nervous systems, as related to diving and diving ailments, including;

- The brain
- Central, autonomic, and peripheral nervous systems
- Vestibular organs, ears and sinuses

Hypothermia / Hyperthermia

- Signs and symptoms
- Preventing and treating hypothermia
- Signs and symptoms of hyperthermia
- Preventing and treating hyperthermia

Barotrauma, describe signs, symptoms and treatment of;

- Ear squeeze and Reversed Ears
- Sinuses squeeze
- Suit squeeze
- Thoracic squeeze
- Reverse squeeze
- Pneumothorax
- Tension Pneumothorax
- Subcutaneous emphysema
- Mediastinum emphysema
- Arterial gas embolism (AGE)

Gas Toxicity, describe the signs, symptoms and treatment of relevant gases on the body (gas toxicity)

- Oxygen- Hypoxic / Anoxic
- Describe the signs, symptoms and management of hypoxia and hyperoxia
- Nitrogen (narco-sis)
- Carbon Dioxide - Describe the signs, symptoms and management of hypercapnia
- Carbon monoxide
- Recognition of gas toxicity – ACUTE and CHRONIC
- Hydrocarbons
- The effects of raised elevations of partial pressures of Oxygen, Carbon Dioxide, Carbon Monoxide and limits permitted in breathing gas (air)

Decompression Illness (DCI)

- Recognition of DCI signs and symptoms
- Manifestations of DCI
- Type 1- Pain Only
- Type 2 – Central Nervous System (CNS)
- Treatment protocols and procedures of DCI- Neurological examination Management and Prevention of Diving Related Injuries
- Perform an initial rapid neurological examination of an injured diver
- Correct actions and procedures while diving
- Actions to be taken by the Dive Team in an emergency
- Describe the basic principles of caring for a casualty during transport

Describe the management of the following medical emergencies

- Bleeding
- Fractures and sprains
- Muscle trauma

Describe the management of the following medical emergencies

- Shock
- Burns
- Electrocution

Describe the marine life that can be found and the effects on the diver, the management of injuries that maybe sustained:-

- Local Marine Life
- Poisonous Marine life
- Signs and Symptoms of marine life injuries
- Medical aid requirements/ treatments of marine life injuries

Describe the management of the following medical emergencies

- Drowning- Wet / Dry
- Asphyxia
- Pulmonary edema
- Respiratory arrest
- Cardiac arrest

### **Evidence Sources**

Listed below are a few examples about the kinds of evidence that would provide a guide as to whether an individual is meeting the standards required to be competent.

### **Work activities**

- Perform a basic neurological examination on a diving casualty
- Set up and use Oxygen Provider equipment system

### **Written reports**

- A multi choice examination should be established with questions related to the items listed in the Underpinning Knowledge section

**Competency Unit : Diving Procedures****Summary of Competency Elements**

This Competency Unit consists of the following elements:

1. Describe Diving Procedures
2. Describe the Requirements for Decompression Procedures and Outline their Use

**Required Skills and Knowledge**

The assumed skills and knowledge for learners are to:

- Be able to understand written and verbal communications in English, and be able to communicate easily with other persons
- Be able to understand basic diving terminology

<b>Competency Unit Code</b> CD-CCD-100D-0	<b>Competency Level</b> Inland/Inshore Diver (CSCUBA and SSDE)
<b>Competency Unit Title</b> Diving Procedures	

### Description of Competency Element

<b>Competency Element Title</b> 1. Describe Diving Procedures
<b>Performance Criteria</b>  A competent commercial diver must be able to perform the following: 1.1 Describe the roles and responsibilities of the dive team members and others supporting the dive operation 1.2 Outline the minimum team size 1.3 Outline the requirements of company diving procedures, manuals, management systems and dive plan 1.4 Outline the Permit to Work requirements and procedures 1.5 State the requirement to carry out equipment Dive Check Lists <ul style="list-style-type: none"> <li>• Pre dive Checks</li> <li>• Post Dive Checks</li> </ul> 1.6 Outline the requirement and content of a dive briefing/ toolbox talk. To actively engage with identification and mitigation of hazards during the toolbox talk. 1.7 State the requirement to carry out personal Dive Check Lists <ul style="list-style-type: none"> <li>• Pre dive Checks</li> <li>• Post Dive Checks</li> </ul> 1.8 State the reporting requirements for Accident / Incident Investigation 1.9 Outline the procedures required for emergency response in the water and on the surface 1.10 Describe the actions required by a stand by diver in an emergency situation (diver rescue) 1.11 Act as a diver recorder under supervision of the dive supervisor, required to fill up logs and tables
<b>Underpinning Knowledge</b>  The diver shall: <ul style="list-style-type: none"> <li>• Understand the Roles and Responsibilities of the dive team members and others supporting the dive operation</li> <li>• Understand the minimum Dive Team size for the diving operation to be carried out</li> <li>• Content of a company diving operations manual</li> <li>• Be competent in the proper set-up, operation and maintenance of his diving equipment and complete checklists</li> <li>• Have sufficient knowledge and skills to ensure safe underwater operations</li> <li>• Understand the principles and operation of high and low pressure air compressors, their associated equipment and any applicable safety requirements</li> <li>• Selection and use of Decompression Tables for; <ul style="list-style-type: none"> <li>- No decompression diving</li> <li>- Decompression diving</li> <li>- Omitted decompression</li> <li>- Decompression treatment requirements</li> <li>- Altitude Diving</li> </ul> </li> <li>• Understand the reporting requirements for Accident / Incident Investigation</li> <li>• Safe diving procedures while acting as a dive team member (surface and in the water)</li> </ul>
<b>Range and Context</b> The contents shall include:

Company Safety Management system and the structure / roles and responsibilities of relevant positions in the company structure

Requirement and content of a Dive Plan

Basic marine chart reading skills

Basic meteorology skills

Dive Briefing / Toolbox meetings

Dive equipment Check Lists, how to establish them and use them effectively

- Pre Dive Checks
- Post Dive Checks

Dive Check – personal checks, how to establish them and use them effectively

- Pre Dive Checks
- Post Dive Checks

Understand his actions and response in a Diving Emergency

- In water diver emergencies
  - Loss of Air
  - Loss of Communications
  - Trapped Diver
  - Contaminated Air supplies
  - Vomiting underwater
- Emergency response procedures
  - Fire
  - Vessel Emergencies
  - Diving Incident response
  - Man overboard

Safety procedures applicable when;

- Diving alone (one diver in the water on life line / umbilical)
- Diving with a dive partner (two or more divers in the water on life line / umbilical)
- When acting as the stand by diver

Safety procedures applicable to:

- Equipment set-up and check-off lists
- Diver stage handling
- Diver tending procedures
- Decompression schedules
- Medical support for diving operations
- Air requirements for diving operations (diver and s/by diver)
- Diver depth monitoring

### **Evidence Sources**

Listed below are a few examples about the kinds of evidence that would provide a guide as to whether an individual is meeting the standards required to be competent.

#### **Work activities**

- Outline safe diving operational procedures

#### **Written reports**

- A multi choice examination should be established with questions related to the items listed in the Underpinning Knowledge section

<b>Competency Unit Code</b> CD-CCD-100D-0	<b>Competency Level</b> Inland/Inshore Diver (CSCUBA and SSDE)
<b>Competency Unit Title</b> Diving Procedures	

### Description of Competency Element

<b>Competency Element Title</b> 2. Describe the Requirements for Decompression Procedures and Outline their Use
<b>Performance Criteria</b>  A competent commercial diver must be able to perform the following: 2.1 State the requirement and use of Decompression Tables for: <ul style="list-style-type: none"> <li>• No decompression diving</li> <li>• Decompression diving</li> <li>• Omitted decompression</li> <li>• Decompression treatment requirements</li> <li>• Altitude diving requirements</li> </ul>
<b>Underpinning Knowledge</b>  The diver shall: <ul style="list-style-type: none"> <li>• Selection and use of Decompression Tables for: <ul style="list-style-type: none"> <li>- No decompression diving</li> <li>- Decompression diving</li> <li>- Omitted decompression</li> <li>- Decompression treatment requirements</li> <li>- Altitude Diving</li> </ul> </li> </ul>
<b>Range and Context</b> The contents shall include:  Understand Decompression Procedures <ul style="list-style-type: none"> <li>• No decompression diving</li> <li>• Decompression diving ( in water decompression and surface decompression)</li> <li>• Omitted decompression</li> <li>• Decompression treatment requirements</li> <li>• Use of appropriate decompression tables</li> </ul>
<b>Evidence Sources</b>  Listed below are a few examples about the kinds of evidence that would provide a guide as to whether an individual is meeting the standards required to be competent.  <b>Work activities</b> <ul style="list-style-type: none"> <li>• Using decompression tables – establish a decompression schedule for a selected dive profile</li> </ul> <b>Written reports</b> <ul style="list-style-type: none"> <li>• A multi choice examination should be established with questions related to the items listed in the Underpinning Knowledge section</li> </ul>

