# PERSONAL RECORD BOOK

## Marine Mechanical Technician

ita

This is your Record Book!

# DO NOT SUBMIT TO THE ITA

**<u>This is not required to achieve certification</u>**

- **It is a record of your progress towards achieving certification in the trade**
- **It provides a record of your experience**
- **It is your responsibility to keep it up-to-date**
- **Take it with you if you change employers**

*Note: Employers and supervisors are not responsible for keeping your Record Book up-to-date. They are responsible for sign-off of hours and sign-off of competencies once you have achieved the required level of skills and knowledge.*

# APPRENTICE IDENTIFICATION

## Trade: MARINE MECHANICAL TECHNICIAN

| | | | |
|---|---|---|---|
| Legal First Name: | | Legal Last Name: | |
| Suite Number: | Street Number and Name: | | |
| City: | | Province: | Postal Code: |
| Telephone Number: | | Email Address: | |

### Work Safely!

A safe work attitude contributes to an accident free environment. Accident prevention and safe working conditions are the responsibility of both employers and employees.

Wear the required personal protective equipment, follow safe work practices and follow all safety regulations applicable to specific job activities.

Employer's responsibilities:

- Provide and maintain safety equipment and protective devices
- Ensure proper safe work clothing is worn
- Enforce safe work procedures
- Provide safeguards for machinery, equipment and tools
- Observe all accident prevention regulations
- Train employees in safe use and operation of equipment

Employee's responsibilities:

- Work in accordance with the safety regulations pertaining to job environment
- Work in such a way as not to endanger themselves or fellow workers.

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# EMPLOYER INFORMATION

**Originating Employer**

| | |
|---|---|
| Start Date: | End Date: |
| Employer: | |
| Contact Person: | |
| Address: | Phone: |
| | Email: |
| | Fax: |
| Supervisor/Journeyperson 1: | *TWID #: |
| | Phone: |
| | Email: |
| Supervisor/Journeyperson 2: | TWID #: |
| | Phone: |
| | Email: |

***TWID # – Trade Worker Identification Number**

*If you have more than one employer during your apprenticeship, record the information for subsequent employers on the following page(s).*

If your job ends or you change employers…

**Before leaving your place of employment:**

- **Update Workplace Hours through a *Work-Based Training Hours form* for the current reporting period and get signoff by your employer.**
- **Update Record of Competencies with your supervisor.**
- **Confirm with your employer that your workplace hours have been reported to ITA, and if possible get a copy of all Work-Based Training Hours reports submitted.**
- **Notify the ITA of the change in your employment by submitting an *Apprentice and Sponsor Registration form* with your new employer.**

When re-employed…

**You must be registered with your new employer before submitting any work-based training hours to the ITA.**

## Subsequent Employers

| | |
|---|---|
| Start Date: | End Date: |
| Employer: | |
| Contact Person: | |
| Address: | Phone: |
| | Email: |
| | Fax: |
| Supervisor/Journeyperson 1: | TWID #: |
| | Phone: |
| | Email: |
| Supervisor/Journeyperson 2: | TWID #: |
| | Phone: |
| | Email: |

## Subsequent Employers

| | |
|---|---|
| Start Date: | End Date: |
| Employer: | |
| Contact Person: | |
| Address: | Phone: |
| | Email: |
| | Fax: |
| Supervisor/Journeyperson 1: | TWID #: |
| | Phone: |
| | Email: |
| Supervisor/Journeyperson 2: | TWID #: |
| | Phone: |
| | Email: |

# WORKPLACE HOURS

## Instructions

Make an entry in this section each time your hours are reported to the ITA.

1. Get a copy of the *Workplace Hours Report* from your employer.
2. Fill in the dates of the reporting period and the hours reported.
3. Enter your employer name, address and phone number.
4. Keep your Record Book in a safe place.

Workplace Hours

**Workplace hours** must be submitted to the ITA by your employer on a regular basis. Your hours should be reported at least every six months; however, every three months is preferred.

At the beginning of your apprenticeship discuss the frequency of reporting with your employer.

Keeping Workplace hours up-to-date in your Record Book gives you the tools to better manage your apprenticeship. It provides you with the opportunity to:

- Follow up with your employer each reporting period to ensure your hours are reported on a regular basis.
- Discuss your progress with your direct supervisor/journeyperson on a regular basis.

| DATE (TO-FROM) | EMPLOYER | HOURS |
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| TOTAL HOURS | | |

# RECORD OF COMPETENCIES

## Instructions

The Record of Competencies is filled out and signed-off by the journeyperson supervising your work.

1. Know what skills are expected at each level of the program.
2. Ask the journeyperson to sign off on the competency when you have acquired the skills and are able to perform the task without supervision.
3. If the journeyperson agrees that you have the required skills, he/she will:
   - Record the date that the competency was achieved
   - Sign off on the competency
   - Enter his/her Trades Worker Identification Number (TWID #)

What is a Record of Competencies?

The Record of Competencies lists all competencies you should be knowledgeable in prior to receiving your certification. Keeping this section up to date will allow you to track your progress towards certification and demonstrate proficiency in the skills within the scope of your trade. Completion of the entire program should result in you becoming a skilled and knowledgeable journeyperson.

- Refer to this section periodically to ensure you are getting the work experience you need.
- Use the competencies as a guide to ensure work tasks are assigned so that you acquire the skills and knowledge required to be successful in the trade.

Review the Record of Competencies on a regular basis with your direct supervisor/journeyperson to ensure they have been completed.

Program Outline

The Program Outline provides detailed information on the scope of knowledge and skills expected at each level of the program, further defining the competencies listed in the Record Book. The Program Outline is a great resource for developing a training plan.

