

Atlantic Workforce Partnership

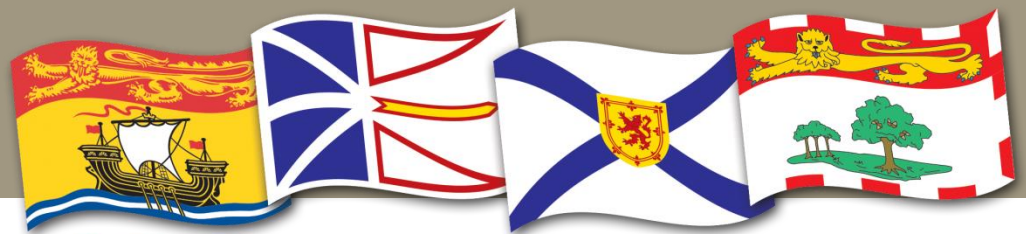
Curriculum Standard

OIL HEAT SYSTEM TECHNICIAN

Version: 2023

Revised: N/A

Atlantic Apprenticeship



Atlantic Apprenticeship Curriculum Standard

Oil Heat System Technician

Preface

This Atlantic Apprenticeship Curriculum Standard is intended to assist instructional staff in the design and delivery of technical, in-class training in support of the Oil Heat System Technician program.

This document contains all the technical training elements required to complete the Oil Heat System Technician apprenticeship program and has been developed based on the 2015 National Occupational Analysis (NOA). The NOA can be found on the Red Seal website (www.red-seal.ca).

Implementation of this AACCS for Apprenticeship training is outlined in the following table.

Level	Implementation Effective
Level 1	2024-2025
Level 2	2025-2026
Level 3	2026-2027

**** The above implementation schedule was current at time of printing. Please confirm with Apprenticeship Staff prior to commencing training.**

Granting of credit or permission to challenge level examinations for pre-employment or pre-apprenticeship training for the Oil Heat System Technician trade will be based on the content outlined in this standard. Training providers must contact their provincial apprenticeship authority for more information on the process and requirements for determining eligibility for credit towards an apprenticeship program. Programs which have been deemed acceptable by the jurisdictional apprenticeship authority will be identified in transfer credit matrix developed through the Atlantic Apprenticeship Harmonization Project.

Acknowledgements

The development of the Atlantic Apprenticeship Curriculum Standard (AACS) is an initiative of the Atlantic Apprenticeship Council's Atlantic Apprenticeship Harmonization Project (AAHP) through the Atlantic Workforce Partnership and Employment and Social Development Canada.

The Atlantic Apprenticeship Council wishes to acknowledge the contributions of the following industry and instructional representatives on the Atlantic Trade Advisory Committee (ATAC) who participated in the development of this document in April 2022.

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User Guide

Atlantic Apprenticeship Curriculum Standards (AACS) are developed based on Red Seal Occupational Standards (RSOS), National Occupational Analyses (NOA), Interprovincial Program Guides (IPG) (if available) and extensive industry consultation. This document represents the minimum content to be delivered as part of the harmonized Atlantic program for the Oil Heat System Technician trade.

The AACS's are deliberately constructed for ease of use and flexibility of structure in order to adapt to all delivery requirements. They detail units of training, unit outcomes and objectives. They do not impose a delivery model or teaching format.

Jurisdictions and/or training providers will select and develop delivery materials and techniques that accommodate a variety of learning styles and delivery patterns. The AACS does not dictate study materials, textbooks or learning activities to be used in delivery.

The document includes a Level Structure to facilitate mobility for apprentices moving from one jurisdiction to another.

Structure

The content of the AACS is divided into units. Unit codes are used as a means of identification and are not intended to convey the order of delivery. It is at the discretion of the training provider to deliver the content in the required logical sequence of delivery within the level. Jurisdictions are free to deliver units one at a time or concurrently within a level, provided all outcomes are met.

The Learning Outcomes describe what the apprentice should know or be able to do at the end of training. Wording of the Learning Outcomes, "Demonstrate knowledge of..." acknowledges the broad spectrum of ways in which knowledge can be assessed (i.e. practical projects, multiple choice testing, presentations, etc.) by instructional staff within the training.

Summative evaluation will be through a multiple-choice Level Examination administered through the jurisdictional Apprenticeship Authority.