**Competency Unit : Underwater and Surface Operational Hazards**

**Summary of Competency Elements**

This Competency Unit consists of the following elements:

1. Identify Underwater Hazards during Diving Operations
2. Identify Operational Surface Hazards during Diving Operations

**Required Skills and Knowledge**

The assumed skills and knowledge for learners are to:

- Be able to understand written and verbal communications in English, and be able to communicate easily with other persons;
- Be able to understand basic diving terminology
- Be able to identify hazards associated with commercial diving activities; both equipment hazards and environmental hazards

<b>Competency Unit Code</b> CD-CCD-100E-0	<b>Competency Level</b> Inland/Inshore Diver (CSCUBA and SSDE)
<b>Competency Unit Title</b> Underwater and Surface Operational Hazards	

### Description of Competency Element

<b>Competency Element Title</b> 1. Identify Underwater Hazards during Diving Operations
<b>Performance Criteria</b>  A competent commercial diver must be able to perform the following: 1.1 Identify the various safety tools for risk management used in the project planning: HAZIDS/HAZOBS, Job Safety Assessment/Risk Assessment for the dive operation 1.2 Contribute inputs during risk assessment 1.3 Identify the sub-sea hazards in diving operations
<b>Underpinning Knowledge</b>  The diver shall: <ul style="list-style-type: none"> <li>• Understand the Roles and Responsibilities of the dive team members and others supporting the dive operation with the development of Hazard identification and Risk Assessments</li> <li>• Understand the minimum Dive Team size for the diving operation to be carried out</li> <li>• Content of a company diving operations manual</li> <li>• Be competent in the proper set-up, operation and maintenance of his diving equipment</li> <li>• Have sufficient knowledge and skills to ensure safe underwater operations</li> <li>• Have knowledge of, and the understanding to avoid, the hazards of differential pressures involved in upstream head and intakes as well as system tag-out procedures</li> <li>• Understand the various safety tools for Risk Management used in the project planning;- HAZIDS/ HAZOBS, Risk Assessment / Job Safety Assessments for the dive operation</li> <li>• Be able to provide competent input during a Risk Assessment</li> <li>• Identify the subsea hazards for diving operations</li> </ul>
<b>Range and Context</b> The contents shall include:  HAZIDS / Risk Assessment / Job Safety Assessments for the dive operation  Underwater hazards <ul style="list-style-type: none"> <li>• Known hazards when diving from vessels</li> <li>• Visibility</li> <li>• Tides, currents, underwater entrapment</li> <li>• Umbilical entanglement / management</li> <li>• Ships sea chests, rudders, anchors, propellers, thrusters</li> <li>• Boat lowering devices</li> <li>• Cofferdams</li> <li>• Hazardous marine life;- review of Physiology Unit</li> <li>• Contaminated environments</li> <li>• Differential Pressures</li> <li>• Confined / Restricted access / overhead environments</li> <li>• Use of tools- hand tools; hydraulic and underwater cutting equipment</li> <li>• Simultaneous operations</li> <li>• Structures on the seabed- fix structures; scrap items</li> </ul>

### **Evidence Sources**

Listed below are a few examples about the kinds of evidence that would provide a guide as to whether an individual is meeting the standards required to be competent.

#### **Work activities**

- Participate in a group to identify sub-sea hazards during a risk assessment in preparation the dive

#### **Written reports**

- Complete a hazard identification exercise for a simulated dive task

<b>Competency Unit Code</b> CD-CCD-100E-0	<b>Competency Level</b> Inland/Inshore Diver (CSCUBA and SSDE)
<b>Competency Unit Title</b> Underwater and Surface Operational Hazards	

### Description of Competency Element

<b>Competency Element Title</b> 2. Identify Operational Surface Hazards during Diving Operations
<b>Performance Criteria</b>  A competent commercial diver must be able to perform the following: 2.1 Identify the various safety tools for risk management used in the project planning: HAZIDS/HAZOBS, Job Safety Assessment/Risk Assessment for the dive operation 2.2 Contribute inputs during risk assessment 2.3 Identify hazards associated on the surface related to diving activities
<b>Underpinning Knowledge</b>  The diver shall: <ul style="list-style-type: none"> <li>• Understand the Roles and Responsibilities of the dive team members and others supporting the dive operation with the development of Hazard identification and Risk Assessments</li> <li>• Understand the minimum Dive Team size for the diving operation to be carried out</li> <li>• Content of a company diving operations manual</li> <li>• Be competent in the proper set-up, operation and maintenance of his diving equipment</li> <li>• Have sufficient knowledge and skills to ensure safe underwater operations</li> <li>• Have knowledge of, and the understanding to avoid, the hazards of differential pressures involved in upstream head and intakes as well as system tag-out procedures</li> <li>• Understand the various safety tools for Risk Management used in the project planning;- HAZIDS/ HAZOBS, Risk Assessment / Job Safety Assessments for the dive operation</li> <li>• Be able to provide competent input during a Risk Assessment</li> <li>• Identify the hazards associated with diving activities while working on the surface</li> </ul>
<b>Range and Context</b> The contents shall include:  HAZIDS / Risk Assessment / Job Safety Assessment for the dive operation  Surface related hazards <ul style="list-style-type: none"> <li>• Known hazards when diving from vessels- surface related i.e positioning; other marine craft; loss of power</li> <li>• Surface Visibility</li> <li>• Weather – rain, heat, wind</li> <li>• Fire in control room/ onboard vessel</li> <li>• Vessel Collision</li> <li>• Lifting objects</li> <li>• Other contractors working in area</li> <li>• Simultaneous operations</li> <li>• Security of the dive site – Pirates – asset protection</li> </ul>
<b>Evidence Sources</b>  Listed below are a few examples about the kinds of evidence that would provide a guide as to

whether an individual is meeting the standards required to be competent.

**Work activities**

- Participate in a group to identify operational surface hazards during a risk assessment in preparation the dive

**Written reports**

- Complete a hazard identification exercise for a simulated dive task

**Competency Unit:** Documentation and Records

**Summary of Competency Elements**

This Competency Unit consists of the following element:

1. Perform Documentation and Recording for a Diver

**Assumed Skills and Knowledge**

Learners are assumed to be able to:

- understand written and verbal communications in English, and be able to communicate easily with other persons
- eligibly to write in English language
- record accurate details in time keeping; details of events and general information

<b>Competency Unit Code</b> CD-CCD-100F-0	<b>Competency Level</b> Inland/Inshore Diver (CSCUBA and SSDE)
<b>Competency Unit Title</b> Documentation and Records	

### Description of Competency Element

<b>Competency Element Title</b> 1. Perform Documentation and Recording for a Diver,
<b>Performance Criteria</b>  A competent commercial diver must be able to perform the following: 1.1 Describe the requirements for accurate records (diving, maintenance, checklists etc) to be maintained 1.2 Demonstrate clear and concise record keeping of dives and associated work 1.3 Complete personal dive log book and records
<b>Underpinning Knowledge</b>  A competent individual needs to know and understand: <ul style="list-style-type: none"> <li>• Documentation required to be completed during the diving operation</li> <li>• Accurate recording methods</li> <li>• Personal dive records and log books and certification</li> <li>• Planned Maintenance recording methods</li> </ul>
<b>Range and Context</b>  A competent individual needs to know and understand: <ul style="list-style-type: none"> <li>• Equipment maintenance manuals and records</li> <li>• DDC log records</li> <li>• Pre and Post dive check sheets</li> <li>• Diving operations record keeping <ul style="list-style-type: none"> <li>- Diver certification and medicals</li> <li>- Personal Dive Records and log books</li> <li>- Training records</li> </ul> </li> </ul>
<b>Evidence Sources</b>  Listed below are a few examples about the kinds of evidence that would provide a guide as to whether an individual is meeting the standards required to be competent.  <b>Work Activities</b> <ul style="list-style-type: none"> <li>• Complete personal dive record</li> <li>• Complete pre-dive check list and post dive check list</li> <li>• Complete maintenance log of diving equipment</li> </ul> <b>Written Reports</b> <ul style="list-style-type: none"> <li>• A multi choice examination should be established with questions related to the items listed in the Underpinning Knowledge section</li> </ul>

## 5.0 INLAND/INSHORE CSCUBA DIVER SPECIFIC COMPETENCY UNITS

The trainee diver has to be competent in all the CSCUBA Specific Competency Units to qualify as a CSCUBA Level 1 Diver.

