

Diver Certification Board of Canada

CERTIFICATION SCHEME FOR REMOTELY OPERATED VEHICLE (ROV) PERSONNEL

TABLE OF CONTENTS

1.0	Purpose	2
2.0	DEFINITIONS	2
	• Shall	2
	• Should	2
3.0	Remotely Operated Vehicle (ROV) Personnel.....	3
3.1	General Requirements	3
4.0	Remotely Operated Vehicle (ROV) Classification.....	2
4.1	Class I – Observation.....	2
4.2	Class II – Observation With Payload Capability	2
4.3	Class III – Work Class.....	3
4.4	Class IV – Seabed-Working Vehicles	3
5.0	Levels of Certification	4
5.1	Requirements for Certification.....	4
5.1.1	ROV Pilot/Technician Level 2	4
5.1.2	ROV Pilot/Technician Level 1	5
5.1.3	ROV Senior Pilot/Technician	5
5.1.4	ROV Pilot/Technician Supervisor.....	5

1.0 PURPOSE

The purpose of certifying the competence of ROV Personnel (Pilot/Technicians, Supervisors and Superintendents) is to help ensure the safety of personnel, equipment, assets and the environment and includes the protection of divers who often work in the same underwater area as a ROV.

In general the levels of certification and the competencies required to obtain certification are designed to meet the requirements of ROV Contractors and ROV end users.

The procedure to apply for certification by the Diver Certification Board of Canada is outlined in Appendix C.

2.0 DEFINITIONS

For the purposes of this scheme, the following definitions apply.

- **Shall**

Requirement to be strictly followed in order to conform to the scheme in which no deviation will be permitted.

- **Should**

Indicates that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others or that a certain course of action is preferred but not a firm requirement.

3.0 REMOTELY OPERATED VEHICLE (ROV) CLASSIFICATION

3.1 Class I – Observation

Pure observation vehicles are physically limited to video observation. Generally they are small vehicles fitted with video camera, lights and thrusters. They cannot undertake any other task without considerable modification.

3.2 Class II – Observation with Payload Capability

Vehicles capable of carrying additional sensors such as still color cameras, cathodic protection measurement systems, additional video cameras and sonar systems. Class II vehicles should be capable of operating without loss of original function while carrying at least two additional sensors. Class II vehicles may be fitted with a basic grabber/manipulator system.

3.3 Class III – Work Class

Underwater vehicles large enough to carry additional sensors and/or complex manipulators. Class III vehicles commonly have a multiplexing capability that allows additional sensors and tools to operate without being “hardwired” through the umbilical system. These vehicles are larger and more powerful than Class I and Class II.

Class III A – Work class vehicles < 100 Hp

Class III B – Work class vehicles 100 Hp to 150 Hp

Class III C – Work class vehicles >150 Hp

3.4 Class IV – Seabed-Working Vehicles

Seabed working vehicles positioned on the seabed by a wheel or belt traction system, or thruster propellers or water jet power, or by combinations of any of these propulsion methods. Class IV vehicles are typically much larger and heavier than Class III Work Class vehicles, and are configured for special purpose tasks. Such tasks typically include cable and pipeline trenching, excavation, dredging and other remotely operated seabed construction activities.

4.0 REMOTELY OPERATED VEHICLE (ROV) PERSONNEL

4.1 General Requirements

Due to the nature and complexity of ROV systems, personnel operating, troubleshooting and maintaining ROV systems require broad based competencies. Personnel operating ROV systems require training in a wide range of specialized fields.

Reference is made to:

1. International Marine Contractors Association (IMCA) C 005 Rev. 1 “*Competence Assurance & Assessment Scheme*.”
2. NORSOK Standard U-102. *Remotely Operated Vehicle (ROV) Services*.
3. MATE Guidelines for ROV Technicians

Notes:

1. All ROV candidates/personnel shall maintain a Diver Certification Board of Canada (DCBC) recognized ROV logbook (See Appendix D) as proof of logged piloting experience.
2. ROV candidates who do not meet the identified category requirements but who can provide documentary evidence that they have been gainfully employed in the certification category being applied for, shall be permitted to undergo a DCBC Assessment of Prior Learning (APL) (Appendix E) to determine acceptability.

5.0 LEVELS OF CERTIFICATION

Under the DCBC ROV personnel competency scheme, the following certifications will be issued.

