

SKILLED**TRADES**^{BC}

Personal Record Book

*Refrigeration and Air Conditioning
Mechanic*

This is your Record Book!

DO NOT SUBMIT TO SkilledTradesBC

This is not required to achieve certification

- 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: REFRIGERATION AND AIR CONDITIONING MECHANIC

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/Journey person 1:	*TWID #:
	Phone:
	Email:
Supervisor/Journey person 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:

- Please have your sponsor update your Work Based Training hours on their [SkilledTradesBC Portal account](#).
- Update Record of Competencies with your supervisor.
- Confirm with your employer that your workplace hours have been reported to SkilledTradesBC, and if possible get a copy of all Work-Based Training Hours reports submitted.
- Notify SkilledTradesBC 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 SkilledTradesBC.

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 SkilledTradesBC.

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 SkilledTradesBC 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.

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://skilledtradesbc.ca/refrigeration-air-conditioning-mechanic>

Apprenticeship Toolkit

For general information on apprenticeship and tips for navigating the apprenticeship system in BC visit SkilledTradesBC's website to learn about the [apprenticeship basics](#).

LEVEL 1

IMPORTANT!

Download the Program Outline!

<https://skilledtradesbc.ca/refrigeration-air-conditioning-mechanic>

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: PERFORM SAFETY RELATED FUNCTIONS

- Identify classes of fires

LINE B: USE TOOLS AND EQUIPMENT

- Inspect and maintain charging, evacuation and recovery tools
- Describe the use of elevated platforms
- Describe digital technology

LINE C: PERFORM ROUTINE TRADE ACTIVITIES

- Interpret information found on a set of drawings
- Convert between orthographic and isometric projections
- Identify codes, standards and organizations
- Describe code implications
- Interpret CSA B52 code requirements for refrigerants, receivers and pressure testing
- Complete the CFC/HCFC/HFC control training program
- Describe manufacturer and supplier documentation
- Source manufacturer documentation
- Describe record management
- Describe refrigerants
- Describe compressed gases

- Describe compressors, evaporators and condensers
- Identify metering devices
- Describe valves
- Describe the installation of valves

LINE D: USE COMMUNICATION TECHNIQUES

- Describe effective communication practices

LINE E: APPLY ELECTRICAL CONCEPTS

- Describe electrical concepts
- Solve simple problems using Ohm's and Kirchhoff's laws
- Describe single phase and three phase power supplies
- Identify transformers
- Describe switches and relays
- Interpret electrical diagrams
- Describe common faults
- Describe single phase motors
- Describe three phase motors
- Describe motor protection
- Describe control systems
- Describe wiring components
- Describe conductor installation
- Describe wire termination

LINE F: APPLY REFRIGERATION AND AIR CONDITIONING THEORY

- Describe heat pumps
- Describe basic refrigeration systems
- Describe the PE chart in relation to refrigeration cycles
- Describe factors that limit performance

LINE G: PLAN REFRIGERATION AND AIR CONDITIONING INSTALLATIONS

- Describe work site preparation
- Describe material handling
- Describe piping design
- Describe medium temperature refrigeration systems
- Describe equipment placement

LINE H: INSTALL REFRIGERATION AND AIR CONDITIONING INSTALLATIONS

- Describe the installation of medium temperature systems

PRACTICAL

LINE A: PERFORM SAFETY RELATED FUNCTIONS

- Manage workplace hazards
- Use WHMIS
- Use (and maintain) personal protective equipment (PPE) and safety equipment
- Use lock-out and tag-out procedures
- Select fire extinguishers for class of fire and relevant condition

LINE B: USE TOOLS AND EQUIPMENT

- Use hand and levelling tools
- Use power tools
- Use air-fuel and oxy-fuel equipment to braze and solder
- Use charging, evacuation and recovery tools
- Use precision measuring tools
- Use temperature measuring instruments
- Use leak detectors
- Use electrical test meters
- Use ladders
- Use hoisting, lifting and rigging equipment
- Use electronic devices

LINE C: PERFORM ROUTINE TRADE ACTIVITIES

- Apply formulas
- Perform conversions and heat load calculations
- Calculate piping measurements and offsets
- Use drafting symbols, lettering and line conventions
- Create an isometric drawing of a basic orthographic piping arrangement
- Use pressure enthalpy (PE) charts
- Apply sealants