<b>Competency Unit:</b> CSCUBA Diving Equipment, Systems, Procedures and Practices
<b>Summary of Competency Elements</b>  This Competency Unit consists of the following elements: <ol style="list-style-type: none"><li>1. Use CSCUBA Diving Equipment, Systems, Procedures and Practices</li><li>2. Describe CSCUBA Drills in a Confined and Controlled Environment</li></ol> The commercial diver shall be competent to understand and be able to correctly set up, operate, maintain and use various types of CSCUBA diving equipment, full face masks, compressors and the procedures for self contained air diving.
<b>Assumed Skills and Knowledge</b>  Learners are assumed to be able to: <ul style="list-style-type: none"><li>• understand written and verbal communications in English, and be able to communicate easily with other persons;</li><li>• understand diving equipment terminology and equipment uses</li><li>• act on instructions</li></ul>

<b>Competency Unit Code</b> CD-SCD-101A-0	<b>Competency Level</b> Inland/Inshore CSCUBA Diver
<b>Competency Unit Title</b> CSCUBA Diving Equipment, Systems, Procedures and Practices	

### Description of Competency Element

<b>Competency Element Title</b> 1. Use CSCUBA Diving Equipment, Systems, Procedures and Practices
<b>Performance Criteria</b>  A competent commercial diver must be able to perform the following: 1.1 Describe the roles and responsibilities of a diver, a diver's tender, and a standby diver on a CSCUBA dive site 1.2 Describe the limitations of CSCUBA equipment used in commercial diving operations 1.3 Describe safe means to enter and exit the water 1.4 Demonstrate the correct basic maintenance and use of common types of CSCUBA equipment 1.5 Describe correct diver checks prior to entering the water 1.6 Describe the use of CSCUBA equipment in the tethered mode, using a life line and or secured to a float on the surface 1.7 Describe the correct use of personal diving equipment i.e. wet suit, dry suit, buoyancy device, fins, mask / regulator, bailout cylinder, knife, harness, full face masks (AGA, EXO, KMB) 1.8 Describe the principles and use of underwater wireless (through water) communications; hard wire communications; diver line signals; diver hand signals 1.9 Describe the use of high pressure compressors 1.10 Describe the use of High / Low Pressure Air, cylinders, hoses and fittings
<b>Underpinning Knowledge</b>  A competent diver needs to know and understand: <ul style="list-style-type: none"> <li>• A complete knowledge of the principles and responsibilities of being a diver, a diver's tender, and a standby diver on a CSCUBA dive site</li> <li>• The basic construction and theory of operation for the various components of self-contained breathing equipment, including reserve systems</li> <li>• The „set up' of CSCUBA equipment and its use</li> <li>• Use of Personal diving equipment</li> <li>• Limitations of CSCUBA diving and equipment for commercial diving works</li> <li>• Requirements of operational and emergency contingency plans</li> <li>• Various Full Face masks available for use and how to use them</li> <li>• Use of diving ladders to enter and exit the water and in the event of an emergency</li> <li>• The safety requirements and principles for handling High Pressure and Low pressure gases (air)</li> <li>• The principles of Wireless and hard wire communication systems</li> <li>• Line Pull signals – sequence of use and how to use them- life line management</li> <li>• Planned Maintenance Systems; and basic maintenance requirements of compressors, personal diving equipment and CSUBA diving equipment</li> </ul>
<b>Range and Context</b>  <b>Responsibilities and act as a dive team member on the dive site</b> <ul style="list-style-type: none"> <li>• Diver</li> <li>• Standby diver</li> <li>• Tender</li> </ul>

**Dry Exercises of using and handling / setting up:**

**Diving Equipment and Systems:**

- Personal Diving Equipment
- CSCUBA systems
- Regulators and Full-Face Masks (such as AGA;EXO;KMB; US Divers)
- Communications systems: Hard wire; through water and line pulls
- Discussion for CSCUBA drills and exercises to be carried out during practical diving

**High Pressure (HP) and Low Pressure (LP) supplies**

- Use of HP hoses
- Use of LP Hoses
- Hose cleanliness and cleaning requirements
- Regulators (HP to LP delivery)
- Security and safety while using HP and LP supplies
- HP Compressors- use and maintenance

**Planned Maintenance Systems (PMS)**

- Competency to carry out Maintenance on diving equipment
- Updating of Maintenance Records

**Methods of entering and exiting the water for normal and emergency situations**

**Evidence Sources**

Listed below are a few examples about the kinds of evidence that would provide a guide as to whether an individual is meeting the standards required to be competent.

**Work activities**

- Use and setting up CSCUBA equipment ready for use
- Handling personal diving equipment
- Using HP and LP supplies correctly
- Entering and exiting the water safely

**Written reports**

A multi choice examination should be established with questions related to the items listed in the Underpinning Knowledge section.

<b>Competency Unit Code</b> CD-SCD-101A-0	<b>Competency Level</b> Inland/Inshore CSCUBA Diver
<b>Competency Unit Title</b> CSCUBA Diving Equipment, Systems, Procedures and Practices	

### Description of Competency Element

<b>Competency Element Title</b> 2. Describe CSCUBA Drills in a Confined and Controlled Environment
<b>Performance Criteria</b>  A competent commercial diver must be able to perform the following: 2.1 Describe the drills in the event of: <ul style="list-style-type: none"> <li>• Uncontrolled Ascent</li> <li>• Equipment malfunction, loss of air, loss of communications</li> <li>• Trapped Diver</li> <li>• Umbilical Entanglement</li> <li>• Unconscious / injured diver in the water recovery</li> <li>• Contaminated air supply</li> <li>• Vomiting Underwater</li> <li>• No visibility</li> </ul> 2.2 Describe actions required during an emergency situation while using CSCUBA equipment
<b>Underpinning Knowledge</b>  A competent diver needs to know and understand: <ul style="list-style-type: none"> <li>• A complete knowledge of the principles and responsibilities of being a diver, a diver's tender, and a standby diver on a CSCUBA dive site</li> <li>• The basic construction and theory of operation for the various components of self-contained breathing equipment, including reserve systems</li> <li>• The „set up' of CSCUBA equipment and its use</li> <li>• Use of Personal diving equipment</li> <li>• Limitations of CSCUBA diving and equipment for commercial diving works</li> <li>• Requirements of operational and emergency contingency plans</li> <li>• Various Full-Face masks available for use and how to use them</li> <li>• Use of diving ladders to enter and exit the water and in the event of an emergency</li> <li>• The safety requirements and principles for handling High Pressure and Low pressure gases (air)</li> <li>• The principles of Wireless and hard wire communication systems</li> <li>• Line Pull signals – sequence of use and how to use them- life line management</li> </ul>
<b>Range and Context</b>  <b>Responsibilities and act as a dive team member on the dive site</b> <ul style="list-style-type: none"> <li>• Diver</li> <li>• Standby diver</li> <li>• Tender</li> </ul> <b>Dry Exercises of using and handling / setting up:</b> <b>Diving Equipment and Systems:</b> <ul style="list-style-type: none"> <li>• Personal Diving Equipment</li> <li>• CSCUBA systems</li> <li>• Regulators and Full Face Masks (such as AGA;EXO;KMB; US Divers)</li> <li>• Communications systems: Hard wire; through water and line pulls</li> <li>• Discussion for CSCUBA drills and exercises to be carried out during practical diving</li> </ul>

- Use of the equipment with in a confined water / controlled environment
  - Buoyancy Exercises
  - Sharing Air source (Buddy Breathing)
  - Rescue Skills
  - Navigation skills
- Emergency drills (in confined and open water environments) using CSCUBA equipment
  - Uncontrolled ascent (**Note: Confined/pool water activity only**)
  - Equipment malfunction, loss of air; loss of communications
  - Trapped diver
  - Lifeline entanglement
  - Unconscious / injured diver in the water recovery
  - Contaminated air supply
  - Vomiting underwater
  - No visibility

**Methods of entering and exiting the water for normal and emergency situations**

**Evidence Sources**

Listed below are a few examples about the kinds of evidence that would provide a guide as to whether an individual is meeting the standards required to be competent.

