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OFFICIAL PROGRAM STANDARDS NOTIFICATION (OPSN)

**Issued: February 20, 2019**

**Program: Refrigeration and Air Conditioning Mechanic**

**To:** ITA Training Providers
Articulation Chair
System Liaison Person
School Districts

**Subject:** **Refrigeration and Air Conditioning Mechanic**

**OPSN No.:** **OPSN 2019 001**

**Effective Date:** **December 1, 2019**

**Summary of Change:** Please be advised that changes have occurred to the Refrigeration and Air-Conditioning Mechanic program as a result of the Pan-Canadian Harmonization Initiative. The Harmonized program will be implemented effective December 1, 2019.

The program changes are as follows:

- Refrigeration and Air Conditioning Mechanic Program Outline Update
- Reduction of Work-based Training Hours – 6,210 hours (from 7,220 hours)
- 5-week duration increase for the **Harmonized Refrigeration and Air Conditioning Mechanic Program**:
  - Level 1 – 180 hours, 6 weeks (no change)
  - Level 2 – 210 hours, 7 weeks (from 180 hours, 6 weeks)
  - Level 3 – 300 hours, 10 weeks (from 240 hours, 8 weeks)
  - Level 4 – 300 hours, 10 weeks (from 240 hours, 8 weeks)

The Harmonized Refrigeration and Air Conditioning Mechanic Program Outline and Program Profile have been posted on the Refrigeration and Air Conditioning Mechanic webpage at www.itabc.ca.

Also, be aware that Training Providers are subject to review by Technical Safety BC (formerly BC Safety Authority) and must be compliant with Technical Safety BC's program approval requirements to deliver Gasfitter – Class B training as per the Safety Standards Act. Further information can be found at www.technicalsafetybc.ca.

Please see OPSN 2018 002.1 for changes to the Gasfitter – Class B program.

**Rationale:** At the request of industry, the Canadian Council of Directors of Apprenticeship's (CCDA) Harmonization Initiative was launched in Fall 2013, and endorsed by the Forum of Labour Market Ministers (FLMM) in 2014. The goal of Harmonization is to *substantively align* apprenticeship systems across Canada by making apprenticeship

training requirements more consistent in Red Seal trades.

In consultation with stakeholders, the CCDA identified four Harmonization priorities: trade name, total training hours (in-school plus on-the-job), number of training levels, and the sequencing of the training content.

Refrigeration and Air Conditioning Mechanic is one of five trades identified for the fourth phase of Harmonization. After a series of consultations and pan-Canadian webinars, the finalized priorities for the Harmonized Refrigeration and Air Conditioning Mechanic program were as follows:

1. Use of the Red Seal **trade name** – Refrigeration and Air Conditioning Mechanic
    - *BC – will no longer use Refrigeration Mechanic.*
2. Consistent **total training hours** (in-school plus on-the-job) – 7,200 hours total
    - *BC – Technical training will increase from 840 hours (28 weeks) to 990 hours (33 weeks), and Work-based Training is reduced from 7,220 hours to 6,210 hours.*
3. Same number of **training levels** – 4-level program
    - *BC – no change.*
4. Consistent **sequencing** of training content
    - *BC – Minor changes required to align to the Harmonized sequencing.*

**Details:**

A Refrigeration and Air Conditioning Mechanic program review was conducted in November 2018 to align BC's Refrigeration and Air Conditioning program to the Harmonized sequencing. The review resulted in changes to the current sequence of technical training.

ITA will identify transition strategies for apprentices in the current program and invite training providers to participate in webinars beginning in mid-February.

ITA is also working on a communication plan to inform apprentices and employer sponsors of the changes to the program.

**Attachments:**

***Refrigeration and Air Conditioning Mechanic Program Outline Review Details***
This attachment provides details of the revisions made to the Refrigeration and Air Conditioning Mechanic Program Outline during the review process.

