

# Refrigeration and Air Conditioning Mechanic

**Transition Plan**

Updated December 2022

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## Abbreviations

<b>CCDA</b>	Canadian Council of Directors of Apprenticeship
<b>CL</b>	Current level
<b>DA</b>	Direct Access (SkilledTradesBC's registration system)
<b>ER</b>	Employer sponsor
<b>HL</b>	Harmonized level
<b>IPSE</b>	Interprovincial Red Seal Exam
<b>NOA</b>	Red Seal National Occupational Analysis
<b>RACM</b>	Refrigeration and Air Conditioning Mechanic
<b>RSOS</b>	Red Seal Occupational Standard; replaces NOA
<b>SLE</b>	Standardized Level Exam
<b>TP</b>	Training provider
<b>TT</b>	Technical training
<b>TW</b>	Trade worker
<b>WBT</b>	Work-based training

## Harmonization Overview

The Canadian Council of Directors of Apprenticeship (CCDA) is responsible for the Red Seal Program, which develops common interprovincial standards and examinations. The CCDA is undertaking the Harmonization Initiative in 30 Red Seal trades by 2020. British Columbia is an active participant in this initiative.

The goal is to substantively align apprenticeship systems across Canada by making apprenticeship training requirements more consistent in the Red Seal trades.

### Harmonization Priorities

1. Use of Red Seal trade name
2. Consistent total training hours (in-school and on-the-job)
3. Same number of training levels
4. Consistent sequencing of training content, including use of most recent Red Seal Occupational Standard (RSOS).

### HARMONIZATION: What's changing for

#### Refrigeration and Air Conditioning Mechanic (Refrigeration Mechanic)

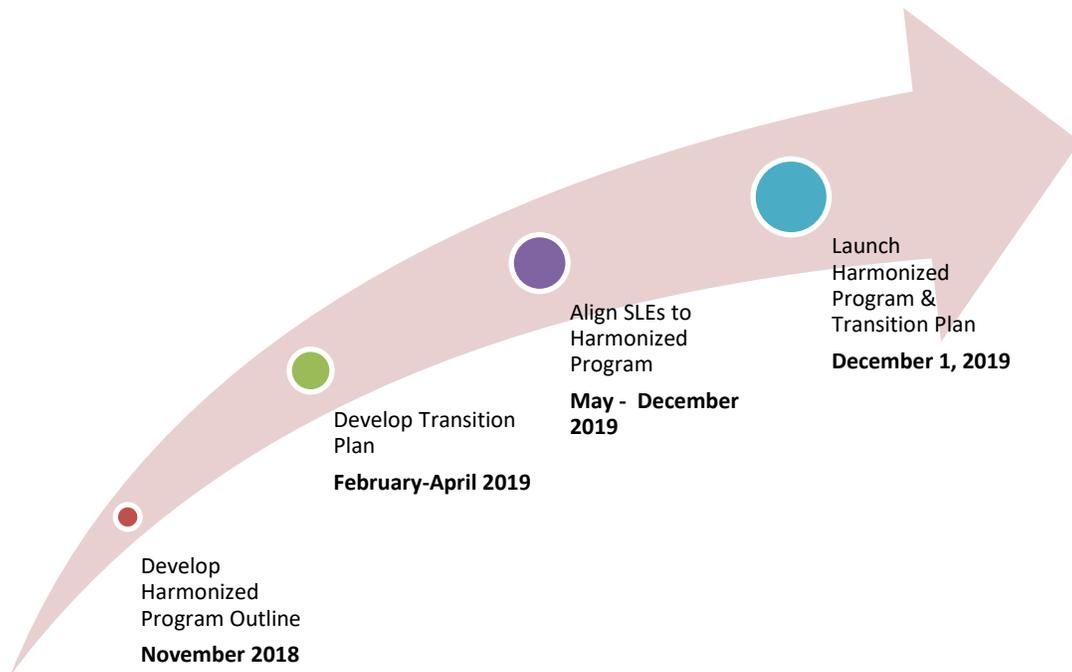
	Changing in BC?	What will it be?
<b>TRADE NAME</b>	<b>YES</b>	<b>Refrigeration and Air Conditioning Mechanic</b>
<b>NUMBER OF TRAINING LEVELS</b>	<b>NO</b>	<b>4</b>
<b>TOTAL HOURS</b> technical + work-based training	<b>YES</b>	<b>7,200 hours</b> Decrease by 860
<b>TRAINING SEQUENCE</b> order of subjects taught	<b>YES</b>	<b>Some changes to sequence</b>