*Download from:* https://www.itabc.ca/program/marine-mechanical-technician

Apprenticeship Toolkit

For general information on apprenticeship and tips for navigating the apprenticeship system in BC visit ITA's website to learn about the *apprenticeship basics.*

# LEVEL 1

## IMPORTANT!

**Download the Program Outline!**

**https://www.itabc.ca/program/marine-mechanical-technician**

**Read the competency tables**
**Some competencies are taught in many levels**
**For detailed information about that competency, go to the Program Outline**

## THEORY

### LINE A: OCCUPATIONAL SKILLS

- ☐ **DESCRIBE THE PRINCIPLES OF FRP CONSTRUCTION TECHNIQUES, ESPECIALLY WITH REGARD TO FACTORS THAT INFLUENCE OR ARE INFLUENCED BY MECHANICAL INSTALLATIONS**
- ☐ **DESCRIBE THE PRINCIPLES OF STEEL AND ALUMINUM CONSTRUCTION TECHNIQUES, ESPECIALLY WITH REGARD TO FACTORS THAT INFLUENCE OR ARE INFLUENCED BY MECHANICAL INSTALLATIONS**
- ☐ **DESCRIBE THE FUNCTION AND USE OF COMMON TRADE MEASUREMENT TOOLS**
- ☐ **DESCRIBE ENGINE OVERHAUL TOOLS AND THEIR USE**
- ☐ **DESCRIBE THE ELEMENTS OF SAFE WORKING PRACTICES IN A MARINE INDUSTRY WORKPLACE**
- ☐ **DESCRIBE COMMON HAZARDS AND RISKS OF ACCIDENT/INJURY IN A MARINE INDUSTRY WORKPLACE**
- ☐ **DESCRIBE WHMIS, LABELLING OF HAZARDOUS MATERIALS, AND USE OF MSDS DOCUMENTS**
- ☐ **DESCRIBE SAFE HANDLING AND LABELLING HAZARDOUS MATERIALS COMMONLY FOUND IN THE RECREATIONAL MARINE INDUSTRY WORKPLACE**
- ☐ **DESCRIBE THE REASONS AND USE OF PERSONAL PROTECTION GEAR FOR PREVENTION OF INJURY OR ILLNESS FROM EXPOSURE TO HAZARDOUS MATERIALS BY INHALATION AND SKIN CONTACT**
- ☐ **DESCRIBE THE USE OF EYE PROTECTION AND HEARING PROTECTION GEAR**

- [ ] **DESCRIBE THE NATURE AND STAGES OF FIRE DEVELOPMENT AND CORRECT PROCEDURES TO FOLLOW UPON THE EVENT OF A WORKPLACE FIRE**
- [ ] **DESCRIBE THE USE OF SMOTHERING, WATER AND FIRE EXTINGUISHERS FOR SUPPRESSING A WORKPLACE FIRE**
- [ ] **DESCRIBE THE COMMON HAZARDS RELATED TO WORKING IN CONFINED SPACES IN TYPICAL MARINE INDUSTRY SETTINGS AND PROPER SAFE WORKING PROCEDURES**
- [ ] **DESCRIBE THE HAZARDS ASSOCIATED WITH FALLING INTO DEEP WATER AND SAFETY PRECAUTIONS FOR WORKING AROUND WATER**
- [ ] **DESCRIBE LOCKOUT/TAGGING PROCEDURES TO PREVENT PERSONAL INJURY OR EQUIPMENT DAMAGE FROM INADVERTENT STARTING OR ENERGIZING OF SHOP POWER EQUIPMENT**
- [ ] **DESCRIBE LOCKOUT/TAGGING PROCEDURES TO PREVENT PERSONAL INJURY OR EQUIPMENT DAMAGE FROM INADVERTENT STARTING OF ENGINES OR ACTIVATION OF MACHINERY**
- [ ] **DESCRIBE TAGGING PROCEDURES TO PREVENT INADVERTENT USE OF A VESSEL OR SYSTEMS WHEN CRITICAL COMPONENTS OR ALARMS ARE INOPERABLE**
- [ ] **DESCRIBE THE USE OF COMMON VESSEL HAULING EQUIPMENT**
- [ ] **DESCRIBE THE METHODS AND TECHNIQUES FOR BLOCKING VESSELS ON SHORE**
- [ ] **DESCRIBE THE PROCEDURES, EQUIPMENT AND TECHNIQUES FOR LIFTING ENGINES AND OTHER HEAVY EQUIPMENT IN AND OUT OF VESSELS**
- [ ] **DESCRIBE THE CORRECT PROCEDURES FOR WINTERIZING AND LAYING UP ENGINES, PERIPHERAL EQUIPMENT AND OTHER VESSEL SYSTEMS**
- [ ] **DESCRIBE THE PROPER AND LEGAL PROCEDURES FOR DISPOSING OF HAZARDOUS MATERIALS COMMONLY FOUND IN THE MARINE INDUSTRY WORKPLACE**
- [ ] **DESCRIBE PROCEDURES FOR DEALING WITH ACCIDENTAL SPILLS IN THE WORKPLACE OR IN THE WATER**
- [ ] **DESCRIBE EMERGING EMISSIONS CONTROL REGULATION RELATED TO MARINE ENGINES**
- [ ] **DESCRIBE THE TYPICAL PROCEDURES FOR COMMISSIONING NEW ENGINES PRE-START, INITIAL STARTING AND POST-START**