User Guide (continued)

The 2015 National Occupational Analysis References (NOA) to AACS Comparison chart outlines the relation between each NOA sub-task and the AACS units. NOA References have also been detailed in each unit to highlight the direct link between the unit and relevant sub-tasks in the NOA.

In the Level Structure section, the document identifies suggested hours in order to provide an indication of the time it should take to cover the material in the unit and is provided as a guide only. Adjustments to the suggested hours for each unit may be required to account for rate of apprentice learning, statutory holidays, storm days, registration and examinations. These suggested hours detailed for each unit will represent both theory and practical training (if relevant) and for consistency will be based on a standard of 30 hours per week of training. The true length of time required to deliver an outcome successfully will depend upon the learning activities and teaching methods used.

There are two types of objectives found in the AACS document: theoretical and practical.

The theoretical objectives represent the material that is to be covered during the technical training in order to convey the required knowledge to the apprentice.

The practical objectives represent the tasks or skills that have been deemed by the Atlantic Trade Advisory Committee as critical for the apprentices to receive exposure to while attending technical training. For example, exposure could be done through instructor demonstration or individual or group performance of the skill or task. Training providers are encouraged to use practical demonstration and opportunities for hands-on learning whenever possible. Practical objectives are not intended to replace the on-the-job training component of the apprentice's program or to mirror or replace the logbook skills that are to be taught and evaluated in the workplace.

Detailed content for each objective has not been developed. Where detail is required for clarity, content has been provided.

Glossary of Terms

These definitions are intended as a guide to how language is used in the document.

Adjust	To put in good working order; regulate; bring to a proper state or position.
Application	The use to which something is put and/or the circumstance in which an individual would use it.
Characteristic	A feature that helps to identify, tell apart or describe recognizably; a distinguishing mark or trait.
Component	A part that can be separated from or attached to a system; a segment or unit.
Define	To state the meaning of (a word, phrase, etc.).
Describe	To give a verbal account of; tell about in detail.
Explain	To make plain or clear; illustrate; rationalize.
Identify	To point out or name objectives or types.
Interpret	To translate information from observation, charts, tables, graphs and written material.
Maintain	To keep in a condition of good repair or efficiency.
Method	A means or manner of doing something that has procedures attached to it.
Operate	How an object works; to control or direct the functioning of.
Procedure	A prescribed series of steps taken to accomplish an end.
Purpose	The reason for which something exists or is done, made or used.

Glossary of Terms (continued)

Service

Routine inspection and replacement of worn or deteriorating parts.

An act or business function provided to a customer in the course of an individual's profession (e.g., haircut).

Technique

Within a procedure, the manner in which technical skills are applied.

Test

v. To subject to a procedure that ascertains effectiveness, value, proper function or other quality.

n. A way of examining something to determine its characteristics or properties, or to determine whether or not it is working correctly.

Essential Skills / Skills for Success

Through extensive research, the Government of Canada and other national and international agencies have identified and validated key essential skills for the workplace. These skills are used in nearly every job and at different levels of complexity. They provide the foundation for learning all other skills and enable people to evolve with their jobs and adapt to workplace change. In response to the evolving labour market and changing skill needs, in 2021 the Government of Canada launched a new **Skills for Success** model: QR code #1 or web link below.

<https://www.canada.ca/en/services/jobs/training/initiatives/skills-success/new-model.html>

The Employment and Social Development Canada (ESDC) website provides information about the Skills for Success, including:

- a brief description of the skill;
- why the skill is important;
- tools to help you improve on each of the skills, and
- videos to help you improve on each of the skills.

This information can be found at: QR code #2 or web link below.

<https://www.jobbank.gc.ca/essentialskills>

Skills for Success training tools can be found at: QR code #3 or web link below.

<https://www.canada.ca/en/services/jobs/training/initiatives/skills-success/tools.html>

The development and improvement of these Skills for Success is inherent throughout the apprenticeship training program as apprentices work towards achieving journey person status.