## Transition Planning Process

The re-sequencing of the Refrigeration and Air Conditioning Mechanic Program (RACM) program through the Harmonization Initiative has resulted in some changes to the sequencing of technical training.

We consulted with the public and private post-secondary training providers that deliver the Refrigeration and Air Conditioning Mechanic program and have considered the input of our internal partners. We evaluated a few scenarios, and the transition plan outlined in this document was identified as the best option. We have also ensured that there are options for all current apprentices to complete their apprenticeship.

## Program Development and Transition Planning 2017-2018



### Training Providers (6)

British Columbia Institute of Technology (BCIT)  
Camosun College  
Okanagan College  
Refrigeration Training Institute (RTI)  
Thompson Rivers University (TRU)  
Vancouver Island University (VIU)

## Apprentice Numbers in Current Program (March 1, 2019)

Program	Status	0TT	1TT	2TT	3TT	Total
Refrigeration and Air Conditioning Mechanic	Active	361	292	254	201	<b>1108</b>
	Inactive	228	115	70	27	<b>440</b>
	<b>Total</b>	<b>589</b>	<b>407</b>	<b>324</b>	<b>228</b>	<b>1548</b>

**Notes on the numbers and estimates:**

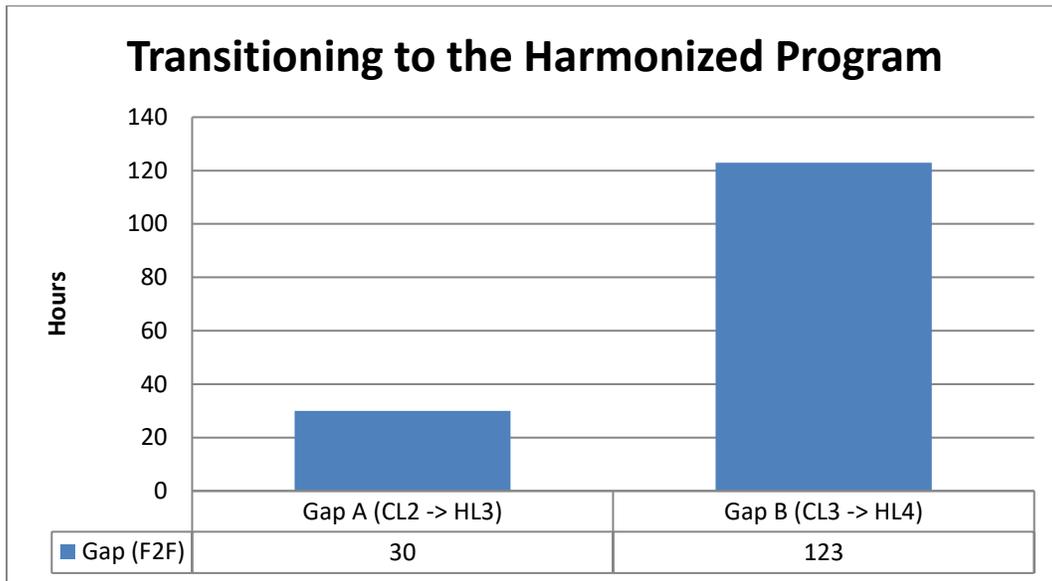
1. **Current Level 4TT** - TWs who have completed L4 TT are not considered in transition planning.
2. **Active** – apprentices for whom activity has been logged in Direct Access (DA) within the last 18 months.
3. **Inactive** – apprentices for whom **no** activity has been logged in DA within the last 18 months.