- Apply adhesives
- Select brackets, fasteners and hangers

LINE E: APPLY ELECTRICAL CONCEPTS

- Install relays
- Sketch a series and parallel circuit
- Troubleshoot simple circuits
- Disassemble and reassemble single and three phase motors

LINE F: APPLY REFRIGERATION AND AIR CONDITIONING THEORY

- Create a flow diagram for a heat pump

LINE H: INSTALL REFRIGERATION AND AIR CONDITIONING INSTALLATIONS

- Prepare, join and install piping and tubing
- Install control systems

LINE L: SERVICE REFRIGERATION AND AIR CONDITIONING SYSTEMS

- Maintain system components and consumables

Supervisor Signature

NOTES FROM LEVEL 1

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LEVEL 2

IMPORTANT!

Download the Program Outline!

<https://skilledtradesbc.ca/refrigeration-air-conditioning-mechanic>

Read the competency tables

Some competencies are taught in many levels

For detailed information about that competency, go to the Program Outline

THEORY

LINE C: PERFORM ROUTINE TRADE ACTIVITIES

- Identify environmental agencies associated with system drainage
- Interpret B52 code requirements for field assembly and testing
- Interpret B52 code requirements for Class T machinery rooms
- Apply manufacturer's and supplier documentation
- Describe documentation responsibilities
- Describe lubrication systems
- Describe the installation of valves

LINE E: APPLY ELECTRICAL CONCEPTS

- Describe millivolt circuits
- Describe proportional control operation
- Identify resistors
- Describe variable resistors
- Describe PLC ladder logic
- Interpret electrical diagrams
- Identify causes of motor failure
- Describe refrigeration control applications

LINE F: APPLY REFRIGERATION AND AIR CONDITIONING THEORY

- Describe the properties of air
- Interpret a psychrometric chart
- Describe fan laws and performance curves
- Describe air filtration and purification systems
- Describe air-to-air heat exchangers
- Describe multi-temperature systems
- Describe water chilled systems
- Describe food preservation and storage
- Describe insulation requirements

LINE G: PLAN REFRIGERATION AND AIR CONDITIONING INSTALLATIONS

- Describe low temp refrigeration systems
- Describe equipment placement

LINE H: INSTALL REFRIGERATION AND AIR CONDITIONING INSTALLATIONS

- Describe the installation of low temperature systems

LINE I: APPLY GAS UTILIZATION THEORY

- Describe methods of combustion air supply
- Describe draft
- Describe the building as a system
- Describe the applications and installation of mechanical safety devices

LINE J: INSTALL GAS-FIRED SYSTEMS

- Describe piping, tubing and hoses for gas applications

LINE L: SERVICE REFRIGERATION AND AIR CONDITIONING SYSTEMS

- Identify conditions requiring more than routine maintenance

PRACTICAL

LINE B: USE TOOLS AND EQUIPMENT

- Use air measuring tools
- Use a combustible gas detector
- Use software for design and analytics

LINE C: PERFORM ROUTINE TRADE ACTIVITIES

- Create a piping installation drawing for a refrigeration system
- Analyze lubricants
- Select compressors, evaporators, and condensers
- Select metering devices
- Select accessories

LINE E: APPLY ELECTRICAL CONCEPTS

- Select single-phase transformers
- Troubleshoot walk-in freezer circuits
- Troubleshoot multiple-voltage HVAC/R circuits
- Maintain semi and hermetic compressors
- Verify motor starting and protection devices
- Verify motor installation and operation
- Select refrigeration controls
- Install electrical components

LINE F: APPLY REFRIGERATION AND AIR CONDITIONING THEORY

- Use a pressure enthalpy (PE) chart to balance components
- Calculate cooler and freezer loads

LINE G: PLAN REFRIGERATION AND AIR CONDITIONING INSTALLATIONS

- Create a field level risk assessment (FLRA)
- Select low temp refrigeration equipment
- Create a material take-off

LINE H: INSTALL REFRIGERATION AND AIR CONDITIONING INSTALLATIONS

- Create a control system material take-off
- Install control systems

LINE I: APPLY GAS UTILIZATION THEORY

- Calculate air requirements and products of combustion

LINE J: INSTALL GAS-FIRED SYSTEMS

- Select gas-fired appliances rated at 400 MBH or less

LINE L: SERVICE REFRIGERATION AND AIR CONDITIONING SYSTEMS

- Service refrigeration systems
- Maintain refrigeration control systems
- Service refrigeration control systems

Supervisor Signature

NOTES FROM LEVEL 2

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LEVEL 3

IMPORTANT!