**For more information contact:**

ITA Program Standards
programstandards@itabc.ca

**cc:**

All Staff

# REFRIGERATION AND AIR CONDITIONING MECHANIC COMPETENCY MIGRATION CHART

| LINE | NEW COMPETENCY TITLES | New Level | Current Level | LINE | PREVIOUS COMPETENCY TITLES | Gap/ Overlap | Notes |
|---|---|---|---|---|---|---|---|
| **LINE A** | **PERFORM SAFETY RELATED FUNCITONS** | **1** | **1** | **LINE A** | **USE SAFE WORK PRACTICES** | | |
| A1 | Maintains Safe Work Environment | 1 | 1 | A1<br>A2<br>A3 | Control Workplace Hazards<br>Use Information in the WorkSafe BC OHS Regulations<br>Use WHMIS | Aligned | |
| A2 | Use Personal Protective Equipment (PPE) and Safety Equipment | 1 | 1 | A2 | Use Personal Protective Equipment | Aligned | |
| A3 | Perform Lock-Out and Tag-Out Procedures | 1 | 1 | A1 | Control Workplace Hazards | Aligned | |
| A4 | Practice Fire Prevention | 1 | 1 | A5 | Practice Fire Prevention | Aligned | |
| **LINE B** | **USE TOOLS AND EQUIPMENT** | **1/2/3** | **1/2/3** | **LINE B** | **USE TOOLS AND EQUIPMENT** | | |
| B1 | Use Hand Tools and Equipment | 1 | 1 | B1 | Use Hand Tools | Aligned | |
| B2 | Use Portable and Stationary Power Tools | 1 | 1 | B2 | Use Power Tools | Aligned | |
| B3 | Use Brazing and Soldering Equipment | 1 | 1 | B4 | Use Cutting, Brazing and Soldering Equipment | Aligned | |
| B4 | Use Charging, Evacuation and Recovery Tools | 1 | 1 | B7 | Use Charging, Evacuation and Recovery Tools | Aligned | |
| B5 | Use Diagnostic and Measuring Tools and Equipment | 1/2 | 1 | B7 | Use Charging, Evacuation and Recovery Tools | Aligned | |
| B6 | Use Access Equipment | 1 | 1 | B5 | Use Access Equipment | Aligned | |
| B7 | Use Rigging, Hoisting, Lifting and Positioning Equipment | 1 | 1 | B6 | Use Rigging, Hoisting and Lifting Equipment | Aligned | |
| B8 | Use Digital Technology | 1/2/3 | 1/2/3 | B8 | Use Computers | Aligned | Learning tasks updated in each level to reflect current technology |
| **LINE C** | **PERFORM ROUTINE TRADE ACTIVITIES** | **1/2/3/4** | **1/2/4** | **LINE C** | **ORGANIZE WORK** | | |
| C1 | Apply Mathematics and Science | 1 | 1 | C1<br>C2 | Use Trade Related Mathematics<br>Use Trade Related Science | Aligned | |
| C2 | Interpret Drawings and Specifications | 1/2 | 1 | C3 | Read Drawings and Specifications | Overlap | |
| C3 | Use Codes, Regulations and Standards | 1/2/3/4 | 1/2/4 | C4 | Use Codes, Regulations and Standards | Gap CL3→HL4 | See transition plan |
| C4 | Use Manufacturer and Supplier Documentation | 1/2 | 1 | C5 | Develop Communication Skills | Overlap | |
| C5 | Organize Work and Maintain Records | 1/2/3/4 | 1<br>1 | C5<br>C6 | Develop Communication Skills<br>Plan a Project | Overlap | |
| C6 | Select Refrigerants, Compressed Gases and Oils | 1/2 | 1<br>2 | D1<br>D2 | Use of Refrigerants<br>Use of Lubricants | Aligned | |
| C7 | Apply Sealants and Adhesives | 1 | | | Context all levels | Aligned | |
| C8 | Select HVAC/R Components and Accessories | 1/2/3 | 1/2<br>1/2<br>1/2/3<br>2/3 | D3<br>D4<br>D5<br>D6<br>D7 | Describe Compressors<br>Describe Evaporators<br>Describe Condensers<br>Use Metering Devices<br>Describe Accessories | Aligned | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| C9 | Select Fasteners, Brackets and Hangers | 1 | | | Context all levels | Aligned | |
| C10 | Install Valves | 1/2 | 2/3 | D7 | Describe Accessories | Aligned | |
| **LINE D** | **USE COMMUNICATION TECHNIQUES** | **1/4** | | **LINE C** | **ORGANIZE WORK** | | |
| D1 | Use Communication Techniques | 1/4 | 1 | C5 | Develop Communication Skills | New HL4 | Was contextual |
| D2 | Use Mentoring Techniques | 4 | | | | New HL4 | Was contextual |
| **LINE E** | **APPLY ELECTRICAL CONCEPTS** | **1/2/3/4** | **1/2/3/4** | **LINE E** | **APPLY ELECTRICAL CONCEPTS** | | |
| E1 | Use the Principles of Electricity and Electronics | 1/2/3 | 1/2/4<br>3 | E1<br>E5 | Apply Basic Electrical Concepts<br>Apply Electronic Concepts | Aligned | |
| E2 | Use Electrical Wiring Diagrams and Schematics | 1/2/3/4 | 1/4 | E2 | Use Electrical Wiring Diagrams and Schematics | Aligned | |
| E3 | Apply Motor and Motor Control Theory | 1/2/3/4 | 1/2/3<br>1/2/3/4 | E3<br>E4 | Apply Single Phase Motor Theory<br>Apply Three Phase Motor Theory | Minor gap<br>CL3→HL4 | See transition plan |
| E4 | Select Control Systems | 2/3/4 | 3 | E6 | Describe Control Technology | Aligned | |