**Work activities**

- Use and setting up CSCUBA equipment ready for use
- Handling personal diving equipment
- Discuss the CSCUBA Drills and procedures
- Entering and exiting the water safely

**Written reports**

A multi choice examination should be established with questions related to the items listed in the Underpinning Knowledge section.

**Competency Unit: CSCUBA Diving**

**Summary of Competency Elements**

This Competency Unit consists of the following elements:

1. Perform Safe CSCUBA Diving - Setting Up of Equipment
2. Perform Safe CSCUBA Diving - In-water Diving Activities

The CSCUBA diver shall be competent in practical surface and in water use of a variety of types of CSCUBA diving equipment. He shall be able to dive safely and competently using CSCUBA diving equipment with the management and control of life lines and communications in both shelter and open water of varying depths to a maximum of 30msw with varying bottom conditions, and underwater visibility as well as possess the knowledge to maintain such equipment.

Note: Compression Chamber dives and/or recreational dives shall not be considered equivalent experience to in water training and shall not be used for accumulated in water time calculations.

**Assumed Skills and Knowledge**

Learners are assumed to:

- Be able to understand written and verbal communications in English, and be able to communicate easily with other persons;
- Be able to understand diving equipment terminology and equipment uses
- Be able to act on instructions
- Be a confident swimmer

<b>Competency Unit Code</b> CD-SCD-101B-0	<b>Competency Level</b> Inland/Inshore CSCUBA Diver
<b>Competency Unit Title</b> CSCUBA Diving	

### Description of Competency Element

<b>Competency Element Title</b> 1. Perform Safe CSCUBA Diving - Setting Up of Equipment
<b>Performance Criteria</b>  A competent commercial diver must be able to perform the following: 1.1 Set up basic CSCUBA equipment ready for use; completing pre-dive checks of the equipment 1.2 Demonstrate correct diver checks prior to entering the water 1.3 Perform basic knots and rigging 1.4 Describe user basic maintenance procedures for CSCUBA equipment, prepare equipment for use, dismantle and reassemble self-contained equipment 1.5 Act as a diver/diver's tender in diving operations where line signals are the primary means of communication 1.6 Act as a diver/diver's tender in diving operations where a divers intercom is the primary means of communication
<b>Underpinning Knowledge</b>  A competent individual needs to know and understand: <ul style="list-style-type: none"> <li>• Use of CSCUBA equipment while being tended from the surface</li> <li>• Use of mouthpiece regulators</li> <li>• Use of full face masks</li> <li>• Lifeline signals and hard wire / through water communications</li> <li>• Operational requirements of CSCUBA equipment</li> <li>• Basic Maintenance of CSCUBA equipment</li> <li>• Limitations of CSCUBA equipment</li> <li>• Hazards associated with the use of CSCUBA equipment</li> <li>• Emergency situations and procedures</li> <li>• Nitrogen Narcosis – signs and symptoms and effects on the diver</li> </ul>
<b>Range and Context</b>  The diver's skills and knowledge shall include the following: <ul style="list-style-type: none"> <li>• Setting up basic CSCUBA equipment ready for use</li> <li>• Equipment checks pre dive checks of the equipment and post dive checks</li> <li>• Basic knots and rigging skills</li> <li>• Basic marine chart reading skills</li> <li>• Basic meteorology (assessing the weather) skills</li> <li>• Diver's tender</li> <li>• Standby diver</li> <li>• Basic maintenance procedures for CSCUBA equipment</li> <li>• Line signals are the primary means of communication</li> </ul>
<b>Evidence Sources</b>  Listed below are a few examples about the kinds of evidence that would provide a guide as to whether an individual is meeting the standards required to be competent.

**Work Activities**

- Demonstrate the correct use of CSCUBA diving equipment while on the dive site and conducting training dives
- Work as a team member during all diving activities
- Act as a tender; diver and stand by diver in normal and emergency dive scenarios and drills
- Maintenance of CSCUBA equipment

**Verbal / or Written reports**

- A multi choice examination should be established with questions related to the items listed in the Underpinning Knowledge section
- Complete personal dive logbook

<b>Competency Unit Code</b> CD-SCD-101B-0	<b>Competency Level</b> Inland/Inshore CSCUBA Diver
<b>Competency Unit Title</b> CSCUBA Diving	

### Description of Competency Element

<b>Competency Element Title</b> 2. Perform Safe CSCUBA Diving - In-water Diving Activities
<p><b>Performance Criteria</b></p> <p>A competent commercial diver must be able to perform the following:</p> <p>2.1 Demonstrate proficiency of the equipment within a confined water or controlled environment, including the following skills:</p> <ul style="list-style-type: none"> <li>• Buoyancy Exercises</li> <li>• Sharing Air source (Buddy Breathing- when using mouthpiece regulator only)</li> <li>• Rescue Skills</li> <li>• Navigation skills</li> </ul> <p>2.2 Demonstrate proficiency of the equipment in a controlled open water environment (quarry, lake, open sea, reservoir, river), including the following skills:</p> <ul style="list-style-type: none"> <li>• Buoyancy Exercises</li> <li>• Sharing Air source (Buddy Breathing - when using mouthpiece regulator only)</li> <li>• Rescue Skills</li> <li>• Navigation skills</li> <li>• Perform diving in overhead / penetration / confined areas</li> </ul> <p>2.3 Demonstrate the use of various full-face masks (such as AGA, EXO, KMB) c/w hard wire communications and through water communications</p> <p>2.4 Demonstrate proficient use of buoyancy control devices, wet suit and dry suit</p> <p>2.5 Perform the roles and duties of a diver's tender</p> <p>2.6 Perform emergency drills (in confined and open water environments) using CSCUBA equipment and demonstrate a complete knowledge of the procedures to be followed in case of:</p> <ul style="list-style-type: none"> <li>• Uncontrolled Ascent</li> <li>• Equipment malfunction, loss of air, loss of communications</li> <li>• Trapped Diver</li> <li>• Umbilical Entanglement</li> <li>• Unconscious / injured diver in the water recovery</li> <li>• Contaminated air supply</li> <li>• Vomiting Underwater</li> <li>• No visibility</li> </ul> <p>2.7 Describe emergency ascent procedures <i>(Note: emergency ascents can be very hazardous, divers are not asked to perform it; describing it should be sufficient.)</i></p> <p>2.8 Perform a simulated rescue of an unconscious/injured diver using CSCUBA equipment while acting as surface personnel</p> <p>2.9 Complete a dive to 30m in a control environment of a deck decompression chamber</p>
<p><b>Underpinning Knowledge</b></p> <p>A competent individual needs to know and understand:</p> <ul style="list-style-type: none"> <li>• Use of CSCUBA equipment while being tended from the surface</li> <li>• Use of mouthpiece regulators</li> <li>• Use of full-face masks</li> <li>• Lifeline signals and hard wire / through water communications</li> <li>• Operational requirements of CSCUBA equipment</li> </ul>

- Basic Maintenance of CSCUBA equipment
- Limitations of CSCUBA equipment
- Hazards associated with the use of CSCUBA equipment
- Emergency situations and procedures
- Nitrogen Narcosis – signs and symptoms and effects on the diver

**Range and Context**

The diver's skills and knowledge shall include the following:

- Setting up basic CSCUBA equipment ready for use
- Equipment checks pre dive checks of the equipment and post dive checks
- Basic knots and rigging skills
- Basic marine chart reading skills
- Basic meteorology (assessing the weather) skills
- Use of the equipment within a confined water / controlled environment
  - Buoyancy Exercises
  - Sharing Air source (Buddy Breathing)
  - Rescue Skills
  - Navigation skills
- Overhead / penetration dive (s)
- Mouthpiece Regulators
- Full face masks (such as AGA, EXO, KMB) c/w hard wire communications and through water communications
- Buoyancy control devices; wet suit and dry suit
- Diver's tender
- Standby diver
- Emergency drills (in confined and open water environments) using CSCUBA equipment
  - Uncontrolled ascent (**Note: Confined/pool water activity only**)
  - Equipment malfunction, loss of air; loss of communications
  - Trapped diver
  - Lifeline entanglement
  - Unconscious / injured diver in the water recovery
  - Contaminated air supply
  - Vomiting underwater
  - No visibility
- Buddy Breathing ( "octopus breathing" ) techniques while using mouthpiece regulator
- Emergency ascent procedures (for use of regulator only system)
- Simulated rescue of an unconscious / injured diver using CSCUBA equipment while acting as diver; diver's tender and stand by diver
- Basic Maintenance procedures for CSCUBA equipment
- Line signals are the primary means of communication
- Chamber dive to 30m

**Evidence Sources**

Listed below are a few examples about the kinds of evidence that would provide a guide as to whether an individual is meeting the standards required to be competent.