- a) ROV Pilot/Technician Level 2 (Entry level certification applicable to all classes of ROV)
- b) ROV Pilot/Technician Level 1 (Specific to the classes I & II or classes III & IV))
- c) ROV Senior Pilot/Technician (Specific to the class of vehicle)
- d) ROV Pilot/Technician Supervisor (Specific to the class of vehicle)

5.1 Requirements for Certification

5.1.1 ROV Pilot/Technician Level 2

To enter a program leading to certification as an ROV Pilot/Technician Level 2 a candidate would have to provide evidence of:

- A nationally-recognised technical or trade qualification (military service qualification and/or national vocational qualification is acceptable) accepted in one or more of the following subjects:
 - i) electrical
 - ii) electronic
 - iii) hydraulics
 - iv) mechanics

OR

- i) A nationally-recognised technical qualification (not covered by the above) in a relevant subject;

OR

- ii) In certain circumstances, candidates who do not meet the above but have extensive industrial experience, supported by evidence, may be acceptable.

To become certified as an ROV Pilot/Technician Level 2 the candidate would have to satisfactorily complete formal training of an adequate content and duration acceptable to the DCBC in the operation, maintenance and repair of various ROV system types.

Program content shall cover all key subject matters as identified in Appendix B.

and A minimum 20 hours documented ROV piloting experience, on an ROV or on a simulator, undertaken whilst under supervision by an experienced ROV pilot.

5.1.2 ROV Pilot/Technician Level 1 (Classes I & II or Classes III & IV)

The ROV Pilot/Technician Level 1 candidate shall demonstrate the competencies of a ROV Pilot/Technician Level 2, and in addition shall demonstrate the Level 1 competencies indicated in Appendix B. He/she shall also have

- Six (6) months documented experience working in industry as an ROV Pilot/Technician Level 2
- Seventy-five (75) hours logged piloting experience (in the appropriate class of ROV) as an ROV Pilot/Technician Level 2 , of which 20 hours must be actual ROV piloting.
- Hours of experience on a Class III or IV vehicle will count as qualifying time for certification at the Class I & II level.

5.1.3 ROV Senior Pilot/Technician

The ROV Senior Pilot/Technician candidate shall demonstrate the competencies of a ROV Pilot/Technician Level 1, and in addition shall demonstrate the Senior Pilot/Technician competencies indicated in Appendix B. He/she shall also have

- One (1) year experience as an ROV Pilot/Technician Level 1
- One hundred (100) hours logged piloting experience as an ROV Pilot/Technician Level 1, on the class of ROV for which certification is being sought, of which 80 hours must be spent piloting an actual ROV.
- Hours of experience gained on a higher class of ROV will count toward competency for lower classes of ROV.

5.1.4 ROV Pilot/Technician Supervisor

The ROV Pilot/Technician Supervisor candidate shall demonstrate the requirements as that of a ROV Senior Pilot/Technician as well as have attained:

- One year experience as a Senior ROV Pilot/Technician (to be discussed further)
- One hundred hours logged piloting experience as a Senior Pilot/Technician applicable to the class of ROV for which certification as an ROV is requested.
- Formal administrative/leadership management training, including applicable legislation
- Satisfactory completion of an industrial safety supervisor course

- Ability to understand and implement ROV project manuals and project procedures for the work
- Competence in the best practice training of ROV personnel
- Competence in evaluating ROV personnel relating to ROV safety, operational and technical competencies
- An ability to document/communicate task reporting;
- Experience as a trainee supervisor on 20 ROV deployments under the supervision of a qualified supervisor.

Criteria for Acceptable Simulators

1. Hardware
 - a. Pilot console and displays should emulate the intended Class of ROV.
2. Environmental
 - a. Capable of simulating a diverse range of environmental conditions, e.g. current, visibility, sea state, ambient light level, vehicle lights and seabed conditions.
3. Missions
 - a. Ability for a wide range of missions appropriate to the class of ROV including collision/interaction with sub-sea infrastructure, objects in the scene and the seabed.
4. Sensors
 - a. Appropriate to the class of ROV.
5. Sonar
 - a. Sonar should match output to actual sonar used on ROV with realistic controls and imagery.
6. Work Class
 - a. Must include Sonar, manipulators, cameras, oil pressure, TMS.
7. Tooling
 - a. Appropriate to class of vehicle.
8. Fault insertion
 - a. Failure of lights, cameras, hydraulics, electrics, sonar and other sensors as appropriate, and to include intermittent telemetry faults.
9. Physics
 - a. Realistic interaction between tether/vehicle and environment.