- [ ] **DESCRIBE TYPICAL PROCEDURES FOR CONDUCTING SEA TRIALS FOLLOWING COMMISSIONING OF NEW ENGINES OR REPAIR WORK**
- [ ] **DESCRIBE THE BASIC ELEMENTS OF VESSEL TYPES, HULL FORMS, PERFORMANCE, STABILITY AND PROPULSION SYSTEM CONFIGURATIONS**
- [ ] **DESCRIBE THE COMMON SOURCES OF TECHNICAL DATA RELATED TO THE TRADE AND THEIR MEANS OF ACCESS**
- [ ] **DESCRIBE THE USE OF BROWSERS AND SEARCH ENGINES TO ACCESS TECHNICAL AND MANUFACTURERS' INFORMATION ON THE INTERNET**
- [ ] **DESCRIBE THE REASONS FOR INDUSTRIAL STANDARDS, HOW THEY ARE APPLIED IN THE WORKPLACE AND WHAT ORGANIZATIONS PROVIDE STANDARDS RELATED TO THE TRADE**
- [ ] **DESCRIBE COMMON FASTENERS USED IN THE MARINE MECHANICAL WORKPLACE**
- [ ] **DESCRIBE THE PRINCIPLES OF FRP CONSTRUCTION TECHNIQUES, ESPECIALLY WITH REGARD TO FACTORS THAT INFLUENCE OR ARE INFLUENCED BY MECHANICAL INSTALLATIONS**
- [ ] **DESCRIBE THE PRINCIPLES OF STEEL AND ALUMINUM CONSTRUCTION TECHNIQUES, ESPECIALLY WITH REGARD TO FACTORS THAT INFLUENCE OR ARE INFLUENCED BY MECHANICAL INSTALLATIONS**
- [ ] **DESCRIBE COMMON FRP RESINS AND REINFORCEMENTS, THEIR USE AND CURE FACTORS**
- [ ] **DESCRIBE BASIC GEL COAT REPAIR PROCEDURES**
- [ ] **DESCRIBE THE TYPES AND USES OF ADHESIVES, SEALANTS, BEDDING COMPOUNDS AND EPOXY FOR TYPICAL APPLICATIONS IN THE MARINE WORKPLACE**
- [ ] **DESCRIBE THE TYPES AND USES OF CLEANERS, DE-GREASING AGENTS AND CLEANING SOLVENTS FOR TYPICAL APPLICATIONS IN THE MARINE WORKPLACE**
- [ ] **DESCRIBE THE PROPERTIES, IDENTIFICATION AND USE OF ENGINE OILS USED IN MARINE EQUIPMENT**
- [ ] **DESCRIBE THE PROPERTIES, IDENTIFICATION AND USE OF TRANSMISSION FLUIDS AND GEAR OILS USED IN MARINE EQUIPMENT**
- [ ] **DESCRIBE THE PROPERTIES AND USES OF GREASES FOR MARINE EQUIPMENT**

- [ ] **DESCRIBE THE PROPERTIES AND USE OF COOLANTS IN MARINE ENGINE COOLING SYSTEMS**
- [ ] **DESCRIBE THE PROPERTIES OF ENGINE COOLANTS, ASSESSMENT OF COOLANT PROPERTIES AND PROCEDURES FOR CHANGING COOLANT**
- [ ] **DESCRIBE COMMON PROBLEMS WITH ENGINE AND DRIVE TRAIN LUBRICANTS AND BASIC ON-SITE TESTS FOR DIAGNOSING PROBLEMS**
- [ ] **DESCRIBE TECHNIQUES FOR TAKING OIL SAMPLES FOR LAB TESTS**
- [ ] **INTERPRET LAB TEST REPORTS**
- [ ] **DESCRIBE THE TECHNIQUES AND PROCEDURES FOR CHANGING ENGINE OIL/FILTERS, TRANSMISSION OIL AND GEAR OIL**

## LINE B: VESSEL SYSTEMS

- [ ] **DESCRIBE THE SIZING, LOCATING AND SAFETY STANDARDS CONSIDERATIONS FOR THE INSTALLATION OF THRU-HULLS IN ALL VESSELS**
- [ ] **DESCRIBE THE CORRECT MATERIALS USED AND PROCEDURES FOR THRU-HULL INSTALLATIONS IN RFP, METAL AND WOOD HULLS**
- [ ] **DESCRIBE TYPES, SELECTION CONSIDERATIONS AND COMPONENTS OF NATURAL DRAFT, FORCED AIR AND HOT WATER CABIN HEATING SYSTEMS**
- [ ] **DESCRIBE PROPER INSTALLATION CONSIDERATIONS AND PROCEDURES FOR INSTALLING NATURAL DRAFT, FORCED AIR AND HOT WATER CABIN HEATING SYSTEMS**
- [ ] **DESCRIBE THE PRINCIPLES OF REFRIGERATION THEORY, COMPONENTS OF REFRIGERATION SYSTEMS AND REFRIGERATION EQUIPMENT COMMONLY FOUND ON RECREATIONAL VESSELS**
- [ ] **DESCRIBE THE CHARACTERISTICS OF PROPANE GAS AND SAFETY CONSIDERATIONS**
- [ ] **DESCRIBE COMMON REGULATORY CODES AND STANDARDS**
- [ ] **DESCRIBE SAFE INSTALLATIONS OF STORAGE TANKS AND FUEL SUPPLY LINES**
- [ ] **DESCRIBE THE SELECTION, LOCATION AND INSTALLATION CONSIDERATIONS FOR INSTALLING DAVITS AND HOISTS IN FRP, METAL OR WOOD VESSELS**

- [ ] **DESCRIBE THE INSTALLATION OF DAVITS AND HOISTS, POWER HOOK UP AND RIGGING REQUIREMENTS**
- [ ] **DESCRIBE THE FUNCTION AND SELECTION OF ELECTRIC AND HYDRAULIC ANCHOR WINDLASSES**
- [ ] **DESCRIBE THE INSTALLATION TECHNIQUES AND POWER/CONTROL HOOK-UPS FOR ANCHOR WINDLASSES**
- [ ] **DESCRIBE TYPICAL FIRE SUPPRESSION EQUIPMENT INSTALLED ON RECREATIONAL VESSELS AND COMMON INSPECTION PROCEDURES**
- [ ] **DESCRIBE SAFETY HAZARDS ASSOCIATED WITH FIRE SUPPRESSION EQUIPMENT AND SAFE LOCK OUT PROCEDURES**
- [ ] **DESCRIBE THE FUNCTION AND OPERATION OF RUDDERS, QUADRANTS, TUBES, GLANDS AND TYPICAL CABLE OPERATED STEERING SYSTEMS**
- [ ] **DESCRIBE DIAGNOSING, SERVICING AND REPAIR OF RUDDERS, GLANDS AND CABLE SYSTEMS**
- [ ] **DESCRIBE THE FUNCTION, COMPONENTS AND INSTALLATION OF FRESH WATER PLUMBING SYSTEMS**
- [ ] **DESCRIBE THE FUNCTION, COMPONENTS AND INSTALLATION OF WASTE WATER PLUMBING SYSTEMS**
- [ ] **DESCRIBE THE THEORY AND BASIC OPERATION OF DESALINATION SYSTEMS**
- [ ] **DESCRIBE THE MAJOR COMPONENTS OF DESALINATION SYSTEMS AND THEIR OPERATION**
- [ ] **DESCRIBE TYPICAL DIAGNOSING, ROUTINE SERVICE AND STORAGE PROCEDURES FOR DESALINATORS**
- [ ] **DESCRIBE THE FUNCTION, COMPONENTS AND INSTALLATION CONSIDERATIONS FOR MANUAL, POWERED AND SUBMERSIBLE PUMPS AND SWITCHING EQUIPMENT AND SYSTEM INSTALLATION CONSIDERATIONS**
- [ ] **DESCRIBE THE CORRECT PROCEDURES FOR INSTALLING MANUAL AND POWERED BILGE PUMP SYSTEMS**