| E5 | Apply Wiring Practices | 1/2/3/4 | | | Context all levels | Aligned | |
| **LINE F** | **APPLY REFRIGERATION AND AIR CONDITIONING THEORY** | **1/2/3/4** | **1/2/3/4** | **LINE F** | **PLAN AND INSTALL REFRIGERATION AND AIR CONDITIONING SYSTEMS** | | |
| F1 | Analyze Heat Pumps and Air Conditioning Systems | 1/2/3 | 2/3 | F1 | Analyze Heat Pumps and Air Conditioning Systems | Minor gap<br>CL1→HL2 | Introduction added to HL1, will be reviewed again in HL2 if missed. |
| F2 | Analyze Refrigeration Systems | 1/2/3/4 | 1/2/3/4 | F2 | Analyze Refrigeration Systems | Aligned | |
| F3 | Apply Food Storage Theory | 2 | 2 | F3 | Apply Food Storage Fundamentals | Aligned | |
| F4 | Analyze Hydronic Systems | 3 | 3 | F7 | Analyze Hydronic Systems | Aligned | |
| **LINE G** | **PLAN REFRIGERATION AND AIR CONDITIONING INSTALLATION** | **1/2/3** | **1/2<br>2/3** | **LINE C<br>LINE F** | **ORGANIZE WORK<br>PLAN AND INSTALL REFRIGERATION AND AIR CONDITIONING SYSTEMS** | | |
| G1 | Perform Work Site Preparation | 1/2 | 1/2 | C6 | Plan a Project | Aligned | |
| G2 | Plan HVAC/R System Installation | 1/2/3 | 2/3 | F4 | Install Heat Pumps and Air Conditioning Systems | Aligned | |
| **LINE H** | **INSTALL REFRIGERATION AND AIR CONDITIONING SYSTEMS** | **1/2/3** | **1/2/3/4** | **LINE F** | **PLAN AND INSTALL REFRIGERATION AND AIR CONDITIONING SYSTEMS** | | |
| H1 | Install HVAC/R Piping and Tubing | 1 | 1/3 | F6 | Install Piping and Tubing | Aligned | |
| H2 | Install HVAC/R Systems | 1/2/3 | 2/3 | F4<br><br>F5 | Install Heat Pumps and Air Conditioning Systems and Accessories<br>Install Refrigeration Systems and Accessories | Aligned | |
| H3 | Install Control Systems | 1/2/3 | 3 | F8 | Install Control Systems | Aligned | |
| **LINE I** | **APPLY GAS UTILIZATION THEORY** | **2/3** | **4** | **LINE F** | **PLAN AND INSTALL REFRIGERATION AND AIR CONDITIONING SYSTEMS** | | |
| I1 | Apply Combustion Theory | 2 | 4 | F9 | Apply Gas B Theory | Gap CL2 → HL3 | See transition plan |
| I2 | Apply Draft Theory | 2 | | | | Gap CL2 → HL3 | See transition plan |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| I3 | Apply Alternate Fuel Theory | 3 | | | | Gap CL3 → HL4 | See transition plan |
| I4 | Apply Knowledge of Mechanical Safety Devices | 2 | | | | Gap CL2 → HL3 | See transition plan |
| **LINE J** | **INSTALL GAS-FIRED SYSTEMS** | **2/3/4** | **4** | **LINE F** | **PLAN AND INSTALL REFRIGERATION AND AIR CONDITIONING SYSTEMS** | | |
| J1 | Identify Burners | 3 | 4 | F9 | Apply Gas B Theory | Gap CL3 → HL4 | See transition plan |
| J2 | Identify Flame Safeguards | 3 | | | | Gap CL3 → HL4 | See transition plan |
| J3 | Install Gas Piping and Tubing Systems | 2/4 | | | | Gap CL2 → HL3 | See transition plan |
| J4 | Install Gas Regulators, Valves and Valve Train Components | 3/4 | | | | Gap CL3 → HL4 | See transition plan |
| J5 | Install Gas Controls | 3/4 | | | | Gap CL3 → HL4 | See transition plan |
| J6 | Install Air Supply Systems | 4 | | | | Aligned | |
| J7 | Install Gas Venting Systems | 3/4 | | | | Gap CL3 → HL4 | See transition plan |
| J8 | Install Draft Control Systems | 4 | | | | Aligned | |
| J9 | Install Gas-Fired Appliances and Ancillary Equipment | 2/3 | | | | Gap CL2 → HL3<br>Gap CL3 → HL4 | See transition plan |
| J10 | Install LPG, LNG, CNG, Vapourizing and Mixing Systems | 4 | | | | Aligned | |
| J11 | Plan Gas-Fired Appliance System Installations | 4 | | | | Aligned | |
| **LINE K** | **COMMISSION SYSTEMS** | **3/4** | **3** | **LINE G**<br>**LINE F** | **COMMISSION REFRIGERATION AND AIR CONDITIONING SYSTEMS**<br>**PLAN AND INSTALL REFRIGERATION AND AIR CONDITIONING SYSTEMS** | | |
| K1 | Commission HVAC/R Systems | 3 | 3 | G1<br>G2<br>G3 | Perform System Pre-start-up Checks<br>Start Up Heat Pumps and Air Conditioning Systems<br>Start Up Refrigeration Systems | Aligned | |
| K2 | Commission Control Systems | 3 | 3 | | Context | Aligned | |
| K3 | Commission Fuel/Air Delivery Systems | 4 | 4 | F9 | Apply Gas B Theory | Aligned | |
| K4 | Commission Gas-Fired Appliances and Ancillary Equipment | 4 | | | | | |
| K5 | Perform Combustion Analysis | 4 | | | | | |
| K6 | Commission Draft Control Systems | 4 | | | | | |
| K7 | Training and Handover of Gas-Fired Equipment | 4 | | | | | |
| K8 | Decommission and Disconnect Appliance and Equipment | 4 | | | | | |