Certification level							ROV CLASS			
Pilot/ Tech 2 (PT2)	Pilot/ Tech 1 (PT2)	Senior Pilot/Tech (SPT) Pilot/Tech	Pilot/Tech Supervisor (PTS)		Reference Code	Tasks to be performed	I	II	III	IV

1	SAFETY/ENVIRONMENT AWARENESS				
-01	GENERAL KNOWLEDGE				

PT2	PT1	SPT	PTS	1-01	-001	Demonstrate an understanding of all applicable regulatory, company and client requirements relating to ROV operations	X	X	X	X
PT2	PT1	SPT	PTS	1-01	-002	Recognize unsafe behaviour and take corrective action	X	X	X	X
N/A	N/A	SPT	PTS	1-01	-003	Document unsafe practices, notify authorities, and communicate best practices to crew	X	X	X	X
PT2	PT1	SPT	PTS	1-01	-004	Demonstrate awareness of the importance of safety in the work place including hazards associated with confined spaces	X	X	X	X
PT2	PT1	SPT	PTS	1-01	-005	Demonstrate an understanding of the various types of energy within the system, e.g. high voltage, high pressures, stored energy, chemical, mechanical	X	X	X	X
PT2	PT1	SPT	PTS	1-01	-006	Locate Safety equipment in work space e.g. first aid kit, fire extinguishers, blood borne pathogen kit, survival suits, man-overboard equipment, MSDS sheets	X	X	X	X
PT2	PT1	SPT	PTS	1-01	-007	Demonstrate knowledge and intent of safety briefings.	X	X	X	X
N/A	N/A	SPT	PTS	1-01	-008	Lead safety briefings for ROV team	X	X	X	X

Certification level							ROV CLASS			
Pilot/ Tech 2 (PT2)	Pilot/ Tech 1 (PT2)	Senior Pilot/Tech (SPT) Pilot/Tech	Pilot/Tech Supervisor (PTS)		Reference Code	Tasks to be performed	I	II	III	IV
N/A	N/A	N/A	PTS	1-01	-009	Lead safety briefings for client, vessel crew, and ROV team	X	X	X	X
PT2	PT1	SPT	PTS	1-01	-010	Understand purpose and intent of JSA/HASP and risk assessment and contribute to processes	X	X	X	X
N/A	N/A	SPT	PTS	1-01	-011	Prepare and conduct JSA/HASP and risk assessments	X	X	X	X
PT2	PT1	SPT	PTS	1-01	-012	Understand the purpose and intent of Accident Investigation and contribute to process	X	X	X	X
N/A	N/A	SPT	PTS	1-01	-013	Conduct Accident Investigation and Root Cause Analysis	X	X	X	X
PT2	PT1	SPT	PTS	1-01	-014	Demonstrate knowledge of safety management systems	X	X	X	X
PT2	PT1	SPT	PTS	1-01	-015	Demonstrate awareness of best industry practices toward the environment	X	X	X	X
				2	MAINTENANCE AND REPAIR					
				-01	GENERAL KNOWLEDGE					
PT2	PT1	SPT	PTS	2-01	-001	Demonstrate safe use of hand tools				
PT2	PT1	SPT	PTS	2-01	-002	Demonstrate satisfactory troubleshooting techniques or approaches to problems	X	X	X	X
N/A	N/A	SPT	PTS	2-01	-003	Demonstrate proficiency with troubleshooting techniques or approaches to problems	X	X	X	X

N/A	N/A	N/A	PTS	2-01	-004	Demonstrate advanced troubleshooting techniques or approaches to problems	X	X	X	X
Certification level							ROV CLASS			
Pilot/ Tech 2 (PT2)	Pilot/ Tech 1 (PT2)	Senior Pilot/Tech (SPT) Pilot/Tech	Pilot/Tech Supervisor (PTS)		Reference Code	Tasks to be performed	I	II	III	IV
PT2	PT1	SPT	PTS	2-01	-005	Track maintenance issues in the system log books	X	X	X	X
PT2	PT1	SPT	PTS	2-01	-006	Identify subsea tools such as soft line cutter, hard line cutter, trash pump, AX gasket tool and simple torque tools	N/A	X	X	X
				-02	KNOWLEDGE of ROV Electrical systems					
PT2	PT1	SPT	PTS	2-02	-001	Demonstrate the ability to read electrical schematics and identify electrical symbols	X	X	X	X
PT2	PT1	SPT	PTS	2.02	-002	Demonstrate the operation, purpose, and hazards associated with Transfer Switches	X	X	X	X
PT2	PT1	SPT	PTS	2-02	-003	Demonstrate understanding of a dedicated system generator and proper grounding	X	X	X	X
PT2	PT1	SPT	PTS	2-02	-004	Identify a minimum of two types of telemetry	X	X	X	X
N/A	PT1	SPT	PTS	2-02	-005	Demonstrate an understanding of the system telemetry	X	X	X	X
N/A	N/A	N/A	PTS	2-02	-006	Interface disparate telemetry protocols and troubleshoot system and third party equipment	X	X	X	X
PT2	PT1	SPT	PTS	2-02	-007	Demonstrate inspection and preventative maintenance on the umbilical	X	X	X	X