## LINE C: HYDRAULIC EQUIPMENT

- ☐ **DESCRIBE THEORY, COMPONENTS AND OPERATION OF MODERN 2-STROKE OUTBOARD ENGINES**
- ☐ **DESCRIBE THEORY, COMPONENTS AND OPERATION OF MODERN 4-STROKE OUTBOARD ENGINES**
- ☐ **DESCRIBE HYDRAULIC THEORY, HYDRAULIC SYSTEM PUMPS, VALVES, MOTORS, CYLINDERS, HYDRAULIC OIL AND POWER DISTRIBUTION SYSTEMS**
- ☐ **DESCRIBE THE FUNCTION AND COMPONENTS OF HYDRAULIC STEERING SYSTEMS, PUMPS, HELM STATIONS, CYLINDERS AND STEERING SYSTEM LAYOUTS FOR SINGLE AND MULTIPLE STATION INSTALLATIONS**
- ☐ **DESCRIBE DIAGNOSING PROCEDURES AND TECHNIQUES FOR FAULT FINDING COMMON MARINE HYDRAULIC SYSTEM PROBLEMS**
- ☐ **DESCRIBE PROPER PROCEDURES FOR INSTALLING AND SERVICING HYDRAULIC MOTORS AND CYLINDERS FOR TYPICAL MARINE APPLICATIONS**

## LINE D: METAL WORKING

- ☐ **DESCRIBE THE METALS COMMONLY FOUND IN THE RECREATIONAL MARINE INDUSTRY, THEIR MAIN PROPERTIES AND USES**
- ☐ **DESCRIBE THE BASIC METALWORKING OPERATIONS, INCLUDING CUTTING, DRILLING, TAPPING, CUTTING THREADS, FILING, GRINDING AND BENDING IN VARIOUS COMMON MARINE METALS**
- ☐ **DESCRIBE THE COMMON WELDING TYPES AND TECHNIQUES AND THEIR APPLICATION IN THE MARINE INDUSTRY WORKPLACE**
- ☐ **DESCRIBE THE PRINCIPLES AND COMPONENTS OF OXY-ACETYLENE EQUIPMENT**

## LINE E: ELECTRICAL

- ☐ **DESCRIBE AC AND DC POWER**
- ☐ **DESCRIBE OHM'S LAW AND RELATIONSHIPS BETWEEN VOLTAGE, CURRENT AND RESISTANCE**

- [ ] **IDENTIFY AND DESCRIBE SYMBOLS USED IN SCHEMATICS FOR SWITCHES, LIGHTS, MOTORS, FUSES/BREAKERS, ALARM SENDERS/DETECTORS, SOLENOIDS AND GAUGES**
- [ ] **DESCRIBE WHERE, WHY AND HOW TO USE CONTINUITY TESTERS, TEST LIGHT, MULTI-METERS AND AMPROBES**
- [ ] **DESCRIBE TYPES OF DC STORAGE BATTERIES IN COMMON MARINE USE**
- [ ] **DESCRIBE BATTERY APPLICATIONS, RECHARGING, CAPACITY AND BATTERY BANKS**
- [ ] **DESCRIBE BATTERY CHARGER TYPES**
- [ ] **DESCRIBE BATTERY CHARGING CONTROL AND MONITORING EQUIPMENT**
- [ ] **DESCRIBE INVERTERS AND CHARGER/INVERTERS INSTALLATION PROCEDURES AND DIAGNOSING**
- [ ] **DESCRIBE ALTERNATOR OPERATION AND TYPICAL MALFUNCTIONING**
- [ ] **DESCRIBE TESTING AND DIAGNOSING TECHNIQUES**
- [ ] **DESCRIBE THE OPERATION OF ENGINE STARTING SYSTEMS, INCLUDING STARTER MOTORS, SOLENOIDS AND PRE-HEAT**
- [ ] **DESCRIBE COMMON STARTER SYSTEM PROBLEMS AND DIAGNOSING TECHNIQUES**
- [ ] **DESCRIBE DC ELECTRICAL CIRCUIT COMPONENTS AND PROPER INSTALLATION TECHNIQUES**
- [ ] **DESCRIBE THE TYPICAL ELECTRICAL SYSTEM FAULTS AND SYMPTOMS OF TROUBLE ON VESSELS**
- [ ] **DESCRIBE THE CAUSES OF GALVANIC CORROSION, COMPATIBILITY OF METALS IN THE MARINE ENVIRONMENT AND STEPS COMMONLY TAKEN TO PREVENT OR REDUCE CORROSION**
- [ ] **DESCRIBE THE FUNCTION, COMPONENTS AND INSTALLATION TECHNIQUES FOR TYPICAL ENGINE GAUGES, ALARMS AND SAFETY ALARM SYSTEMS IN VESSELS, INCLUDING HEAT DETECTORS, PRESSURE DETECTORS, FIRE AND GAS ALARM SYSTEMS, TACHOMETERS, FUEL GAUGES AND BILGE WATER ALARMS**
- [ ] **DESCRIBE THE FUNCTION OF SELF-CONTAINED AC GENERATORS AND THE CRITERIA TO BE CONSIDERED WHEN INSTALLING A NEW SYSTEM**

## LINE F: ENGINE SUPPORT SYSTEMS

- [ ] **DESCRIBE FUEL TANK MATERIALS, CONSTRUCTION AND PROPER INSTALLATION TO ABYC STANDARDS FOR GASOLINE AND DIESEL INSTALLATIONS**
- [ ] **DESCRIBE FUEL LEVEL SENDER AND GAUGES, INSTALLATION AND DIAGNOSING**
- [ ] **DESCRIBE FUEL TANK PLUMBING, FUEL LINES AND INSTALLATION TO ABYC STANDARDS**
- [ ] **DESCRIBE THE FUNCTION AND OPERATIONS OF MECHANICAL AND ELECTRIC GASOLINE AND DIESEL FUEL PUMPS**
- [ ] **DESCRIBE THE FUNCTION AND SELECTION OF GASOLINE AND DIESEL FUEL FILTERS AND WATER SEPARATORS**
- [ ] **DESCRIBE THE CHARACTERISTICS OF GASOLINE AND DIESEL FUEL, ADDITIVES AND COMMON PROBLEMS/SOLUTIONS ASSOCIATED WITH CONTAMINATION AND DETERIORATION**