| LINE L | SERVICE REFRIGERATION AND AIR CONDITIONING SYSTEMS | 1/2/3/4 | 2/3/4 | LINE H | MAINTAIN AND SERVICE REFRIGERATION AND AIR CONDITIONING SYSTEMS | | |
|---|---|---|---|---|---|---|---|
| L1 | Maintain HVAC/R Systems | 1/2 | 2/3 | H1 | Maintain HVAC and Refrigeration Systems | Aligned | |
| L2 | Service HVAC/R Systems | 2/3/4 | 2/3 | H2 | Service and Repair HVAC and Refrigeration Systems | Overlap | |
| L3 | Maintain Control Systems | 2/3/4 | 4 | H3 | Maintain Control Systems | Aligned | |
| L4 | Service Control Systems | 2/3/4 | 4 | H4 | Service and Repair Control Systems | Aligned | |
| **LINE M** | **SERVICE GAS-FIRED APPLIANCES AND EQUIPMENT** | **3/4** | **4** | **LINE F** | **PLAN AND INSTALL REFRIGERATION AND AIR CONDITIONING SYSTEMS** | | |
| M1 | Service Gas Distribution Systems | 3/4 | 4 | F9 | Apply Gas B Theory | Gap CL3 → HL4 | See transition plan |
| M2 | Service Gas Burners and Ancillary Equipment | 3/4 | | | | | |
| M3 | Maintain Gas-Fired Appliances, Boilers and Ancillary Equipment | 3/4 | | | | | |
| M4 | Service Fuel/Air Delivery Systems | 4 | | | | | |
| M5 | Service and Repair Control Systems | 3/4 | | | | | |
| M6 | Maintain Gas-Fired Refrigeration Equipment | 4 | | | | | |