**Work Activities**

- Demonstrate the correct use of CSCUBA diving equipment while on the dive site and conducting training dives
- Carryout emergency drills competently for using CSCUBA equipment
- Work as a team member during all diving activities
- Act as a tender; diver and stand by diver in normal and emergency dive scenarios and drills
- Maintenance of CSCUBA equipment

**Verbal / or Written reports**

- A multi choice examination should be established with questions related to the items listed in the Underpinning Knowledge section
- Complete personal dive logbook

## 6.0 INLAND/INSHORE SSDE DIVER SPECIFIC COMPETENCY UNITS

The trainee diver must be competent in all the SSDE Specific Competency Units to qualify as a SSDE Level 2 Diver.

<b>Competency Unit:</b> SSDE – Diving Equipment, Systems, Procedures and Practices
<b>Summary of Competency Elements</b>  This Competency Unit consists of the following element: 1. Use SSDE, Systems, Procedures and Practices  The competent diver shall be competent to correctly set up; operate; maintain and use SSDE, compressors, high pressure / low pressure air supplies and the procedures for surface supplied air diving. The SSDE Diver shall have the knowledge required for safe underwater operations and procedures.
<b>Assumed Skills and Knowledge</b>  Learners are assumed to be able to: <ul style="list-style-type: none"><li>• understand written and verbal communications in English, and be able to communicate easily with other persons</li><li>• understand diving equipment terminology and equipment uses</li><li>• act on instructions</li></ul>

<b>Competency Unit Code</b> CD-SSD-102A-0	<b>Competency Level</b> Inland/Inshore Diver (SSDE)
<b>Competency Unit Title</b> SSDE, Diving Equipment Systems, Procedures and Practices	

### Description of Competency Element

<b>Competency Element Title</b> 1. Use SSDE, Systems, Procedures and Practices
<b>Performance Criteria</b>  A competent SSDE diver must be able to perform the following: 1.1 Describe the principles and responsibilities of being a diver, a diver's tender, and a standby diver on a dive site when using SSDE systems 1.2 Describe the components of the SSDE systems 1.3 Describe the limitations of SSDE system use 1.4 Describe the sequence of diver checks prior to entering the water 1.5 Describe safe means to enter and exit the water 1.6 Describe the correct basic maintenance and use of SSDE equipment 1.7 List the minimum equipment standards for SSDE diving 1.8 Describe the use of SSDE equipment 1.9 Describe the sequence of communications with hard wire communications 1.10 Describe the basic SSDE skills to be carried out in dive practical 1.11 Describe the correct use of personal diving equipment i.e. wet suit, dry suit, buoyancy device, fins, mask/regulator, bailout cylinder, knife, harness, masks (AGA, EXO, KMB), helmets 1.12 Describe the principles of high pressure and low-pressure compressors 1.13 Describe the principles of working with High pressure air cylinders, hoses, and fittings 1.14 Describe the actions required during emergency situations related to using SSDE
<b>Underpinning Knowledge</b>  A competent diver needs to know and understand: <ul style="list-style-type: none"> <li>• A complete knowledge of the principles and responsibilities of being a diver, a diver's tender, and a standby diver on a SSDE dive site</li> <li>• The basic construction and theory of operation for the various components of Surface supplied diving equipment, including reserve systems</li> <li>• The 'set up' of SSDE and its use</li> <li>• Use of Personal diving equipment with SSDE</li> <li>• Limitations of diving and equipment for commercial diving works</li> <li>• Requirements of operational and emergency contingency plans</li> <li>• Full face masks available for use and how to use them</li> <li>• The safety requirements and principles for handling High Pressure and Low-pressure gases (air)</li> <li>• Planned Maintenance Systems; and basic maintenance requirements of LP compressors, personal diving equipment and SSDE diving equipment</li> </ul>
<b>Range and Context</b>  <b>Responsibilities of dive team personnel on an SSDE Dive work site</b> <ul style="list-style-type: none"> <li>• Diver</li> <li>• Standby diver</li> <li>• Tender</li> </ul> <b>Dry Exercises of using and handling / setting up:</b> <b>Diving Equipment and Systems:</b>

- Personal Diving Equipment
- SSDE equipment / systems
- Regulators, Masks, Helmets (such as, AGA, EXO, KMB; US Divers)
- Communications systems: Hard wire and line pulls

**High Pressure (HP) and Low Pressure (LP) supplies**

- Use of HP hoses
- Use of LP Hoses
- Hose cleanliness and cleaning requirements
- Regulators (HP and LP)
- Security and safety while using HP and LP supplies
- HP and LP Compressors- use and maintenance

**Outline the SSDE diving skills to be carried out during the practical diving sessions**

**Planned Maintenance Systems (PMS) on SSDE systems**

- Competent to carry out basic maintenance on diving equipment
- Updating of Maintenance Records

**Methods of entering and exiting the water for normal and emergency situations**

**Evidence Sources**

Listed below are a few examples about the kinds of evidence that would provide a guide as to whether an individual is meeting the standards required to be competent.

**Work activities**

- Use and setting up SSDE equipment ready for use
- Handling personal diving equipment
- Using HP and LP supplies correctly

**Written reports**

- A multi choice examination should be established with questions related to the items listed in the Underpinning Knowledge section

**Competency Unit: SSDE Diving****Summary of Competency Elements**

This Competency Unit consists of the following elements:

1. Perform Safe SSDE Diving - Setting Up of Equipment and Preparation
2. Perform Safe SSDE Diving - In-water Diving Exercises and Activities

The diver shall have a detailed understanding and be competent to correctly set up; operate; maintain and use SSDE Diving equipment, compressors, High Pressure / Low Pressure Air supplies and the procedures for surface supplied air diving. The Surface Supplied Diver shall have the knowledge required for safe underwater operations and procedures.

**Assumed Skills and Knowledge**

Learners are assumed to be able to:

- understand written and verbal communications in English and be able to communicate easily with other persons.
- understand diving equipment terminology and equipment uses
- act on instructions
- be a confident swimmer

<b>Competency Unit Code</b> CD-SSD-102B-0	<b>Competency Level</b> Inland/Inshore SSDE
<b>Competency Unit Title</b> SSDE Diving	

### Description of Competency Element

<b>Competency Element Title</b> 1. Perform Safe SSDE Diving - Setting Up of Equipment and Preparation
<b>Performance Criteria</b>  A competent commercial diver must be able to perform the following: 1.1 Perform the duties and responsibilities of being a diver, and a standby diver on a SSDE dive site 1.2 Demonstrate the safe use and the daily basic maintenance on the SSDE equipment 1.3 Describe the procedures involved in preparing operational and contingency plans 1.4 Demonstrate the use of SSDE, system preparation, set up, pre-dive checks and post-dive checks 1.5 Demonstrate the safe use of LP and HP air supplies 1.6 Demonstrate safe means to enter and exit the water 1.7 Use and set up of CSCUBA Replacement diving systems, there limitations and system components 1.8 Describe emergency ascent procedures <i>(Note: Emergency ascents can be very hazardous, divers are not asked to perform it; describing it should be sufficient.)</i> 1.9 Perform user basic maintenance procedures for SSDE equipment, prepare equipment for use, dismantle, and reassemble equipment
<b>Underpinning Knowledge</b>  A competent individual needs to know and understand: <ul style="list-style-type: none"> <li>• A complete knowledge of the principles and responsibilities of being a diver, a diver's tender, and a standby diver on a SSDE dive site</li> <li>• The basic construction and theory of operation for the SSDE systems, including reserve systems</li> <li>• The „set up' of SSDE equipment and its use</li> <li>• Personal diving equipment</li> <li>• Limitations of SSDE diving and equipment for commercial diving works</li> <li>• Requirements of operational and emergency contingency plans</li> <li>• Various masks and helmets available for use and how to use them</li> <li>• Use of diving ladders to enter and exit the water and in the event of an emergency</li> <li>• Methods of recovering an injured / unconscious diver</li> <li>• Planned Maintenance Systems; and basic maintenance requirements of compressors, cylinders, umbilical, control panels, gauges, and personal diving equipment</li> </ul>
<b>Range and Context</b> <ul style="list-style-type: none"> <li>• Duties and responsibilities of being a diver, and a standby diver on a SSDE dive site</li> <li>• Safe use and daily user basic maintenance on the SSDE equipment</li> <li>• Procedures involved in preparing operational and contingency plans</li> <li>• Use of SSDE; system preparation, set up; pre dive checks; post dive checks</li> <li>• Use of LP and HP air supplies</li> <li>• entering and exiting the water in normal and emergency circumstances</li> <li>• CSCUBA Replacement diving systems; - set up and use</li> <li>• Personal diving equipment checks and use</li> </ul>

- Duties of a diver's tender:
  - Dress in the diver and undress the diver
  - Umbilical management and handling
  - Reporting to diving supervisor
  - Line signals

### **Evidence Sources**

Listed below are a few examples of the type of evidence that would provide a guide as to whether a diver is meeting the core standards required for him to be considered competent.