#1 The new Skills for Success model – Canada.ca



#2 Explore careers by essential skills – Job Bank



#3 Assessment and training tools – Canada.ca

Level Structure

Level 1 – 7 Weeks

Code	Unit Title	Hrs*	Pg	Practical Objectives*
OHT-100	Safety Awareness	3	22	<ol style="list-style-type: none"> 1. Select and demonstrate the proper use of PPE. 2. Inspect and maintain PPE.
OHT-105	Communications	3	24	<ol style="list-style-type: none"> 1. Demonstrate ability to effectively communicate with others.
OHT-110	Trade Practices and Related Documents	6	26	<ol style="list-style-type: none"> 1. Interpret various code books, regulations and acts pertaining to the Oil Heat System Technician trade.
OHT-115	Tools and Equipment	9	28	<ol style="list-style-type: none"> 1. Inspect, maintain and store tools and equipment. 2. Use compressed air systems.
OHT-120	Basic Hoisting, Rigging and Lifting	9	30	<ol style="list-style-type: none"> 1. Inspect, maintain and store hoisting, lifting and rigging equipment. 2. Tie various knots used for lifting. 3. Perform calculations to determine the weight of a load.
OHT-125	Access Equipment	6	33	<ol style="list-style-type: none"> 1. Use access equipment. 2. Inspect, maintain and store access equipment.
OHT-130	Drawings and Specifications	24	34	<ol style="list-style-type: none"> 1. Interpret and extract information on drawings. 2. Perform basic sketching.
OHT-135	Trade Math	6	36	<ol style="list-style-type: none"> 1. Perform basic mathematical functions necessary to perform piping related tasks.
OHT-140	Soldering, Flaring and Threading Pipe	12	38	<ol style="list-style-type: none"> 1. Set-up, adjust and shutdown soldering equipment. 2. Maintain and troubleshoot soldering equipment. 3. Thread various pipes. 4. Perform various flares. 5. Perform soldering operations on copper tubing.
OHT-145	Fuel Oil Properties	6	40	N/A
OHT-150	Combustion Theory	15	42	<ol style="list-style-type: none"> 1. Troubleshoot incorrect fuel oil combustion: <ol style="list-style-type: none"> i) to “smoke” (not enough air) ii) create aldehyde (excess air) iii) determine adequate air/oil mixture iv) measure products with gauges

Level Structure (continued)

Level 1 – 7 Weeks (continued)

Code	Unit Title	Hrs*	Pg	Practical Objectives*
OHT-155	Air-Handling Components	6	43	1. Select and install air-handling components on oil burners.
OHT-160	Combustion Efficiency Testing	21	45	1. Adjust draft. 2. Adjust burner and analyze results.
OHT-165	Fuel Storage Systems	21	47	Instructor demonstration: 1. Install a fuel storage tank. i) select a location for fuel storage tank ii) select and size pipe iii) install fill and venting pipes iv) install tubing v) flush fuel delivery systems vi) install oil filter assembly vii) perform visual inspection of fuel storage tanks viii) compile materials list ix) test oil tanks
OHT-170	Electricity I (Principles of Electricity)	30	50	1. Perform basic Ohm's law calculations. 2. Wire a low voltage circuit. i) series ii) parallel iii) series-parallel 3. Test basic wiring components & circuits
OHT-175	House as a System	30	53	1. Perform calculations to determine the amount of combustion and ventilation air required for a particular system. 2. Install and maintain humidifiers. 3. Perform heat loss calculations.
OHT-180	Mentoring I	3	55	N/A

Level 2 – 7 Weeks

Code	Unit Title	Hrs*	Pg	Practical Objectives*
OHT-200	Hydronic Heating Systems	30	57	N/A
OHT-205	Warm Air Furnaces	18	60	1. Install a warm air system. 2. Commission a warm air system. 3. Test a new oil burner firing process. 4. Maintain and repair a warm air heating system. 5. Troubleshoot potential problems in warm air systems. 6. Test heat exchangers for leakage.

Level Structure (continued)

Level 2 – 7 Weeks (continued)