## LINE G: ENGINES

- [ ] **DESCRIBE THE HISTORY, THEORY AND OPERATION OF BASIC INTERNAL COMBUSTION ENGINES**
- [ ] **DESCRIBE AND IDENTIFY THE TYPES OF ENGINES COMMONLY IN USE IN THE MODERN MARINE INDUSTRY**
- [ ] **DESCRIBE THE ROUTINE INSPECTION OF ENGINES AND ENGINE FUNCTION**

## LINE H: BOAT TRAILERS

- [ ] **IDENTIFY BOAT TRAILER COMPONENTS**
- [ ] **EXPLAIN BOAT TRAILER COMPONENT OPERATION**

# PRACTICAL

## LINE A: OCCUPATIONAL SKILLS

- ☐ DEMONSTRATE THE ACCURATE USE OF COMMON TRADE MEASUREMENT TOOLS
- ☐ USE ENGINE OVERHAUL TOOLS TO DISASSEMBLE AND REASSEMBLE MAJOR ENGINE COMPONENTS
- ☐ DEMONSTRATE PROPER USE OF RESPIRATORS, SKIN PROTECTION, EYE AND HEARING PROTECTION GEAR
- ☐ DEMONSTRATE THE USE OF FIRE EXTINGUISHERS TO PUT OUT A FIRE IN A SUPERVISED FIREFIGHTING DEMONSTRATION SETTING
- ☐ TIE COMMON KNOTS AND SECURES VESSELS SAFELY TO DOCKS
- ☐ DEMONSTRATE THE SAFE USE OF HEAVY LIFTING EQUIPMENT FOR LIFTING ENGINES AND OTHER HEAVY EQUIPMENT IN AND OUT OF VESSELS
- ☐ INSPECT ENGINE HOOK-UPS, PERFORM ENGINE PRE-START PROCEDURES AND COMPLETE PERFORMANCE CHECKS WHILE VESSEL IS UNDER WAY
- ☐ DEMONSTRATE AN ABILITY TO READ AND COMPREHEND THE TERMINOLOGY, TECHNICAL DATA, DRAWINGS, CHARTS AND GRAPHS RELATED TO THE TRADE
- ☐ SELECT AND USE FASTENERS FOR TYPICAL APPLICATIONS ON THE JOB
- ☐ PERFORM BASIC FRP STRUCTURAL REPAIRS
- ☐ REMOVE AND REPLACE COOLANT
- ☐ CHANGE ENGINE OIL/FILTERS, TRANSMISSION OIL AND GEAR OIL

## LINE B: VESSEL SYSTEMS

- ☐ INSTALL THRU-HULLS IN FRP, METAL AND WOOD HULLS
- ☐ DIAGNOSE, SERVICE AND REPAIR MECHANICAL STEERING GEAR
- ☐ INSTALL AND REPAIR FRESH WATER SYSTEMS
- ☐ INSTALL AND REPAIR WASTE WATER SYSTEMS
- ☐ INSTALL AND SERVICE MANUAL AND POWERED BILGE PUMP SYSTEMS

## LINE C: HYDRAULIC EQUIPMENT

- ☐ INSTALL AND SERVICE HYDRAULIC STEERING SYSTEMS, SELECTING AND MAKING UP LINES, BLEEDING AND DIAGNOSING
- ☐ PERFORM REPAIR PROCEDURES FOR CORRECTING TYPICAL HYDRAULIC SYSTEM PROBLEMS
- ☐ PERFORM PROPER PROCEDURES FOR INSTALLING AND SERVICING HYDRAULIC MOTORS AND CYLINDERS FOR TYPICAL MARINE APPLICATIONS

## LINE D: METAL WORKING

- ☐ PERFORM BASIC METALWORKING TECHNIQUES WITH COMMON MARINE METALS
- ☐ USE OXY-ACETYLENE EQUIPMENT SAFELY TO PERFORM BASIC HEATING, CUTTING, BRAZING AND SOLDERING OPERATIONS

## LINE E: ELECTRICAL

- ☐ CALCULATE VOLTAGE DROP IN TYPICAL CIRCUITS
- ☐ IDENTIFY AND TRACE ELECTRICAL CIRCUITS IN A SCHEMATIC AND DESCRIBE THEIR FUNCTION
- ☐ USE CONTINUITY TESTERS, MULTI-METERS AND AMPROBES TO MEASURE AND ANALYZE ELECTRICAL CIRCUITS
- ☐ CALCULATE BATTERY REQUIREMENTS FOR VARIOUS MARINE APPLICATIONS
- ☐ INSTALL BATTERIES IN VESSELS TO ABYC STANDARDS
- ☐ INSPECT AND TEST BATTERIES FOR FAULTS AND PROPER FUNCTION
- ☐ INSTALL BATTERY CHARGERS AND INVERTERS
- ☐ TEST ALTERNATOR FUNCTION AND DIAGNOSE TYPICAL MALFUNCTIONS
- ☐ DIAGNOSE AND REPAIR TYPICAL STARTER SYSTEM MALFUNCTIONS
- ☐ INSTALL TYPICAL ELECTRICAL CIRCUITRY USING APPROPRIATE CONDUCTORS, COMPONENTS AND INSTALLATION TECHNIQUES THAT MEET ABYC STANDARDS

- ☐ **DIAGNOSE TYPICAL ELECTRICAL SYSTEM FAULTS ON VESSELS USING TEST EQUIPMENT**
- ☐ **LOCATE, INSTALL AND DIAGNOSE GAUGES, DETECTORS/SENDERS AND SAFETY ALARM SYSTEMS**
- ☐ **INSTALL GENSETS IN VESSELS, INCLUDING REINFORCING STRUCTURES, INSULATION, AND ELECTRICAL HOOK-UPS TO MANUFACTURER'S SPECIFICATIONS AND TO MEET APPLICABLE ABYC STANDARDS**
- ☐ **DIAGNOSE GENSET ELECTRICAL MALFUNCTIONS AND SERVICE GENERATOR COMPONENTS**