#### **Work activities**

- Use and setting up SSDE equipment ready for use
- Handling personal diving equipment
- Using HP and LP supplies correctly
- Entering and exiting the water safely

#### **Written reports**

- A multi choice examination should be established with questions related to the items listed in the Underpinning Knowledge section
- Complete equipment and pre dive / post dive check lists
- Complete personal dive logbook

<b>Competency Unit Code</b> CD-SSD-102B-0	<b>Competency Level</b> Inland/Inshore SSDE
<b>Competency Unit Title</b> SSDE Diving	

### Description of Competency Element

<b>Competency Element Title:</b> 2. Perform Safe SSDE Diving - In-water Diving Exercises and Activities
<b>Performance Criteria</b>  A competent commercial diver must be able to perform the following: 2.1 Perform basic skills and demonstrate proficiency of the equipment within a confined water / controlled environment <ul style="list-style-type: none"> <li>• Buoyancy Exercises</li> <li>• Bailout use</li> <li>• Rescue Skills</li> <li>• Navigation skills</li> </ul> 2.2. Carry out the skills in PC 2.1 a controlled open water environment (quarry; river; lake; open sea water) 2.3. Demonstrate the proficient use of various full-face masks and Helmets (AGA, EXO, KMB) c/w hard wire communications and limitations of secondary and emergency systems currently in use. 2.4. Demonstrate proficient use of buoyancy control devices, wet suit and dry suit and hot water suit 2.5. Perform the duties of a diver's tender and understand the roles and responsibilities of the tender <ul style="list-style-type: none"> <li>• Dress in the diver and undress the diver</li> <li>• Umbilical management and handling</li> <li>• Reporting to diving supervisor</li> </ul> 2.6 Perform emergency drills (in confined and open water environments) using SSDE and demonstrate a complete knowledge of the procedures to be followed in case of: <ul style="list-style-type: none"> <li>• Uncontrolled ascent</li> <li>• Equipment malfunction; - Loss of air; loss of communications</li> <li>• Trapped diver</li> <li>• Umbilical entanglement</li> <li>• Unconscious / injured diver in the water recovery</li> <li>• Contaminated air supply</li> <li>• Vomiting underwater</li> <li>• No visibility</li> </ul> 2.7 Perform simulated rescue of an unconscious / injured diver using SSDE equipment while acting as surface personnel 2.8 Act as a diver / diver's tender in diving operations where line signals are the primary means of communication 2.9 Act as a diver / diver's tender in diving operations where a divers intercom is the primary means of communication 2.10 Complete simulation in water decompression 2.11 Complete a dive to 30m in a control environment of a deck decompression chamber
<b>Underpinning Knowledge</b>  A competent individual needs to know and understand: <ul style="list-style-type: none"> <li>• A complete knowledge of the principles and responsibilities of being a diver, a diver's tender, and a standby diver on a SSDE dive site</li> <li>• The basic construction and theory of operation for the SSDE systems, including</li> </ul>

reserve systems

- The „set up' of SSDE equipment and its use
- Personal diving equipment
- Limitations of SSDE diving and equipment for commercial diving works
- Requirements of operational and emergency contingency plans
- Various masks and helmets available for use and how to use them
- Use of diving ladders to enter and exit the water and in the event of an emergency
- Methods of recovering an injured / unconscious diver
- Planned Maintenance Systems; and basic maintenance requirements of compressors, cylinders, umbilicals, control panels, gauges, and personal diving equipment

### **Range and Context**

- Duties and responsibilities of being a diver, and a standby diver on a SSDE dive site
- Safe use and daily user basic maintenance on the SSDE equipment
- Procedures involved in preparing operational and contingency plans
- Use of SSDE; system preparation, set up; pre dive checks; post dive checks
- Use of LP and HP air supplies
- entering and exiting the water in normal and emergency circumstances
- CSCUBA Replacement diving systems; - set up and use
- Personal diving equipment checks and use
- Basic skills using the equipment within a confined water / controlled environment
  - Buoyancy Exercises
  - Bailout use
  - Rescue Skills
  - Navigation skills
- Diving in a controlled open water environment
- Use of various full-face masks and Helmets (such as AGA, EXO, KMB) c/w hard wire communications and limitations of secondary and emergency systems
- Buoyancy control devices; wet suit and dry suit and hot water suit
- Duties of a diver's tender:
  - Dress in the diver and undress the diver
  - Umbilical management and handling
  - Reporting to diving supervisor
  - Line signals
- Emergency drills (in confined and open water environments) using SSDE:
  - Uncontrolled Ascent
  - Equipment malfunction; - Loss of air; loss of communications
  - Trapped Diver
  - Umbilical Entanglement
  - Unconscious / injured diver in the water recovery
  - Contaminated air supply
  - Vomiting Underwater
  - No visibility
- Emergency ascent procedures (*Note: emergency ascents can be very hazardous, divers are not asked to perform it; describing it should be sufficient.*)
- Rescue drills of an unconscious / injured diver using SSDE equipment
- Maintenance procedures for SSDE equipment
- Prepare equipment for use, dismantle, and reassemble equipment
- Simulated in water decompression
- 30m in the controlled environment of a deck decompression chamber

### **Evidence Sources**

Listed below are a few examples of the type of evidence that would provide a guide as to

whether a diver is meeting the core standards required for him to be considered competent.

**Work activities**

- Use and setting up SSDE equipment ready for use
- Handling personal diving equipment
- Using HP and LP supplies correctly
- Entering and exiting the water safely
- Act as diver; diver's tender and stand by diver
- Carry out emergency drills while acting as diver; tender and stand by diver
- DDC Dive to 30msw

**Written reports**

- A multi choice examination should be established with questions related to the items listed in the Underpinning Knowledge section
- Complete equipment and pre dive / post dive check lists
- Complete personal dive logbook

**Competency Unit: Deck Decompression Chamber (DDC) Procedures**

**Summary of Competency Elements**

This Competency Unit consists of the following element:

1. Carry Out DDC Procedures

The operational requirements and procedures required to use the deck decompression chamber

Note: Relevant Core and SSDE Specific Competency Units must be completed prior to completing this Unit, as it is one of two, DDC 'stand-alone' units.