PT2	PT1	SPT	PTS	2-02	-008	Demonstrate understanding of the importance of closely monitoring and taking appropriate actions for ground fault alarms.	X	X	X	X
Certification level							ROV CLASS			
Pilot/ Tech 2 (PT2)	Pilot/ Tech 1 (PT2)	Senior Pilot/Tech (SPT) Pilot/Tech	Pilot/Tech Supervisor (PTS)		Reference Code	Tasks to be performed	I	II	III	IV
PT2	PT1	SPT	PTS	2-02	-009	Identify typical test equipment including TDR, oscilloscope, OTDR, multimeter, high voltage meg ohmeter, hydraulic flow meter, pressure gauges and temperature gauges	X	X	X	X
N/A	PT1	SPT	PTS	2-02	-010	Conduct tests using TDR, oscilloscope, OTDR, multimeter, high voltage meg ohmeter, hydraulic flow meter, pressure gauges and temperature gauges	X	X	X	X
N/A	N/A	SPT	PTS	2-02	-011	Select appropriate test equipment for troubleshooting and interpret findings	X	X	X	X
PT2	PT1	SPT	PTS	2-02	-012	Demonstrate precautions taken to prevent damage to cameras and lights	X	X	X	X
PT2	PT1	SPT	PTS	2-02	-013	Identify the manufacturer and type of cameras on the system and explain the risks in performing maintenance on these units	X	X	X	X
PT2	PT1	SPT	PTS	2-02	-014	Identify procedure and assist in umbilical re-termination	X	X	X	X
N/A	PT1	SPT	PTS	2-02	-015	Conduct umbilical re-termination under supervision	X	X	X	X
N/A	N/A	SPT	PTS	2-02	-016	Demonstrates umbilical re-termination process and supervise assistants	X	X	X	X

N/A	N/A	N/A	PTS	2-02	-017	Approve umbilical re-termination	X	X	X	X
PT2	PT1	SPT	PTS	2-02	-018	Identify the manufacturer of a subsea light and its associated literature	X	X	X	X
PT2	PT1	SPT	PTS	2-02	-019	Demonstrate the ability to replace a power supply	X	X	X	X
Certification level							ROV CLASS			
Pilot/ Tech 2 (PT2)	Pilot/ Tech 1 (PT2)	Senior Pilot/Tech (SPT) Pilot/Tech	Pilot/Tech Supervisor (PTS)		Reference Code	Tasks to be performed	I	II	III	IV
PT2	PT1	SPT	PTS	2-02	-020	Demonstrate understanding of location and safety awareness as well as proper handling/isolating of various power supplies in the system	X	X	X	X
PT2	PT1	SPT	PTS	2-02	-021	Demonstrate understanding of standard colors or markings used for ground wires in electrical cables	X	X	X	X
PT2	PT1	SPT	PTS	2-02	-022	Describe basic grounding principles and hazards of improper grounding	X	X	X	X
PT2	PT1	SPT	PTS	2-02	-023	Locate a Ground Fault Interrupt circuit on the system	X	X	X	X
PT2	PT1	SPT	PTS	2-02	-024	Identify major components on a typical ROV electrical layout and their purpose to include isolation methods in the event of an accident	X	X	X	X
PT2	PT1	SPT	PTS	2-02	-025	Properly test a fuse and explain their function in a circuit as well as how to determine the rating of one	X	X	X	X
PT2	PT1	SPT	PTS	2-02	-026	Demonstrates understanding of the purpose behind Ground Fault Circuits on the system and what they are monitoring	X	X	X	X
PT2	PT1	SPT	PTS	2-02	-027	Identify fiber optic connectors and re-termination kit	X	X	X	X