## LINE F: ENGINE SUPPORT SYSTEMS

- ☐ **SELECT, INSTALL, INSPECT, CLEAN AND SERVICE FUEL TANKS**
- ☐ **INSTALL FUEL DELIVERY AND RETURN LINES FROM TANK TO ENGINE HOOKUP USING RIGID AND FLEX LINES TO ABYC STANDARDS**
- ☐ **INSPECT FUEL LINES FOR LEAKS, WEAR AND DETERIORATION**
- ☐ **SERVICE GASOLINE AND DIESEL FUEL PUMPS AND FILTERS**

## LINE G: ENGINES

- ☐ **PERFORM ROUTINE INSPECTIONS OF ENGINES AND ENGINE FUNCTION**

## LINE H: BOAT TRAILERS

- ☐ **DEMONSTRATE SERVICE PROCEDURES**

Supervisor Signature

## NOTES FROM LEVEL 1

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# LEVEL 2

## IMPORTANT!

**Download the Program Outline!**

**https://www.itabc.ca/program/marine-mechanical-technician**

**Read the competency tables**
**Some competencies are taught in many levels**
**For detailed information about that competency, go to the Program Outline**

## THEORY

### LINE F: ENGINE SUPPORT SYSTEMS

- ☐ **DESCRIBE CONVENTIONAL WET EXHAUST SYSTEM INSTALLATIONS FOR RAW WATER OR HEAT EXCHANGER COOLED ENGINES**
- ☐ **DESCRIBE DRY EXHAUST SYSTEM INSTALLATIONS**
- ☐ **DESCRIBE I/O EXHAUST SYSTEM INSTALLATIONS**
- ☐ **DESCRIBE PROCEDURES FOR INSPECTING AND REPAIRING INBOARD ENGINE WET OR DRY EXHAUST SYSTEMS**
- ☐ **DESCRIBE ENGINE ROOM LAYOUTS, CLEARANCES, INSULATION, OIL CONTAINMENT AND RECOMMENDED LOCATIONS FOR TANKS AND BATTERIES**
- ☐ **DESCRIBE REQUIREMENTS FOR ASPIRATED AIR AND COOLING VENTILATION AND CALCULATE ASPIRATED AIR REQUIREMENTS**

### LINE G: ENGINES

- ☐ **DESCRIBE THE BASICS OF ENGINE COOLING, TYPES OF COOLING SYSTEMS, HEAT EXCHANGERS, PUMPS AND COOLANTS**
- ☐ **DESCRIBE PROCEDURES FOR DIAGNOSING AND REPAIRING COMMON ENGINE COOLING SYSTEM PROBLEMS OR FAILURES**
- ☐ **DESCRIBE COMPRESSION PROBLEMS, EQUIPMENT USED AND PROCEDURES FOR CONDUCTING LEAK DOWN AND COMPRESSION TESTS**
- ☐ **DESCRIBE THE TECHNIQUES FOR DISASSEMBLY, INSPECTION OF ENGINE COMPONENTS AND RE-ASSEMBLY**

- [ ] **DESCRIBE THE PROCEDURES FOR CLEARING WATER FROM ENGINES THAT HAVE BEEN SUBMERGED, DAMAGE ASSESSMENT AND RE-STARTING**
- [ ] **DESCRIBE INSPECTION AND MEASUREMENT PROCEDURES FOR MAJOR ENGINE COMPONENTS**
- [ ] **DESCRIBE MACHINING REQUIREMENTS, PROCEDURES, ALLOWABLE TOLERANCES AND DOCUMENTATION FOR MACHINING ENGINE COMPONENTS BEING OVERHAULED**
- [ ] **DESCRIBE TOOLS AND PROCEDURES FOR ADJUSTING ENGINE COMPONENTS FOR PROPER OPERATION**

## LINE I: MARINE DRIVE SYSTEMS

- [ ] **DESCRIBE THE BASIC FUNCTION OF PROPELLERS, THE TYPES AND MATERIALS COMMONLY IN USE AND THE MATHEMATICAL RELATIONSHIPS RELATED TO DIAMETER AND PITCH**
- [ ] **DESCRIBE COMMON PROPELLER PROBLEMS, DIAGNOSES AND RECOMMENDED CORRECTION**
- [ ] **DESCRIBE PROPELLER AND PROP SHAFT RELATIONSHIP AND TECHNIQUES FOR REMOVING AND INSTALLING PROPELLERS**
- [ ] **DESCRIBE PROCEDURES FOR TRANSOM ASSEMBLY AND DRIVE LEG COMPONENT INSTALLATION NEW OR AS REPLACEMENT**
- [ ] **DESCRIBE CURRENT TYPES OF STERN DRIVE FUNCTION AND COMPONENTS**
- [ ] **DESCRIBE PROCEDURES FOR DIAGNOSING, TEARDOWN, REPAIR AND RE-ASSEMBLY OF STERN DRIVE COMPONENTS**
- [ ] **DESCRIBE PROCEDURES FOR DISASSEMBLY, REPAIR, RE-ASSEMBLY AND SEALING OF TRANSOM (GIMBAL) HOUSINGS AND BEARINGS**
- [ ] **DESCRIBE THE COMPONENTS AND FUNCTION OF COMMON CONVENTIONAL INBOARD DRIVE TRAIN SYSTEMS**
- [ ] **DESCRIBE THE COMPONENTS, OPERATION AND BASIC DIAGNOSING AND REPAIR PROCEDURES FOR JET DRIVE SYSTEMS**
- [ ] **DESCRIBE THE COMPONENTS, OPERATION AND BASIC DIAGNOSING AND REPAIR PROCEDURES FOR SURFACE PIERCING DRIVE SYSTEMS**
- [ ] **DESCRIBE COMMON FAULTS, DIAGNOSING AND REPAIR/REPLACEMENT AND SERVICING OF CONVENTIONAL DRIVE TRAIN COMPONENTS**