## Apprentice Numbers in Current Program (March 1, 2022)

RACM CL2s	Active	Inactive	Total	RACM CL3s	Active	Inactive	Total
NORTH	5	1	6	NORTH	2	0	2
SOUTH-EAST INTERIOR	19	12	31	SOUTH-EAST INTERIOR	29	5	34
ISLAND	23	19	42	ISLAND	21	7	28
LOWER MAINLAND	31	18	49	LOWER MAINLAND	62	15	77
OTHER	3	0	3	OTHER	4	0	4
<b>Total</b>	<b>81</b>	<b>50</b>	<b>131</b>	<b>Total</b>	<b>118</b>	<b>27</b>	<b>145</b>

**Note:** The OTTs and 1TTs from the March 2019 chart have been transitioned to the Harmonized Program. They have no gaps in training.

## The Gaps



**Gap A (CL2→HL3)** applies to a student who has completed current Level 2 and is moving into harmonized level 3.

**Gap B (CL3→HL4)** applies to a student who has completed current levels 1 - 3. The gap here is approximately **123 hours**. It is recommended that level 4 proceed as a dual stream.

**Gap** is an estimate of the hours of face-to-face instruction a student would need to complete the missing competencies if they transition to the harmonized program.

**Note:** If a TW completes their training in the current program, they will not face a gap in their training. Gaps and overlaps only apply to apprentices who miss their opportunity to train out of the current program.

**\*\*See Appendix A: Details of Gaps for a list of the missing competencies\*\***

## Transition Plan

Implementation Timelines	
Level 1/Foundation/Youth	December 1, 2019
Level 2	December 1, 2019
Level 3	December 1, 2020
Level 4	December 1, 2021

Year 0 18/19	CL1	CL2	CL3	CL4
Year 1 19/20	HL1	HL2	CL3	CL4
Year 2 20/21	HL1	HL2	<div style="background-color: #ffe0b2; padding: 2px;">HL3</div> <div style="background-color: #e8f5e9; padding: 2px;">Gap training 30 hours</div>	CL4
Year 3 21/22	HL1	HL2	<div style="background-color: #ffe0b2; padding: 2px;">HL3</div> <div style="background-color: #e8f5e9; padding: 2px;">Gap training 30 hours</div>	<div style="background-color: #ffe0b2; padding: 2px;">HL4</div> <div style="background-color: #e1f5fe; padding: 2px;">CL4</div>
Year 4 22/23	HL1	HL2	HL3	<div style="background-color: #ffe0b2; padding: 2px;">HL4</div> <div style="background-color: #e8f5e9; padding: 2px;">Gap training* 4 weeks</div>

**\*Gap Training CL3→HL4:** There will be limited intakes of online, synchronous gap training available to apprentices who have completed CL3. These intakes include

- BCIT
  - Starting April 3, 2023; September 4, 2023; January 8, 2024
  - Contact [BCIT\\_apprentice@bcit.ca](mailto:BCIT_apprentice@bcit.ca) / 604-456-8100
- Vancouver Island University (VIU)
  - February 21-March 16, 2023
  - Contact [Apprentice@viu.ca](mailto:Apprentice@viu.ca) / 250-740-6227

**Current Apprentices:** Apprentices who have completed **CL2** or **CL3** should contact their [Apprenticeship Advisor](#) to discuss options for addressing gaps in their training **before** taking their next level of technical training.