PT2	PT1	SPT	PTS	2-02	-028	Be familiar with information regarding fiber connector installation and discuss the basic process to terminate a fiber optic cable using current system methods	X	X	X	X
PT2	PT1	SPT	PTS	2-02	-029	Determine how subsea motors are monitored for runtime	X	X	X	X
Certification level							ROV CLASS			
Pilot/ Tech 2 (PT2)	Pilot/ Tech 1 (PT2)	Senior Pilot/Tech (SPT) Pilot/Tech	Pilot/Tech Supervisor (PTS)		Reference Code	Tasks to be performed	I	II	III	IV
PT2	PT1	SPT	PTS	2-02	-030	Identify major components on a typical ROV electronics/sensory layout and their purpose	X	X	X	X
PT2	PT1	SPT	PTS	2-02	-031	Draw a block diagram of the basic electrical power flow on an entire ROV system	X	X	X	X
PT2	PT1	SPT	PTS	2-02	-032	Identify main circuit boards in ROV system using system manuals	X	X	X	X
N/A	N/A	SPT	PTS	2-02	-033	Demonstrate knowledge of ROV circuit boards sufficient to recommend modifications	X	X	X	X
PT2	PT1	SPT	PTS	2-02	-034	Identify major components in the fiber optic portions of the system	X	X	X	X
				-03	<i>Knowledge of ROV hydraulic systems</i>					
PT2	PT1	SPT	PTS	2-03	-001	Demonstrate the ability to read Hydraulic schematics and identify basic hydraulic symbols				
PT2	PT1	SPT	PTS	2-03	-002	Identify the type and quantity of hydraulic fluid used on the entire system including the winch	N/A	X	X	X

PT2	PT1	SPT	PTS	2-03	-003	Identify size and pressure rating of a hydraulic hose as well as proper installation of a hose (hose routing and hose security)	N/A	X	X	X
PT2	PT1	SPT	PTS	2-03	-004	Demonstrate proper hose and fitting inspection as well as discuss proper care and storage of these items	N/A	X	X	X
PT2	PT1	SPT	PTS	2-03	-005	Identify major components and fittings in a typical ROV hydraulics layout	N/A	X	X	X
Certification level							ROV CLASS			
Pilot/ Tech 2 (PT2)	Pilot/ Tech 1 (PT2)	Senior Pilot/Tech (SPT) Pilot/Tech	Pilot/Tech Supervisor (PTS)		Reference Code	Tasks to be performed	I	II	III	IV
PT2	PT1	SPT	PTS	2-03	-006	Identify compression fit (ie: Swagelok) tools and explain the proper method for making up a fitting and installing the fitting on the system	N/A	X	X	X
PT2	PT1	SPT	PTS	2-03	-007	Identify fittings that PTFE (thread tape) would be used on	N/A	X	X	X
PT2	PT1	SPT	PTS	2-03	-008	Locate a Quick Disconnect on the system	N/A	X	X	X
PT2	PT1	SPT	PTS	2-03	-009	Demonstrate understanding of the importance of ROV hydraulic compensation circuits (comps)	N/A	X	X	X
PT2	PT1	SPT	PTS	2-03	-010	Locate major components and trace compensation circuits	N/A	X	X	X
PT2	PT1	SPT	PTS	2-03	-011	Demonstrates understanding of how to differentiate between high and low pressure fittings	N/A	X	X	X
PT2	PT1	SPT	PTS	2-03	-012	Differentiate between high and low pressure filters	N/A			
PT2	PT1	SPT	PTS	2-03	-013	Demonstrate use of O-rings, gaskets and seals	N/A			

PT2	PT1	SPT	PTS	2-03	-014	Locate tooling valve packs and thruster control valve packs	N/A	X	X	X		
PT2	PT1	SPT	PTS	2-03	-015	Demonstrate understanding of proper disposal procedures for hydraulic fluid contaminated water, rags, filters or any other environmentally hazardous contaminant.	X	X	X	X		
PT2	PT1	SPT	PTS	2-03	-016	Understands the reason for performing hydraulic system air and water checks	N/A	X	X	X		
Certification level							ROV CLASS					
Pilot/ Tech 2 (PT2)	Pilot/ Tech 1 (PT2)	Senior Pilot/Tech (SPT) Pilot/Tech	Pilot/Tech Supervisor (PTS)		Reference Code	Tasks to be performed	I	II	III	IV		
PT2	PT1	SPT	PTS	2-03	-017	Demonstrates understanding of the difference between Rate controlled and Spatially Correspondent controlled manipulators	N/A	X	X	X		
PT2	PT1	SPT	PTS	2-03	-018	Locate the placement of all hydraulic monitoring gauges on the winch, cage and vehicle	N/A	X	X	X		
				-04	SKILLS PROFICIENCY FOR MAINTENANCE TASKS							
PT2	PT1	SPT	PTS	2-04	-001	Demonstrate understanding of the need to follow a pre dive check list of all ROV operational systems	X	X	X	X		
N/A	PT1	SPT	PTS	2-04	-002	Conduct a pre dive check list of all ROV operational systems under supervision	X	X	X	X		
N/A	N/A	SPT	PTS	2-04	-003	Conduct and follow a pre dive check list of all ROV operational systems	X	X	X	X		
N/A	N/A	N/A	PTS	2-04	-004	Supervise pre dive check list of all ROV operational systems	X	X	X	X		