Code	Unit Title	Hrs*	Pg	Practical Objectives*
OHT-210	Domestic Hot Water Heaters	12	63	Instructor demonstration: <ol style="list-style-type: none"> 1. Install indirect fired hot water heaters (tankless coil). 2. Install direct-fired hot water heaters. 3. Maintain and repair domestic hot water heaters. 4. Troubleshoot problems in hot water heaters and identify the corrective action to be taken.
OHT-215	Fuel Pumping Systems	18	65	N/A
OHT-220	Chimneys, Venting and Draft Control	18	68	Instructor demonstration: <ol style="list-style-type: none"> 1. Install & size a stainless-steel chimney. 2. Regulate chimney draft. 3. Troubleshoot and repair potential chimney problems affecting draft.
OHT-225	Motors	15	70	<ol style="list-style-type: none"> 1. Select and replace motors. 2. Troubleshoot and maintain motors and capacitors.
OHT-230	Ignition Systems	15	72	<ol style="list-style-type: none"> 1. Set up or adjust electrodes. 2. Test transformers and ignitors. 3. Test and inspect electrodes. 4. Maintain ignition equipment. 5. Inspect & troubleshoot ignition sys.
OHT-235	Electricity II (Electrical Devices)	30	75	<ol style="list-style-type: none"> 1. Install relays. 2. Troubleshoot and test switches.
OHT-240	Controls and Wiring	30	78	<ol style="list-style-type: none"> 1. Install and program thermostats and components. 2. Troubleshoot thermostats. 3. Install, troubleshoot and test limit controls. 4. Locate and wire controls. 5. Test, troubleshoot & locate controls. 6. Interpret and use schematic and pictorial diagrams.
OHT-245	Planned Maintenance	24	82	<ol style="list-style-type: none"> 1. Inspect various types of heating systems, test components and complete any required adjustments. 2. Disassemble, clean and reassemble components of various types of heating systems. 3. Perform and complete efficiency test and documentation.

Level Structure (continued)

Level 3 – 6 Weeks

Code	Unit Title	Hrs*	Pg	Practical Objectives*
OHT-300	Combustion Chambers	6	85	1. Inspect combustion chambers.
OHT-305	Planning and Estimating	24	87	1. Take field measurements. 2. Complete estimates and plan materials.
OHT-310	Retrofit Systems	21	89	Instructor demonstration: 1. Tune up a heating system. 2. Calculate heating requirements. 3. Install a retrofit system. 4. Test fire-heating unit.
OHT-315	Troubleshooting	36	91	1. Diagnose system faults and their components. 2. Repair system faults and their components.
OHT-320	Zoning	21	93	Instructor demonstration: 1. Install circulators for hot water zoning. 2. Install dump zones. 3. Troubleshoot and repair zoning systems. 4. Balance the system during commissioning.
OHT-325	Specialized Systems	36	95	1. Service, adjust and calibrate a constant level valve. 2. Install and service natural and forced draft vapourizing burners. 3. Troubleshoot vapourizing oil burners. 4. Install and service a combo-system.
OHT-330	Mentoring II	6	97	N/A
OHT-335	Program Review	30	99	N/A

2015 NOA Sub-task to AACS Unit Comparison

NOA Sub-Task		AACS Unit	
Task 1 – Uses tools and equipment.			
1.01	Uses hand tools.	OHT-115	Tools and Equipment
1.02	Uses power tools.	OHT-115	Tools and Equipment
1.03	Applies powder-actuated tools.	OHT-115	Tools and Equipment
1.04	Uses measuring and testing equipment.	OHT-135	Trade Math
		OHT-160	Combustion Efficiency Testing
		OHT-170	Electricity I (Principles of Electricity)
		OHT-325	Specialized Systems
1.05	Uses hoisting, lifting and rigging equipment.	OHT-110	Trade Practices and Related Documents
		OHT-120	Basic Hoisting, Rigging and Lifting
1.06	Uses ladders and platforms.	OHT-110	Trade Practices and Related Document
		OHT-125	Access Equipment
1.07	Uses soldering, flaring and threading tools.	OHT-110	Trade Practices and Related Documents
		OHT-140	Soldering, Flaring and Threading tools
		OHT-165	Fuel Storage Systems
1.08	Uses personal protective equipment (PPE) and safety equipment.	OHT-100	Safety Awareness
		OHT-140	Soldering, Flaring and threading tools
		OHT-300	Combustion Chambers
Task 2 – Organizes work.			
2.01	Communicates with others.	OHT-105	Communications
		OHT-160	Combustion Efficiency Testing
		OHT-245	Planned Maintenance
2.02	Maintains clean and safe work environment.	OHT-100	Safety Awareness
2.03	Interprets codes and documentation.	OHT-100	Safety Awareness
		OHT-110	Trade Practices and Related Documents
2.04	Completes documentation.	OHT-110	Trade Practices and Related Documents
		OHT-245	Planned Maintenance
2.05	Interprets drawings.	OHT-130	Drawings and Specifications
		OHT-155	Air-Handling Components
2.06	Performs basic distribution layout.	OHT-135	Trade Math