## Total Training Hours for Apprenticeship Pathway

The following changes to training time for RACM will come into effect according to the implementation timelines beginning **December 1, 2019**:

- Increased technical training hours to accommodate content added to the Gasfitter – Class B training (**increase of 30 hours at Level 2 and 60 hours at Level 3 and 4**)
- Decreased work-based training (WBT) hours to align with the harmonized standard of 7,200 hours of total training (**decrease of 1,010 hours**)

### Apprenticeship Pathway

Current Program	Hours
Technical Training	840
Level 1 = 180 hours	
Level 2 = 180 hours	
Level 3 = 240 hours	
Level 4 = 240 hours	
Work-based Training Hours	7,220
<b>Current Total Training Hours</b>	<b>8,060</b>

Harmonized Program	Hours
Technical Training	990
Level 1 = 180 hours	
<b>Level 2 = 210 hours</b>	
<b>Level 3 = 300 hours</b>	
<b>Level 4 = 300 hours</b>	
Work-based Training Hours <sup>1</sup>	6,210
<b>Harmonized Total Training Hours</b>	<b>7,200</b>

<sup>1</sup>Work Based Training Hours **do not** include the additional 1,500 hours required for the Gasfitter – Class B license from Technical Safety BC.

### Challenge Pathway and Sign-off Authority

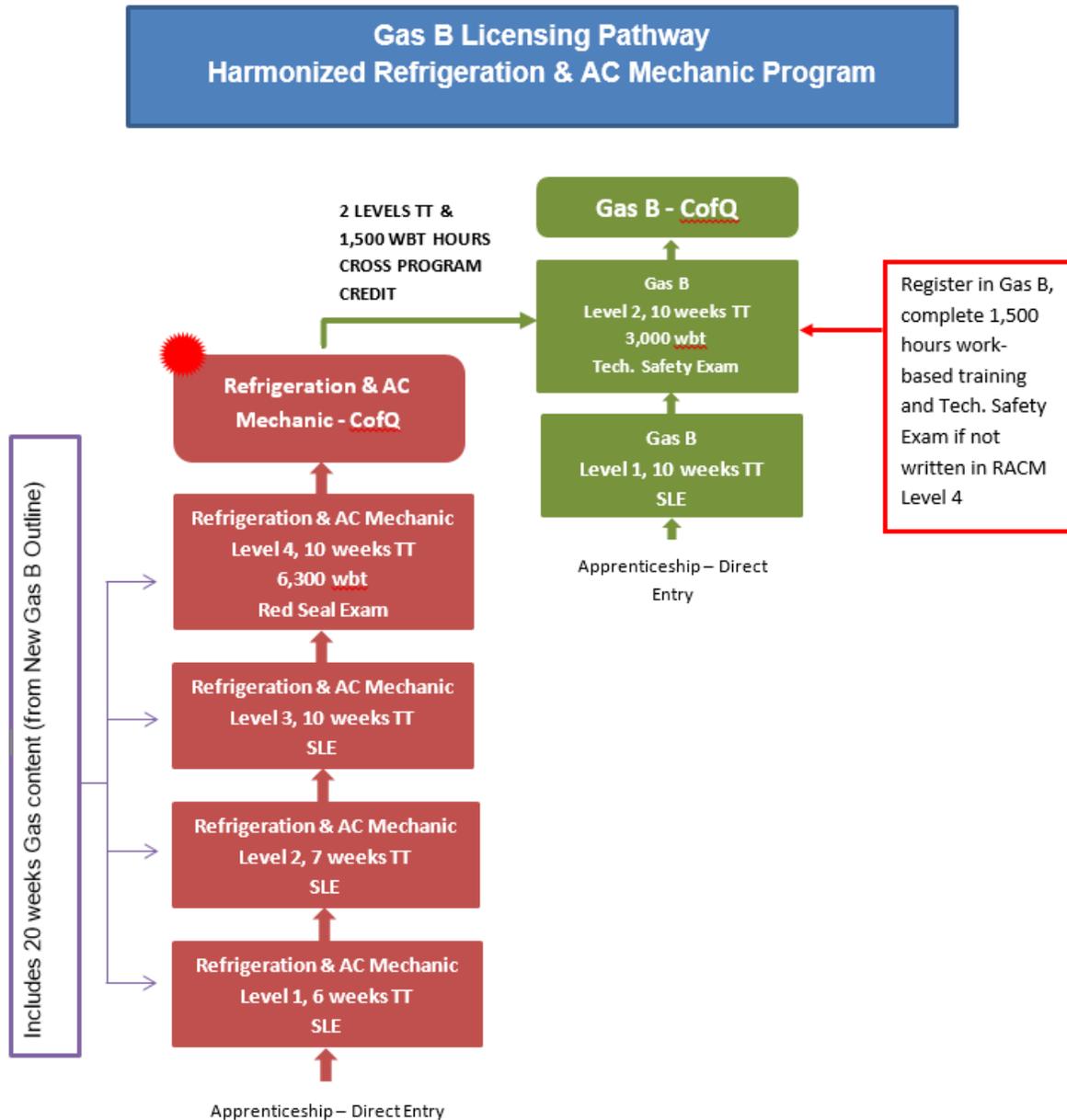
Current Program	Hours
Work-based Training Hours	7,220
Formula for Calculating Challenge WBT	X 1.5
<b>Current Challenge WBT Hours</b>	<b>10,830</b>