PT2	PT1	SPT	PTS	2-04	-005	Demonstrates the ability to compensate the hydraulic system	X	X	X	X
PT2	PT1	SPT	PTS	2-04	-006	Demonstrate understanding of HPU operation and set-up procedures	N/A	X	X	X
N/A	PT1	SPT	PTS	2-04	-007	Set-up HPU under supervision	N/A	X	X	X
N/A	N/A	SPT	PTS	2-04	-008	Set-up HPU	N/A	X	X	X
PT2	PT1	SPT	PTS	2-04	-009	Identify and recognize importance of isolation required for each major energy hazard	X	X	X	X
Certification level							ROV CLASS			
Pilot/Tech 2 (PT2)	Pilot/Tech 1 (PT2)	Senior Pilot/Tech (SPT) Pilot/Tech	Pilot/Tech Supervisor (PTS)		Reference Code	Tasks to be performed	I	II	III	IV
N/A	N/A	SPT	PTS	2-04	-010	Supervise isolation for each major energy hazard	X	X	X	X
PT2	PT1	SPT	PTS	2-04	-011	Identify major components and signal flow in the video circuit from subsea to surface	X	X	X	X
PT2	PT1	SPT	PTS	2-04	-012	Demonstrate the ability to re-route video signals on the video switcher in navigators console	N/A	N/A	X	X
PT2	PT1	SPT	PTS	2-04	-013	Identify sensors that are typically associated with vehicle depth, distance above sea floor, water temperature and heading and be able to locate each of these components on the ROV as they are mentioned	X	X	X	X

PT2	PT1	SPT	PTS	2-04	-014	Show a conceptual understanding of the basic flow of system power, telemetry and hydraulic flow paths through visual and verbal tracing	X	X	X	X
PT2	PT1	SPT	PTS	2-04	-015	Identify the components of the personnel communication equipment	X	X	X	X
N/A	PT1	SPT	PTS	2-04	-016	Inspect and maintain the personnel communication equipment undersupervision	X	X	X	X
N/A	N/A	SPT	PTS	2-04	-017	Inspect and maintain the personnel communication equipment	X	X	X	X
PT2	PT1	SPT	PTS	2-04	-018	(This includes where the information is displayed) Demonstrates ability to identify components of ground fault and water monitoring systems.	X	X	X	X
Certification level							ROV CLASS			
Pilot/ Tech 2 (PT2)	Pilot/ Tech 1 (PT2)	Senior Pilot/Tech (SPT) Pilot/Tech	Pilot/Tech Supervisor (PTS)		Reference Code	Tasks to be performed	I	II	III	IV
PT2	PT1	SPT	PTS	2-04	-019	Ability to determine how to effectively isolate the system for various levels of task	X	X	X	X
PT2	PT1	SPT	PTS	2-04	-020	Demonstrate procedure for performing Ground Fault checks	X	X	X	X
PT2	PT1	SPT	PTS	2-04	-021	Perform hydraulic system air and water checks	N/A	X	X	X
PT2	PT1	SPT	PTS	2-04	-022	Perform a subsea light lamp replacement while demonstrating proper methods and understanding of the hazards involved	X	X	X	X
PT2	PT1	SPT	PTS	2-04	-023	Assists in preparing work area for tasks as well as assist technicians in the basic needs relating to the maintenance	X	X	X	X