**Assumed Skills and Knowledge**

Learners are assumed to be able to:

- Add, subtract, multiply and divide whole numbers, decimals and carry out simple arithmetic calculations
- Calculate percentages; and transpose and solve simple formulas, e.g. gas laws
- Understand written and verbal communications in English, and be able to communicate easily with other persons
- Understand and act on instructions
- Write English
- Understand basic diving equipment terminology
- Medically fit to work under pressure greater than 100 millibar

<b>Competency Unit Code</b> CD-SSD-102C-0	<b>Competency Level</b> Inland/Inshore SSDE Diver
<b>Competency Unit Title</b> Deck Decompression Chamber (DDC) Procedures	

### Description of Competency Element

<b>Competency Element Title</b> 1. Carry Out Deck Decompression Chamber (DDC) Procedures
<b>Performance Criteria</b>  A competent commercial diver must be able to perform the following: 1.1 Identify the DDC Serial Number 1.2 Identify the DDC Classification Society 1.3 Identify the DDC Certificate Register 1.4 Detail the DDC Planned Maintenance System 1.5 Describe the requirements for the construction of a DDC (i.e. understand the basic requirements of a PVHO, such as the use of certified materials and being Classed for use) 1.6 Describe the purposes of the components of the supporting equipment for the operations of the DCC 1.7 Describe the roles and responsibilities of the DDC panel operator and tender inside the chamber 1.8 Identify the hazards when using HP and LP air supplies 1.9 Identify the hazards of oxygen handling and supplies 1.10 Describe the use of mix gas supplies 1.11 List the required air/gas for pressurisation of the DDC to 50msw 1.12 List the required oxygen/gas supplies for the use of Built in Breathing systems 1.13 List both pre-use and post-use checks of the DDC and supporting equipment 1.14 Describe operations of the DDC with each lock at different pressures 1.15 Describe equalisation of outer and inner locks 1.16 Describe DDC communication systems – hard wire, Sound Power Phone and tapping codes 1.17 List the medical equipment required to be available with the DDC 1.18 Detail DDC records and DDC chamber logs showing: <ul style="list-style-type: none"> <li>• Depth / pressure reading</li> <li>• Supply pressure</li> <li>• Oxygen pressures</li> <li>• DDC environmental parameters</li> </ul> 1.19 Describe the use of the medical lock for passing in/out items in the chamber 1.20 Conduct a Risk Assessment for the use of the DDC 1.21 Detail the maintenance records of the DDC and supporting equipment/systems 1.22 Describe the operator response for DDC emergency situations: <ul style="list-style-type: none"> <li>• Loss of Pressure</li> <li>• Loss of air supply pressure</li> <li>• Loss of Communications</li> <li>• Carbon Dioxide build up</li> <li>• Loss of Oxygen supply</li> <li>• Fire in a DDC or in DDC control area</li> <li>• Diver Oxygen Toxicity and Chronic and Acute</li> <li>• Contaminated environment inside the DDC</li> </ul>
<b>Underpinning Knowledge</b>  The DDC procedures need to list: <ul style="list-style-type: none"> <li>• Copies of DDC record keeping log sheets</li> </ul>

- Low and High-pressure hoses/ pipe work specifications
- HP/ LP Air and gas supplies quantities required for DDC operations
- Compressor maintenance
- Regulators, Valves and fittings maintenance
- Oxygen Cleaning requirements
- DDC components and maintenance

### **Range and Context**

The DDC Procedures shall include the following information:

- Deck Decompression Chamber specifications– Pressure vessel for Human Occupancy (PVHO) Standards and requirements
- DDC Planned Maintenance System
- DDC Operating Procedures- Normal use and emergency procedures
- Record keeping of DDC use
- DDC support equipment
- Air Supplies
- Low and High-pressure hoses/ pipe work
- HP/ LP Air and gas supplies
- Compressors
- Valves and fittings
- Oxygen Cleaning and components
- Chamber atmosphere monitoring- dragger tubes; analysers
- DDC components
  - Pressure Vessel requirements – manufacturer standards
  - Pipe work, valves, penetrators, electrical penetrators
  - Built in Breathing Systems (BIBS)
  - Fire suppression Equipment internal and external
  - Communications systems – primary and secondary; (Sound Power Phone)
  - Lighting – Internal and external
  - Carbon Dioxide scrubber units
  - Heating / Cooling Units
  - Medical Lock
  - Chamber Medical Kit
  - DDC Seals – Main door; inner door; medical lock
  - View ports – manufacturer standards and requirements
  - Items not permitted in the DDC
- Operating Procedures
- Emergency Procedures
- Describe the roles and responsibilities of the DDC panel operator and tender inside the chamber

### **Evidence Sources**

Listed below are a few examples about the kinds of evidence that would provide a guide as to whether procedures are meeting the standards required to be competent.

#### **Work activities**

- Review the DDC Procedures
- Review DDC system components
- Identify DDC system components

#### **Products and Outcomes**

- Understand the operations of a DDC and all supporting equipment

**Written reports**

- A multi choice examination should be established with questions related to the items listed in the Underpinning Knowledge section
- Complete DDC equipment and pre dive / post dive check lists
- Conduct Risk Assessment for the use of the DDC

**Competency Unit:** Deck Decompression Chamber (DDC) Operator

**Summary of Competency Elements**

This Competency Unit consists of the following elements:

1. Perform Pre-Dive Operating Checks of a DDC
2. Operate the DDC
3. Perform Emergency Procedures and Actions when Using a DDC

The DDC Operator shall have an understanding of operational requirements and procedures to use the deck decompression chamber, both as a panel operator and as a tender inside the chamber

Note: All Core and SSDE Specific Competency Units must be completed prior to completing this Unit, as it is one of two, DDC „stand-alone‘ units.

**Assumed Skills and Knowledge**

Learners are assumed to be able to:

- Add, subtract, multiply and divide whole numbers, decimals and carry out simple arithmetic calculations
- Calculate percentages; and transpose and solve simple formulas, e.g. gas laws
- Understand written and verbal communications in English, and be able to communicate easily with other persons
- Understand and act on instructions
- Write English and maintain accurate records in time keeping and reading of gauges
- Understand basic diving equipment terminology
- Be medically fit to be under pressure greater than 100millebar
- Understand the effects of pressure on the human body

<b>Competency Unit Code</b> CD-SSD-102D-0	<b>Competency Level</b> Inland/Inshore SSDE Diver
<b>Competency Unit Title</b> Deck Decompression Chamber (DDC) Operator	

### Description of Competency Element

<b>Competency Element Title</b> 1. Perform Pre-Dive Operating Checks of a DDC
<b>Performance Criteria</b>  A competent DDC Operator must be able to perform the following: 1.1 Conduct a risk assessment prior to using the DDC 1.2 Identify the hazards when using HP and LP air supplies 1.3 Identify the hazards of oxygen handling and supplies 1.4 Describe the use of mix gas supplies 1.5 Calculate the required air/gas for pressurisation of the DDC 1.6 Calculate the required oxygen/gas supplies for the use of Built in Breathing systems 1.7 Carry out pre-use and post-use checks of the DDC and supporting equipment 1.8 Describe the roles and responsibilities of the DDC panel operator and tender inside the chamber
<b>Underpinning Knowledge</b>  A competent DDC Operator needs to know and understand: <ul style="list-style-type: none"> <li>• Boyle's Law</li> <li>• Henry's law</li> <li>• Dalton's Law</li> <li>• Charles's Law</li> <li>• Gas quantity requirements and calculations</li> <li>• Effects of pressure on the human body</li> <li>• Able to maintain accurate Record keeping</li> <li>• Low and High-pressure hoses/ pipe work</li> <li>• HP/ LP Air and gas supplies</li> <li>• Compressors</li> <li>• Regulators, Valves and fittings</li> <li>• Oxygen Cleaning requirements</li> <li>• DDC components</li> </ul>
<b>Range and Context</b>  The diver's skills and knowledge shall include the following: <ul style="list-style-type: none"> <li>• Deck Decompression Chamber – Pressure vessel for Human Occupancy (PVHO) Standards and requirements</li> <li>• DDC Operating Procedures- Normal use and emergency procedures</li> <li>• Record keeping of DDC use</li> <li>• DDC support equipment</li> <li>• Air Supplies</li> <li>• Low and High-pressure hoses/ pipe work</li> <li>• HP/ LP Air and gas supplies</li> <li>• Compressors</li> <li>• Valves and fittings</li> <li>• Oxygen Cleaning and components</li> <li>• Chamber atmosphere monitoring- dragger tubes; analysers</li> </ul>

- Items not permitted in the DDC
- Maintain accurate records and logs of use

### **Evidence Sources**

Listed below are a few examples about the kinds of evidence that would provide a guide as to whether an individual is meeting the standards required to be competent.