Harmonized Program	Hours
Harmonized Work-based Training Hours	6,210
Formula for Calculating Challenge WBT	X 1.5
<b>Harmonized Challenge WBT Hours</b>	<b>9,315</b>

**NOTE:** If TWs complete in current program, the WBT hours for that program will apply. If they transition, they will have to complete the WBT hours for the harmonized program.

## Gasfitter B Licensing Changes in BC

Refrigeration apprentices completing the Harmonized Refrigeration and AC Mechanic program will be granted Level 1 and 2 Gasfitter – Class B Technical Training and 1,500 work-based training hours toward a Gasfitter – Class B apprenticeship. To obtain the Gasfitter – Class B license apprentices will need to complete the remaining 1,500 WBT hours and write the Technical Safety BC exam if they have not written it in Level 4 of the Refrigeration program.



## Exams

### Exams for the Harmonized Program

All Standardized Level Exams (SLEs) for the Harmonized program have been implemented.

Please see the RACM trade page (<https://www.skilledtradesbc.ca/program/refrigeration-and-air-conditioning-mechanic>) for exam information.

## Appendix A: Details of Gaps

### GAP A: CL2→HL3

#### Gap (Missing Content)

This table lists the content that a student will be **missing** if they have completed CL2 and then take HL3. This is the content to be delivered in Gap Training in the selected Transition Scenario.

Competency	Missing Objectives or Learning Task	Achievement Criteria	Changes	F2F Hours
I1 Apply Combustion Theory	<ul style="list-style-type: none"> <li>• Describe methods of combustion air supply</li> <li>• Calculate air requirements and products of combustion</li> </ul>	No	New	6
I2 Apply Draft Theory	<ul style="list-style-type: none"> <li>• Describe draft</li> <li>• Describe the building as a system</li> </ul>	No	New	6
I4 Apply Knowledge of Mechanical Safety Devices	<ul style="list-style-type: none"> <li>• Describe the applications and installation of mechanical safety devices</li> </ul>	No	New	6
J3 Install Gas Piping and Tubing Systems	<ul style="list-style-type: none"> <li>• Describe piping, tubing, and hoses for gas applications</li> </ul>	No	New	6
J9 Install Gas-Fired Appliances and Ancillary Equipment	<ul style="list-style-type: none"> <li>• Select gas-fired appliances rated at 400 MBH or less</li> </ul>	No	New	6
				<b>30</b>

There is no significant overlap from CL2→HL3.

## GAP B: CL3→HL4

### Gap (Missing Content)

This table lists the content that a student will be **missing** if they have completed CL3 and then take HL4.