Download the Program Outline!

<https://skilledtradesbc.ca/refrigeration-air-conditioning-mechanic>

Read the competency tables

Some competencies are taught in many levels

For detailed information about that competency, go to the Program Outline

THEORY

LINE B: USE TOOLS AND EQUIPMENT

- Describe remote monitoring

LINE C: PERFORM ROUTINE TRADE ACTIVITIES

- Describe the purpose of the B149.1 Gas Code
- Describe contractual documents
- Describe quote preparation
- Explain capacity control

LINE E: APPLY ELECTRICAL CONCEPTS

- Describe electronic principles
- Identify electronic devices
- Identify electronic dc power supplies
- Describe proportional control operation
- Describe the sequence of operation for a furnace and hydronic heating system
- Describe electronically commutated motors (ECM)
- Describe variable frequency drives (VFDS)
- Describe building automation systems

LINE F: APPLY REFRIGERATION AND AIR CONDITIONING THEORY

- Describe heat pumps
- Describe system configurations
- Describe variable refrigerant flow systems
- Describe defrost systems
- Describe the operation of hydronic heating systems
- Describe multi-boiler hydronic heating system components
- Describe low pressure steam systems
- Describe the installation of a propane refrigerator

LINE G: PLAN REFRIGERATION AND AIR CONDITIONING INSTALLATIONS

- Describe HVAC equipment placement

LINE H: INSTALL REFRIGERATION AND AIR CONDITIONING INSTALLATIONS

- Describe the installation of HVAC systems

LINE I: APPLY GAS UTILIZATION THEORY

- Describe types of alternate fuels for appliances under 400MBH (120KW)
- Describe the applications of alternate fuel appliances under 400MBH (120KW)
- Describe the installations of dual-fuel appliances under 400MBH (120KW)

LINE J: INSTALL GAS-FIRED SYSTEMS

- Describe various burners
- Describe the operation of atmospheric burners
- Describe burner orifices
- Describe the installation of mechanical burners
- Describe flame detectors
- Describe ignition systems

- Describe the operation of standing pilot/thermocouple systems
- Describe regulators
- Describe the operation of gas valve trains for appliances rated at 400MBH or less
- Describe the purpose and operation of gas pressure regulators
- Describe the installation of outdoor reset controls
- Describe multi-boiler hydronic heating system components
- Describe the installation of venting materials
- Describe the installation of mechanical venting systems

LINE M: SERVICE GAS-FIRED APPLIANCES AND EQUIPMENT

- Describe the service procedures for distribution piping
- Describe the procedures for inspecting ancillary equipment
- Describe the procedures for inspecting boilers
- Describe the procedures for inspecting ancillary equipment
- Describe troubleshooting procedures for flame safe guards
- Describe troubleshooting procedures for combination gas valves

PRACTICAL

LINE B: USE TOOLS AND EQUIPMENT

- Perform air conditioning load calculations
- Perform psychrometric calculations

LINE C: PERFORM ROUTINE TRADE ACTIVITIES

- Use gas regulations
- Select heat exchangers
- Service metering devices

LINE E: APPLY ELECTRICAL CONCEPTS

- Design a wire diagram for a hydronic heating system
- Create a control narrative from a wiring diagram for a hydronic system
- Select programmable logic controls (PLCs)

LINE F: APPLY REFRIGERATION AND AIR CONDITIONING THEORY

- Plot psychrometric processes
- Analyze fan systems
- Calculate heat gain and heat loss
- Select pumps
- Calculate volumetric thermal expansion

LINE G: PLAN REFRIGERATION AND AIR CONDITIONING INSTALLATIONS

- Select HVAC equipment
- Verify HVAC system parameters and requirements
- Create a HVAC material take-off

LINE H: INSTALL REFRIGERATION AND AIR CONDITIONING INSTALLATIONS

- Create a control system material take-off
- Install HVAC control systems

LINE J: INSTALL GAS-FIRED SYSTEMS

- Select valves
- Install boilers
- Install air heating appliances

LINE K: COMMISSION SYSTEMS

- Commission HVAC/R systems
- Perform start-up checks
- Verify operating parameters

LINE L: SERVICE REFRIGERATION AND AIR CONDITIONING SYSTEMS

- Service HVAC systems
- Maintain HVAC control systems
- Maintain pneumatic control systems
- Service HVAC control systems

Supervisor Signature

NOTES FROM LEVEL 3

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LEVEL 4

IMPORTANT!