PT2	PT1	SPT	PTS	2-04	-024	Remove and replace camera units under supervision	X	X	X	X
N/A	N/A	SPT	PTS	2-04	-025	Supervise removal, replacement, and setup of camera units	X	X	X	X
				3	PILOTING SKILLS AND NAVIGATION ABILITY					
				-01	<i>Knowledge of safety and operating requirements during Launch and Recovery (LARS) operations</i>					
PT2	PT1	SPT	PTS	3-01	-001	Demonstrate an understanding of the ROV team members' roles and responsibilities during a system launch and recovery operations	X	X	X	X
Certification level							ROV CLASS			
Pilot/ Tech 2 (PT2)	Pilot/ Tech 1 (PT2)	Senior Pilot/Tech (SPT) Pilot/Tech	Pilot/Tech Supervisor (PTS)		Reference Code	Tasks to be performed	I	II	III	IV
PT2	PT1	SPT	PTS	3-01	-002	Demonstrate understanding of how environmental conditions effect the launch and recovery of a system	X	X	X	X
PT2	PT1	SPT	PTS	3-01	-003	Demonstrate understanding of the operation and safety concerns for the ROV system winch	X	X	X	X
PT2	PT1	SPT	PTS	3-01	-004	Demonstrate proper communication procedures during ROV operations and provide a valid example of communication procedures	X	X	X	X
PT2	PT1	SPT	PTS	3-01	-005	Demonstrate safe LARS operation under supervision	X	X	X	X

N/A	N/A	SPT	PTS	3-01	-006	Supervise safe LARS operation.	X	X	X	X
PT2	PT1	SPT	PTS	3-01	-007	Describe the unique differences and safety concerns with fixed A-frame, docking head, cursor, guide wire, rail LARS operations and overboarding cranes	X	X	X	X
PT2	PT1	SPT	PTS	3-01	-008	Demonstrate understanding of the limitations and hazards of operating system lights and subsea motors while on deck or during transition to sea surface	X	X	X	X
				-02	Operational knowledge					
PT2	PT1	SPT	PTS	3-02	-001	List at least two types of navigational aids on the ROV system	X	X	X	X
Certification level							ROV CLASS			
Pilot/ Tech 2 (PT2)	Pilot/ Tech 1 (PT2)	Senior Pilot/Tech (SPT) Pilot/Tech	Pilot/Tech Supervisor (PTS)		Reference Code	Tasks to be performed	I	II	III	IV
PT2	PT1	SPT	PTS	3-02	-002	List at least two types of common acoustic equipment used on the ROV and how they assist with navigation	X	X	X	X
PT2	PT1	SPT	PTS	3-02	-003	Demonstrate camera focus and zoom features	X	X	X	X
N/A	N/A	SPT	PTS	3-02	-004	Select appropriate camera for specific operational task	X	X	X	X
PT2	PT1	SPT	PTS	3-02	-005	Identify considerations for ROV operations on Dynamically Positioned vessels	X	X	X	X

PT2	PT1	SPT	PTS	3-02	-006	Identify intakes, navigational, and environmental hazards that may impact safe operation of ROV	X	X	X	X
				-03	Operational skills					
PT2	PT1	SPT	PTS	3-03	-001	Locate the sonar on the ROV and explain its basic operation	X	X	X	X
PT2	PT1	SPT	PTS	3-03	-002	Demonstrate the ability to operate the sonar system on the ROV and interpret the sonar image	X	X	X	X
PT2	PT1	SPT	PTS	3-03	-003	Demonstrates the ability to communicate effectively to the pilot and guide the pilot to a selected target	X	X	X	X
PT2	PT1	SPT	PTS	3-03	-004	Fly an ROV on a constant heading	X	X	X	X
PT2	PT1	SPT	PTS	3-03	-005	Demonstrate ability to hold station mid water	X	X	X	X
Certification level							ROV CLASS			
Pilot/ Tech 2 (PT2)	Pilot/ Tech 1 (PT2)	Senior Pilot/Tech (SPT) Pilot/Tech	Pilot/Tech Supervisor (PTS)		Reference Code	Tasks to be performed	I	II	III	IV
PT2	PT1	SPT	PTS	3-03	-006	Demonstrate ability to fly ROV to target using vehicle sensors, using proper tether management	X	X	X	X
PT2	PT1	SPT	PTS	3-03	-007	Demonstrate ability to enter and exit a Tether Management System (TMS), either cage or top hat system	X	X	X	X
				4	ADMINISTRATION					
				-01	Computer skills					