Competency	Missing Objectives or Learning Task	Achievement Criteria	Changes	F2F Hours
C3 Use codes, regulations and standards	<ul style="list-style-type: none"> <li>Describe the purpose of the B149.1 gas code.</li> <li>Use gas regulations.</li> </ul>	No	HL3←CL4	8
E2 Use Electrical Wiring Diagrams and Schematics	<ul style="list-style-type: none"> <li>Design a wire diagram for a high-temp 4 zone hydronic heating system</li> <li>Create a control narrative from a wiring diagram</li> </ul>	Yes	New	14
E3 Apply Motor and Motor Control Theory	<ul style="list-style-type: none"> <li>Describe variable frequency drives</li> </ul>	No	HL3←CL4	14
I3 Apply Alternate Fuel Theory	<ul style="list-style-type: none"> <li>Describe types of alternate fuels for appliances under 400MBH (120kW).</li> <li>Describe the applications of alternate fuel appliances under 400MBH (120kW).</li> <li>Describe the installation of dual-fuel appliances under 400MBH (120kW).</li> </ul>	No	HL3←CL4	6
J1 Identify Burners	<ul style="list-style-type: none"> <li>Describe various burners.</li> <li>Describe the operation of atmospheric burners.</li> <li>Describe burner orifices.</li> <li>Describe the installation of mechanical burners.</li> </ul>	No	HL3←CL4	8
J2 Identify Flames Safeguards	<ul style="list-style-type: none"> <li>Describe flame detectors.</li> <li>Describe ignition systems.</li> <li>Describe the operation of standing pilot/thermocouple systems.</li> </ul>	No	HL3←CL4	8
J4 Install Gas Regulators, Valves and Valve Train Components	<ul style="list-style-type: none"> <li>Select valves.</li> <li>Describe regulators.</li> <li>Describe the operation of gas valve trains for appliances rated at 400 MBH or less.</li> <li>Describe the purpose and operation of gas pressure regulators.</li> </ul>	No	HL3←CL4	8
J5 Install Gas Controls	<ul style="list-style-type: none"> <li>Describe the installation of outdoor reset controls.</li> <li>Describe multi-boiler hydronic heating system components.</li> </ul>	No	HL3←CL4	8
J9 Install Gas-Fired Appliances and Ancillary Equipment	<ul style="list-style-type: none"> <li>Install boilers.</li> <li>Install air heating appliances.</li> </ul>	No	HL3←CL4	8
M1 Service Gas Distribution Systems	<ul style="list-style-type: none"> <li>Describe the service procedures for distribution piping.</li> </ul>	No	HL3←CL4	7.5
M2 Service Gas Burners and Ancillary Equipment	<ul style="list-style-type: none"> <li>Describe the procedures for inspecting ancillary equipment</li> </ul>	No	HL3←CL4	7.5
M3 Maintain Gas-Fired Appliances, Boilers and Ancillary Equipment	<ul style="list-style-type: none"> <li>Describe the procedures for inspecting boilers.</li> <li>Describe the procedures for inspecting ancillary equipment.</li> </ul>	No	HL3←CL4	7.5

## RACM Transition Plan

Competency	Missing Objectives or Learning Task	Achievement Criteria	Changes	F2F Hours
M5 Service and Repair Control Systems	<ul style="list-style-type: none"> <li>Describe troubleshooting procedures for flame safe guards.</li> <li>Describe troubleshooting procedures for combination gas valves.</li> </ul>	No	HL3←CL4	7.5
				<b>112</b>