| REFRIGERATION AND AIR CONDITIONING MECHANIC ACHIEVEMENT CRITERIA COMPARISION BY LEVEL (*PRACTICALS)* | | | |
|---|---|---|---|
| **HARMONIZED LEVEL 1** | **CURRENT LEVEL 1** | **HARMONIZED LEVEL 2** | **CURRENT LEVEL 2** |
| WHMIS (new) | | Measure and calculate velocity and volume (moved from CL3) | |
| Lock-out & tag-out (new) | | Use air measuring tools (new) | |
| Brazing and soldering | Braze and solder | Create a piping installation drawing for a refrigeration system | Plan an installation from drawings and specifications including materials and project costs |
| Evacuation and refrigerant recovery | Evacuation and refrigerant recovery | Read values and plot points using a psychrometric chart | Read values and plot points using a psychometric chart |
| Iso from an ortho | Iso from an ortho | Plot PE chart (was done but not assessed as a practical previously) | |
| CFC/HCFC/HFC Control Course | CFC/HCFC/HFC Control Course | Create a material take off for a refrigeration system (from drawing in C2) | Plan an installation from drawings and specifications including materials and project costs |
| Wire a relay (new) | | | |
| Disassemble/reassemble single phase motor | Disassemble/reassemble single phase motor | | |
| Prepare, join and install pipe | Install a piping project | | |
| | Oxy-acetylene steel cutting | | |
| **HARMONIZED LEVEL 3** | **CURRENT LEVEL 3** | **HARMONIZED LEVEL 4** | **CURRENT LEVEL 4** |
| Design a wire diagram for a high-temp 4 zone hydronic heating system;<br>Create a control narrative from wiring diagrams (new) | | Solve problems using the CEC | Solve problems using the CEC |
| | Measure and calculate velocity and volume (now in HL2) | Plan a layout of a residential gas piping installation;<br>Create post-commissioning paper work for a high efficiency furnace and condensing boiler (new) | |
| | | Commission a condensing boiler;<br>Commission a high efficiency furnace (new) | |