Download the Program Outline!

<https://skilledtradesbc.ca/refrigeration-air-conditioning-mechanic>

Read the competency tables

Some competencies are taught in many levels

For detailed information about that competency, go to the Program Outline

THEORY

LINE C: PERFORM ROUTINE TRADE ACTIVITIES

- Interpret codes, rules and regulations applicable to the Gasfitter B certification
- Describe commissioning documentation
- Describe equipment handover

LINE D: USE COMMUNICATION TECHNIQUES

- Describe effective communication practices

LINE E: APPLY ELECTRICAL CONCEPTS

- Describe three phase motor starters
- Describe electronic refrigerant monitoring devices
- Describe other safety monitoring devices

LINE F: APPLY REFRIGERATION AND AIR CONDITIONING THEORY

- Describe indirect systems
- Describe ultra-low temp systems
- Describe absorption systems
- Describe ammonia systems

LINE J: INSTALL GAS-FIRED SYSTEMS

- Describe manual shut-off valves installation
- Describe gas pressure regulator installation
- Describe the installation of regulator venting
- Describe limits, interlocks and operating controls
- Describe installation of passive air supply systems
- Describe the installation of mechanical air supply systems
- Describe the installation of draft control systems
- Describe propane storage systems
- Describe the requirements for the installation of propane cylinder/tank storage systems
- Describe the inspection of propane cylinder/tanks
- Describe propane cylinder/tank installation

LINE K: COMMISSION SYSTEMS

- Describe purging procedures for pipe 4 inch diameter and larger
- Describe factors to consider when starting up a system
- Describe NOx
- Describe the removal of gas-fired appliances

LINE M: SERVICE GAS-FIRED APPLIANCES AND EQUIPMENT

- Describe the service procedures for distribution piping
- Describe the procedures for servicing gas burners
- Describe boiler maintenance procedures
- Describe service requirements of gas-fired air heating appliances
- Describe the servicing procedures for fuel/air delivery systems
- Describe service and repair procedures for control systems
- Describe the maintenance of gas-fired refrigeration equipment

PRACTICAL

LINE C: PERFORM ROUTINE TRADE ACTIVITIES

- Apply Section 7 of the B149.1 Gas Code
- Interpret and apply the Canadian Electrical Code

LINE D: USE COMMUNICATION TECHNIQUES

- Use mentoring techniques

LINE E: APPLY ELECTRICAL CONCEPTS

- Troubleshoot complex circuits
- Perform ECM motor testing
- Perform voltage and current imbalance testing
- Select control point instrumentation

LINE J: INSTALL GAS-FIRED SYSTEMS

- Size piping and tubing systems, low pressure and 2 psig (14 kPa)
- Size regulators
- Size passive air supply systems
- Size venting
- Appliance natural gas and propane conversion
- Plan a residential gas piping installation
- Create commissioning documentation for a high efficiency furnace and a condensing boiler

LINE K: COMMISSION SYSTEMS

- Commission regulators
- Use gas metering devices
- Commission a storage type water heater with a standing pilot and atmospheric burner
- Commission a high efficiency furnace

- Perform flue gas analysis
- Adjust a barometric draft regulator
- Transfer appliance operation to end user

LINE L: SERVICE REFRIGERATION AND AIR CONDITIONING SYSTEMS

- Service hydronic systems
- Service cooling towers
- Maintain DDC control systems
- Service DDC control systems

Supervisor Signature

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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:
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:

Level 3

Date Completed:	Training Provider:
Mark:	Instructor:

Level 4

Date Completed:	Training Provider:
Mark:	Instructor:

COMPLETION REQUIREMENTS

Instructions

Keep a record of each program completion requirement achieved.

REFRIGERATION AND AIR CONDITIONING MECHANIC

- Level 1 - Technical Training
- Level 2 - Technical Training
- Level 3 - Technical Training
- Level 4 - Technical Training

- 6,210 Work-Based Training Hours

- Interprovincial Red Seal examination
- Recommendation for Certification signed by sponsor

Note: After all other completions requirements have been met, SkilledTradesBC 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

*If you have any questions, please contact SkilledTradesBC
Customer Service at customerservice@skilledtradesbc.ca
778-328-8700 or toll free (within BC) at 1-800-660-6011*