- [ ] **DESCRIBE COMPONENTS AND PROCEDURES FOR DIAGNOSING COMMON INBOARD TRANSMISSION PROBLEMS**
- [ ] **DESCRIBE COMPONENTS AND PROCEDURES FOR DIAGNOSING COMMON V-DRIVE TRANSMISSION PROBLEMS**
- [ ] **DESCRIBE THE COMMON SOURCES OF DRIVE TRAIN VIBRATION AND TECHNIQUES FOR IDENTIFYING VIBRATION SOURCES**
- [ ] **DESCRIBE THE BASIC DRIVE TRAIN COMPONENTS OF CURRENT OUTBOARD ENGINE UNITS**
- [ ] **DESCRIBE COMMON ENGINE MOUNT SYSTEMS USED WITH MARINE ENGINES**
- [ ] **DESCRIBE THE BASIC DRIVE TRAIN COMPONENTS OF CURRENT OUTBOARD ENGINE UNITS**
- [ ] **DESCRIBE TOOLS AND PROCEDURES FOR DIAGNOSING AND REPAIRING MODERN OUTBOARD DRIVE LEGS AND DRIVE TRAIN COMPONENTS**
- [ ] **DESCRIBE THE FUNCTION, COMPONENTS AND OPERATION OF HYDRAULIC AND ELECTRIC POWERED BOW AND STERN THRUSTERS, THEIR DIAGNOSING AND SERVICING**
- [ ] **DESCRIBE THE FUNCTION, COMPONENTS AND OPERATION OF HYDRAULIC AND ELECTRIC POWERED TRIM TABS, THEIR DIAGNOSING AND SERVICING**

## LINE J: IGNITION SYSTEMS

- [ ] **DESCRIBE ROUTINE SERVICE OF CONVENTIONAL ELECTRIC IGNITION SYSTEMS, AND ELECTRONIC IGNITION SYSTEMS**
- [ ] **DESCRIBE DIAGNOSING AND REPAIR OF CONVENTIONAL IGNITION SYSTEMS, ELECTRONIC IGNITION SYSTEMS AND COMPUTER CONTROLLED SYSTEMS**
- [ ] **DESCRIBE DIAGNOSING TOOLS AND TECHNIQUES FOR CONVENTIONAL IGNITION SYSTEMS**
- [ ] **DESCRIBE TOOLS AND TECHNIQUES FOR DIAGNOSING ELECTRONIC IGNITION SYSTEMS FOUND ON CURRENT OUTBOARD ENGINES**

## LINE K: CONTROL SYSTEMS

- ☐ DESCRIBE THE TYPES, CHARACTERISTICS AND BASIC OPERATION OF ENGINE CONTROL SYSTEMS FOUND ON RECREATIONAL VESSEL INSTALLATIONS
- ☐ DESCRIBE THE BASIC DIAGNOSING TECHNIQUES FOR ENGINE CONTROL SYSTEM PROBLEMS
- ☐ DESCRIBE THE COMMON AUTOPILOT SYSTEMS, HOW THEY FUNCTION AND THEIR MAIN COMPONENTS
- ☐ DESCRIBE THE BASIC DIAGNOSING TECHNIQUES FOR AUTOPILOT SYSTEM PROBLEMS

## LINE L: FUEL DELIVERY

- ☐ DESCRIBE DIAGNOSING TECHNIQUES FOR CURRENT DIESEL FUEL INJECTION SYSTEMS
- ☐ DESCRIBE COMMON DIESEL FUEL INJECTORS AND DIAGNOSING/SERVICING TECHNIQUES
- ☐ DESCRIBE DIESEL FUEL PRIMARY SYSTEMS, PUMPS, FILTERS AND LINES
- ☐ DESCRIBE CHARACTERISTICS AND QUALITIES OF DIESEL FUEL
- ☐ DESCRIBE IDENTIFICATION OF FUEL QUALITY PROBLEMS
- ☐ DESCRIBE ENGINE PRE-HEATING SYSTEMS AND COMPONENTS
- ☐ DESCRIBE ENGINE PRE-LUBRICATING SYSTEMS
- ☐ DESCRIBE BASIC SERVICING PROCEDURES FOR TURBOCHARGERS AND INTERCOOLERS
- ☐ DESCRIBE GASOLINE ENGINE TANKS AND FUEL DELIVERY SYSTEMS
- ☐ DESCRIBE THE COMPONENTS AND OPERATION OF CARBURETORS AND AIR INTAKE EQUIPMENT
- ☐ DESCRIBE THE COMPONENTS AND OPERATION OF GASOLINE FUEL INJECTION SYSTEMS
- ☐ DESCRIBE REPAIR PROCEDURES ON CARBURETED FUEL SYSTEMS AND FUEL INJECTED SYSTEMS
- ☐ DESCRIBE 2-STROKE OIL INJECTION SYSTEMS, DIAGNOSING AND SERVICING PROCEDURES

# PRACTICAL

## LINE F: ENGINE SUPPORT SYSTEMS

- ☐ PERFORM PROCEDURES FOR INSPECTING AND REPAIRING INBOARD ENGINE WET OR DRY EXHAUST SYSTEMS

## LINE G: ENGINES

- ☐ DIAGNOSE COMMON ENGINE COOLING SYSTEM PROBLEMS OR FAILURES AND PERFORM REPAIR OR REPLACEMENT PROCEDURES
- ☐ CONDUCT LEAK DOWN AND COMPRESSION TESTS
- ☐ PERFORM ENGINE DISASSEMBLY, INSPECTION OF ENGINE COMPONENTS AND RE-ASSEMBLY PROCEDURES
- ☐ PERFORM INSPECTION, MEASUREMENT AND MAKE MACHINING RECOMMENDATIONS FOR REBUILDING MAJOR ENGINE COMPONENTS
- ☐ PERFORM PROCEDURES FOR ADJUSTING ENGINE COMPONENTS FOR PROPER OPERATION