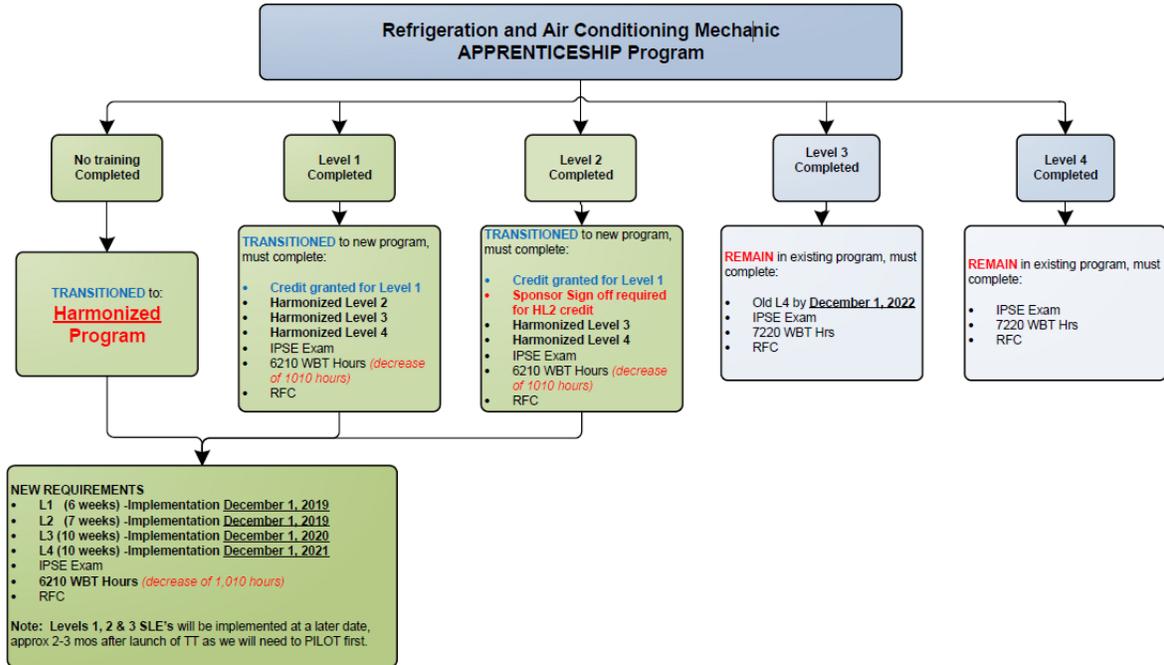
There is no significant overlap from CL3→HL4.

## Appendix B: Communication Plan for Transition

Audience	Purpose	Mode
<b>Training Providers</b>	To announce the changes to training standards and the publication of a new Program Outline and Program Profile on the trade webpage on the SkilledTradesBC website	Official Program Standards Notification (OPSN) via email and posting on trade webpage
<b>Training Providers</b>	To plan for transitioning to the new program	Webinar(s), phone calls and/or face to face meetings
<b>Training Providers</b>	To announce the final transition plan	Program Update and Transition Plan via email and posting on trade webpage
<b>Training Providers</b>	To announce the launch of the harmonized level exams	OPSN via email and posting on trade webpage
<b>Employers</b>	To inform on the upcoming changes to the program and the pathways to completion for their apprentices	Letters sent through SkilledTradesBC Direct Access (DA)
<b>Employers</b>	To inform on the upcoming changes to the program and the pathways to completion for their apprentices	Presentations at Program Advisory Committees (PAC) and other industry events
<b>Apprentices</b>	To inform on the upcoming changes to the program and their pathways to completion	Letters sent through SkilledTradesBC Direct Access (DA)
<b>Apprentices</b>	To inform on the upcoming changes to the program and their pathways to completion	Targeted outreach via phone and email
<b>Apprentices</b>	To inform on the upcoming changes to the program and their pathways to completion	Classroom visits by Apprenticeship Advisors

# Appendix C: Transition Map

## Refrigeration and Air Conditioning Mechanic Transition Map EFFECTIVE December 1, 2019



**CHALLENGE PATHWAY**  
Refrigeration and Air Conditioning Mechanic Hours Requirement: 9,315 hours (was 10,830) (decrease of 1,515 hours)

Last Updated: October 24, 2022  
(Revised Transition Strategy CL2->HL3, CL3->HL4)