#### **Work activities**

- Complete DDC pre dive and post dive check lists for the DDC and supporting equipment
- Carry out accurate DDC record keeping
- Calculate air / gas requirements

#### **Products and Outcomes**

- Conduct a risk assessment prior to using the DDC

#### **Written reports**

- A multi choice examination should be established with questions related to the items listed in the Underpinning Knowledge section
- Carryout gas calculation and requirements to operate the DDC

<b>Competency Unit Code</b> CD-SSD-102D-0	<b>Competency Level</b> Inland/Inshore SSDE Diver
<b>Competency Unit Title</b> Deck Decompression Chamber (DDC) Operator	

### Description of Competency Element

<b>Competency Element Title</b> 2. Operate the DDC
<p><b>Performance Criteria</b></p> <p>A competent DDC Operator must be able to perform the following:</p> <ol style="list-style-type: none"> <li>2.1 Conduct pressurisation and decompression of the chamber in a controlled manner under the supervision of a qualified diving supervisor</li> <li>2.2 Conduct „flushing‘ of the chamber atmosphere while maintaining the exact pressure reading</li> <li>2.3 Conduct operations of the DDC with each lock at different pressures</li> <li>2.4 Perform equalisation of outer and inner locks</li> <li>2.5 Use communication systems – hard wire, Sound Power Phone and tapping codes</li> <li>2.6 List the medical equipment required to be available</li> <li>2.7 Operate the DDC during surface decompression and treatment of a decompression illness under the direct supervision of a qualified diving supervisor</li> <li>2.8 Maintain accurate records and chamber logs showing; <ul style="list-style-type: none"> <li>• Depth / pressure reading</li> <li>• Supply pressure</li> <li>• Oxygen pressures</li> <li>• DDC environmental parameters</li> </ul> </li> <li>2.9 Use a medical lock and interlock system</li> <li>2.10 Use the medical lock for passing in/out items in the chamber</li> <li>2.11 Complete accurate maintenance records of the DDC and supporting equipment/systems</li> <li>2.12 Conduct a „dry dive‘ to 50msw in the twin lock DDC as chamber operator (if the chamber is occupied, there should be a minimum of two personnel within the chamber.)</li> <li>2.13 Conduct and record maintenance of the DDC and all components</li> </ol>
<p><b>Underpinning Knowledge</b></p> <p>A competent DDC Operator needs to know and understand:</p> <ul style="list-style-type: none"> <li>• Boyle's Law</li> <li>• Henry's law</li> <li>• Dalton's Law</li> <li>• Charles's Law</li> <li>• Gas quantity requirements and calculations</li> <li>• Effects of pressure on the human body</li> <li>• Able to maintain accurate Record keeping</li> <li>• Low and High-pressure hoses/ pipe work</li> <li>• HP/ LP Air and gas supplies</li> <li>• Compressors</li> <li>• Regulators, Valves and fittings</li> <li>• Oxygen Cleaning requirements</li> <li>• DDC components</li> <li>• Operating procedures</li> <li>• Emergency operating procedures</li> </ul>

## **Range and Context**

The divers skills and knowledge shall include the following:

- Deck Decompression Chamber – Pressure vessel for Human Occupancy (PVHO) Standards and requirements
- DDC Operating Procedures- Normal use and emergency procedures
- Record keeping of DDC use
- DDC support equipment
- Air Supplies
- Low and High pressure hoses/ pipe work
- HP/ LP Air and gas supplies
- Compressors
- Valves and fittings
- Oxygen Cleaning and components
- Chamber atmosphere monitoring- dragger tubes; analysers
- Items not permitted in the DDC
- DDC Operating Procedures
- DDC Emergency Procedures
- Describe the components of the deck decompression chamber and their purpose
- Describe the components of the supporting equipment for the operations of the deck decompression chamber and their purpose
- Completion of a risk assessment prior to using the DDC
- Conduct and complete checks for the DDC and carryout pre use and post use checks of the DDC and supporting equipment
- Describe the roles and responsibilities of the DDC panel operator and tender inside the chamber
- Conduct pressurisation and decompression of the chamber in a controlled manner under the supervision of a qualified diving supervisor
- Operation of the DDC during surface decompression and treatment of a decompression illness under the supervision of a qualified diving supervisor
- Maintain accurate records and logs of use
- Operation of the medical lock interlock system
- Use of the medical lock for passing in / out items in the chamber
- Complete accurate maintenance records of the DDC and supporting equipment / systems
- Carry out a dry dive' to 30msw in the twin lock DDC

## **Evidence Sources**

Listed below are a few examples about the kinds of evidence that would provide a guide as to whether an individual is meeting the standards required to be competent.

### **Work activities**

- Complete DDC pre dive and post dive check lists for the DDC and supporting equipment
- Carry out accurate DDC record keeping
- Operate the DDC during pressurization and decompression of the chamber and act as the inside tender during a chamber dive to 30m Maintain pressure of the DDC within 1fsw accuracy

### **Products and Outcomes**

- Conduct a risk assessment prior to using the DDC
- Operate the DDC in a competent and controlled manner

### **Written reports**

- A multi choice examination should be established with questions related to the items listed in the Underpinning Knowledge section

<b>Competency Unit Code</b> CD-SSD-102D-0	<b>Competency Level</b> Inland/Inshore SSDE Diver
<b>Competency Unit Title</b> Deck Decompression Chamber Operator	

### Description of Competency Element

<b>Competency Element Title</b> 3. Perform Emergency Procedures and Actions when Using a DDC
<b>Performance Criteria</b>  A competent DDC Operator must be able to perform the following: 3.1 Conduct pressurisation and decompression of the chamber in a controlled manner under the supervision of a qualified diving supervisor 3.2 Conduct 'flushing' of the chamber atmosphere while maintaining the exact pressure reading 3.3 Conduct the response during DDC emergency situations, and conduct simulated drills for the following emergencies: <ul style="list-style-type: none"> <li>• Loss of Pressure</li> <li>• Loss of air supply pressure</li> <li>• Loss of Communications</li> <li>• Carbon Dioxide build up</li> <li>• Loss of Oxygen supply</li> <li>• Fire in a DDC or in DDC control area</li> <li>• Diver Oxygen Toxicity and Chronic and Acute</li> <li>• Contaminate environment inside the DDC</li> </ul> 3.4 Conduct a 'dry dive' to 30msw in the twin lock DDC as chamber operator and tender inside the chamber complete with emergency drills
<b>Underpinning Knowledge</b>  A competent DDC Operator needs to know and understand: <ul style="list-style-type: none"> <li>• Boyle's Law</li> <li>• Henry's law</li> <li>• Dalton's Law</li> <li>• Charles's Law</li> <li>• Gas quantity requirements and calculations</li> <li>• Effects of pressure on the human body</li> <li>• Able to maintain accurate Record keeping</li> <li>• Low and High pressure hoses/ pipe work</li> <li>• HP/ LP Air and gas supplies</li> <li>• Compressors</li> <li>• Regulators, Valves and fittings</li> <li>• Oxygen Cleaning requirements</li> <li>• DDC components</li> <li>• Operating procedures</li> <li>• Emergency operating procedures</li> </ul>
<b>Range and Context</b>  The divers skills and knowledge shall include the following: <ul style="list-style-type: none"> <li>• Deck Decompression Chamber – Pressure vessel for Human Occupancy (PVHO) Standards and requirements</li> <li>• DDC Operating Procedures- Normal use and emergency procedures</li> </ul>

- Record keeping of DDC use
- DDC support equipment
- Air Supplies
- Low and High pressure hoses/ pipe work
- HP/ LP Air and gas supplies
- Compressors
- Valves and fittings
- Oxygen Cleaning and components
- Chamber atmosphere monitoring- drager tubes; analysers
- Items not permitted in the DDC
- DDC Operating Procedures
- DDC Emergency Procedures
- Describe the components of the deck decompression chamber and their purpose
- Completion of a risk assessment prior to using the DDC
- Conduct and complete checks for the DDC and carryout pre use and post use checks of the DDC and supporting equipment
- Conduct pressurisation and decompression of the chamber in a controlled manner under the supervision of a qualified diving supervisor
- Maintain accurate records and logs of use
- Operation of the medical lock interlock system
- Carry out a dry dive to 30msw in the twin lock DDC with emergency drills

#### **Evidence Sources**

Listed below are a few examples about the kinds of evidence that would provide a guide as to whether an individual is meeting the standards required to be competent.

#### **Work activities**

- Complete DDC pre dive and post dive check lists for the DDC and supporting equipment
- Carry out accurate DDC record keeping
- Operate the DDC during pressurization and decompression of the chamber and act as the inside tender during a chamber dive to 30m
- Maintain pressure of the DDC within 1fsw accuracy
- Carryout emergency drills and procedures

#### **Products and Outcomes**

- Conduct a risk assessment prior to using the DDC
- Operate the DDC in a competent and controlled manner
- Competent at operating the DDC in emergency requirements

#### **Written reports**

- A multi choice examination should be established with questions related to the items listed in the Underpinning Knowledge section