## LINE I: MARINE DRIVE SYSTEMS

- ☐ INSPECT PROPELLERS, MAKE DIAGNOSES AND RECOMMENDATIONS FOR CORRECTIVE ACTION
- ☐ REMOVE AND INSTALL PROPELLERS PROPERLY AND SAFELY
- ☐ PERFORM PROCEDURES FOR TRANSOM ASSEMBLY AND DRIVE LEG INSTALLATION ON I/O VESSELS, NEW AND AS REPLACEMENT
- ☐ SERVICE AND DIAGNOSE I/O STERN DRIVES AND TRANSOM ASSEMBLIES
- ☐ DISASSEMBLE, REPAIR AND RE-ASSEMBLE I/O STERN DRIVES AND TRANSOM ASSEMBLIES
- ☐ PERFORM CORRECT PROCEDURES FOR DISASSEMBLY, REPAIR AND RE-ASSEMBLY OF TRANSOM HOUSINGS AND BEARINGS
- ☐ DIAGNOSE, SERVICE AND REPAIR COMMON INBOARD DRIVE TRAIN COMPONENTS
- ☐ DIAGNOSE COMMON INBOARD DRIVE TRANSMISSION PROBLEMS AND REMOVE/REPLACE TRANSMISSION

- ☐ **DIAGNOSE COMMON V-DRIVE TRANSMISSION PROBLEMS AND REMOVE/REPLACE V-DRIVE**
- ☐ **DIAGNOSE VIBRATION PROBLEMS IN VESSELS AND RECOMMEND APPROPRIATE REPAIR PROCEDURES**
- ☐ **INSPECT, ADJUST AND REPLACE ENGINE MOUNTS AND REPAIR ENGINE BEDS**
- ☐ **PERFORM PROCEDURES FOR DIAGNOSING AND REPAIRING MODERN OUTBOARD DRIVE LEGS AND DRIVE TRAINS**
- ☐ **DIAGNOSE, SERVICE AND REPAIR SERVICEABLE COMPONENTS OF THRUSTERS AND TRIM TABS**

## LINE J: IGNITION SYSTEMS

- ☐ **SERVICE CONVENTIONAL IGNITION SYSTEMS, AND ELECTRONIC IGNITION SYSTEMS**
- ☐ **DIAGNOSE AND REPAIR CONVENTIONAL IGNITION SYSTEMS, ELECTRONIC IGNITION SYSTEMS AND COMPUTER CONTROLLED SYSTEMS *(J2)***
- ☐ **DIAGNOSE AND REPAIR CONVENTIONAL IGNITION SYSTEMS *(J3)***
- ☐ **DIAGNOSE AND REPAIR/REPLACE COMPONENTS OF ELECTRONIC IGNITION SYSTEMS**

## LINE K: CONTROL SYSTEMS

- ☐ **DIAGNOSE, REPAIR AND ADJUST SERVICEABLE COMPONENTS OF ENGINE CONTROL SYSTEMS**

## LINE L: FUEL DELIVERY

- ☐ **DIAGNOSE INJECTION PUMP PROBLEMS AND ADJUST PUMP TIMING**
- ☐ **DIAGNOSE AND SERVICE FUEL INJECTOR FAULTS**
- ☐ **INSPECT, CLEAN, TEST AND SET UP INJECTORS**
- ☐ **TROUBLESHOOT AND SERVICE PRIMARY FUEL DELIVERY SYSTEMS**
- ☐ **IDENTIFY FUEL QUALITY AND CONTAMINATION PROBLEMS**
- ☐ **SELECT AND USE FUEL ADDITIVES TO TREAT FUEL QUALITY PROBLEMS**

- [ ] **DIAGNOSE AND REPAIR ENGINE PRE-HEATING SYSTEMS**
- [ ] **PERFORM BASIC SERVICING PROCEDURES FOR TURBOCHARGERS AND INTERCOOLERS**
- [ ] **DESCRIBE AND CARRY OUT ROUTINE SERVICING PROCEDURES FOR GASOLINE FUEL SUPPLY COMPONENTS**
- [ ] **DESCRIBE AND CARRY OUT ROUTINE SERVICING AND ADJUSTMENT PROCEDURES ON CARBURETORS**
- [ ] **DESCRIBE AND CARRY OUT ROUTINE SERVICING AND ADJUSTMENT PROCEDURES ON FUEL INJECTION SYSTEMS**
- [ ] **PERFORM DIAGNOSING AND REPAIR PROCEDURES ON CARBURETED FUEL SYSTEMS AND FUEL INJECTED SYSTEMS**
- [ ] **PERFORM DIAGNOSING AND SERVICING PROCEDURES ON 2-STROKE OUTBOARD OIL INJECTION SYSTEMS**

Supervisor Signature

## NOTES FROM LEVEL 2

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# MISSING COMPETENCIES?

**To develop the best journeyperson possible employers should attempt to provide training in all competencies for the trade. This is not always possible.**

If your employer is unable to provide training in any competency required for your trade, note that competency below. Competencies listed here will remain unsigned until your employer can provide training in that area or until you find an alternate way to gain the experience needed.

| Competency: | Date: |
|---|---|
| Reason: | |
| Alternate plan: | |

| Competency: | Date: |
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| Reason: | |
| Alternate plan: | |

# TECHNICAL TRAINING

## Instructions

Keep a record of each level of technical training completed.

**Level 1**

| | |
|---|---|
| Date Completed: | Training Provider: |
| Mark: | Instructor: |

**Level 2**

| | |
|---|---|
| Date Completed: | Training Provider: |
| Mark: | Instructor: |

# COMPLETION REQUIREMENTS

**Instructions**

Keep a record of each program completion requirement achieved.

## MARINE MECHANICAL TECHNICIAN

- ☐ Level 1 - Technical Training
- ☐ Level 2 - Technical Training

- ☐ 4,800 Work-Based Training Hours

- ☐ ITA Certificate of Qualification examination
- ☐ Recommendation for Certification signed by sponsor

Note: After all other completion requirements have been met, ITA sends a Recommendation for Certification form to the sponsor requesting signoff.

# CERTIFICATIONS

## Instructions

Keep a record of the credentials and endorsements you have earned, including the certification number and date of issue.

| CREDENTIAL EARNED | NUMBER | DATE OF ISSUE |
|---|---|---|
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***If you have any questions, please contact ITA Customer Service at customerservice@itabc.ca***
***778-328-8700 or toll free (within BC) at 1-800-660-6011***