PT2	PT1	SPT	PTS	4-01	-001	Perform a file save/backup task on the computer	X	X	X	X
PT2	PT1	SPT	PTS	4-01	-002	Demonstrate computer system operation	X	X	X	X
PT2	PT1	SPT	PTS	4-01	-003	Demonstrate effective file system navigation and use programs such as word processing and spreadsheeting	X	X	X	X
				-02	<i>Knowledge of proper log keeping requirements</i>					
PT2	PT1	SPT	PTS	4-02	-001	Demonstrate good record keeping skills	X	X	X	X
PT2	PT1	SPT	PTS	4-02	-002	Identify the specific uses of all logbooks on the system	X	X	X	X
PT2	PT1	SPT	PTS	4-02	-003	Complete pre and post dive log entries in the system logbook	X	X	X	X
PT2	PT1	SPT	PTS	4-02	-004	Discuss how information exchange plays a vital role in operational success	X	X	X	X
PT2	PT1	SPT	PTS	4-02	-005	Demonstrate the ability to record dive information onto the dive log	X	X	X	X
PT2	PT1	SPT	PTS	4-02	-006	Demonstrate ability to record video information onto media	X	X	X	X
Certification level							ROV CLASS			
Pilot/ Tech 2 (PT2)	Pilot/ Tech 1 (PT2)	Senior Pilot/Tech (SPT) Pilot/Tech	Pilot/Tech Supervisor (PTS)		Reference Code	Tasks to be performed	I	II	III	IV
PT2	PT1	SPT	PTS	4-02	-007	Demonstrate the ability to manage inventory, parts, spares and consumables	X	X	X	X
				-03	<i>Knowledge of ROV system components</i>					
PT2	PT1	SPT	PTS	4-03	-001	Remove and connect a subsea connector while describing key points such as keyways, torque, cross-threading and O-ring topics	X	X	X	X
PT2	PT1	SPT	PTS	4-03	-002	Locate where water alarm sensors are located and where the information from these sensors is displayed	X	X	X	X

PT2	PT1	SPT	PTS	4-03	-003	Identify subsea tools	N/A	X	X	X
N/A	PT1	SPT	PTS	4-03	-004	Recognize application of ROV tooling	N/A	X	X	X
N/A	N/A	SPT	PTS	4-03	-005	Install ROV tools	N/A	X	X	X
N/A	N/A	N/A	PTS	4-03	-006	Confirm appropriate tooling for job	N/A	X	X	X
PT2	PT1	SPT	PTS	4-03	-007	Demonstrate understanding of NTSC and PAL video standards	X	X	X	X
PT2	PT1	SPT	PTS	4-03	-008	Draw a diagram of the construction of a fiber and non-fiber tether	X	X	X	X
PT2	PT1	SPT	PTS	4-03	-009	Identify an O-ring sizing tool and demonstrate how it works	X	X	X	X
PT2	PT1	SPT	PTS	4-03	-010	Draw a diagram of a common umbilical structure	X	X	X	X
PT2	PT1	SPT	PTS	4-03	-011	Perform a potting operation	X	X	X	X
PT2	PT1	SPT	PTS	4-03	-012	Preform a replacement whip assebly				
PT2	PT1	SPT	PTS	4-03	-013	Demonstrate understanding of cable PBOF needs on the system	X	X	X	X
Certification level							ROV CLASS			
Pilot/ Tech 2 (PT2)	Pilot/ Tech 1 (PT2)	Senior Pilot/Tech (SPT) Pilot/Tech	Pilot/Tech Supervisor (PTS)		Reference Code	Tasks to be performed	I	II	III	IV
PT2	PT1	SPT	PTS	4-03	-014	Construct a short whip for trouble shooting of subsea components and describe the benefits of this "troubleshooting tool"	X	X	X	X
PT2	PT1	SPT	PTS	4-03	-015	Locate several anodes on the system and discuss the purpose of anodes as well as proper installation and maintenance of them	X	X	X	X
PT2	PT1	SPT	PTS	4-03	-016	Demonstrate proper O-ring removal, inspection, lubrication and installation	X	X	X	X

				5	MISCELLANEOUS					
				-01	<i>Knowledge of various topics relating to ROV's or the industry</i>					
PT2	PT1	SPT	PTS	5-01	-001	Describe applications for which ROV's are used	X	X	X	X
PT2	PT1	SPT	PTS	5-01	-002	Identify subsea structures/products and any associated acronyms (Example: TLP, BOP, THS, UTAJ, HCS)	X	X	X	X
PT2	PT1	SPT	PTS	5-01	-003	Describe the importance of customer expectations and goals	X	X	X	X

Competency Areas	New Numbering System	Test equipment	Knowledge areas	Practical skills application
Safety	001		electrical - power systems, grounding	
maintenance and repair piloting	002	XXX	Electronic - sensors, video, sonar	
	003		Hydraulic - compensation, circuits, fittings	
administration	004		Mechanical – O-rings, fasteners	
miscellaneous	005		"project management" – personal skills, communications, record keeping	