NOA Sub-Task		AACs Unit	
		OHT-305	Planning and Estimating
2.07	Organizes material and components.	OHT-305	Planning and Estimating
2.08	Commissions appliances and components.	OHT-110	Trade Practices and Related Documents
Task 3 – Installs fuel storage tanks.			
3.01	Selects fuel storage tanks.	OHT-165	Fuel Storage Systems
3.02	Determine fuel storage tank location.	OHT-110	Trade Practices and Related Documents
		OHT-165	Fuel Storage Systems
3.03	Prepares location for fuel storage tanks.	OHT-135	Trade Math
		OHT-165	Fuel Storage Systems
3.04	Positions fuel storage tanks.	OHT-165	Fuel Storage Systems
3.05	Installs fuel storage tank components.	OHT-165	Fuel Storage Systems
3.06	Installs fill and vent pipes.	OHT-165	Fuel Storage Systems
Task 4 – Installs fuel supply system.			
4.01	Selects fuel supply components.	OHT-165	Fuel Storage Systems
		OHT-215	Fuel Pumping Systems
		OHT-325	Specialized Systems
4.02	Installs fuel supply components.	OHT-165	Fuel Storage Systems
		OHT-215	Fuel Pumping Systems
		OHT-325	Specialized Systems
Task 5 – Installs and retrofits oil-fired and wood/oil appliances and components.			
5.01	Selects appliances.	OHT-200	Hydronic Heating Systems
		OHT-205	Warm Air Furnaces
		OHT-210	Domestic Hot Water Heaters
		OHT-325	Specialized Systems
5.02	Positions appliances.	OHT-200	Hydronic Heating Systems
		OHT-205	Warm Air Furnaces
		OHT-210	Domestic Hot Water Heaters
		OHT-325	Specialized Systems
5.03	Installs components on appliance.	OHT-200	Hydronic Heating Systems
		OHT-205	Warm Air Furnaces
		OHT-210	Domestic Hot Water Heaters
		OHT-310	Retrofit Systems
		OHT-325	Specialized Systems
5.04	Connects fuel supply to appliance.	OHT-140	Soldering, Flaring and Threading Pipe
		OHT-200	Hydronic Heating Systems
		OHT-205	Warm Air Furnaces
		OHT-210	Domestic Hot Water Heaters

NOA Sub-Task		AACS Unit	
		OHT-215	Fuel Pumping Systems
		OHT-310	Retrofit Systems
		OHT-325	Specialized Systems
5.05	Connects electrical supply to appliance.	OHT-115	Tools and Equipment
		OHT-170	Electricity I (Principles of Electricity)
		OHT-200	Hydronic Heating Systems
		OHT-205	Warm Air Furnaces
		OHT-210	Domestic Hot Water Heaters
		OHT-310	Retrofit Systems
		OHT-325	Specialized Systems
5.06	Connects vent/exhaust piping to appliance.	OHT-115	Tools and Equipment
		OHT-200	Hydronic Heating Systems
		OHT-205	Warm Air Furnaces
		OHT-210	Domestic Hot Water Heaters
		OHT-220	Chimneys, Venting and Draft Control
		OHT-310	Retrofit Systems
5.07	Installs dump zones for wood/oil systems.	OHT-320	Zoning
5.08	Connects drain to appliance.	OHT-200	Hydronic Heating Systems
Task 6 – Installs forced-air heating systems.			
6.01	Assembles ductwork.	OHT-135	Trade Math
		OHT-205	Warm Air Furnaces
		OHT-310	Retrofit Systems
6.02	Installs ductwork.	OHT-205	Warm Air Furnaces
Task 7 – Installs hydronic heating systems.			
7.01	Assembles boilers.	OHT-200	Hydronic Heating Systems
7.02	Installs hydronic distribution system.	OHT-200	Hydronic Heating Systems
7.03	Installs indirect water.	OHT-210	Domestic Hot Water Heaters
7.04	Installs oil-fired water heater.	OHT-210	Domestic Hot Water Heaters
7.05	Installs hydronic heating systems component.	OHT-200	Hydronic Heating Systems
Task 8 – Selects venting systems.			
8.01	Selects venting systems.	OHT-135	Trade Math
		OHT-160	Combustion Efficiency Testing
		OHT-220	Chimneys, Venting and Draft Control
8.02	Prepares locations for termination.	OHT-220	Chimneys, Venting and Draft Control
		OHT-325	Specialized Systems

NOA Sub-Task		AACS Unit	
8.03	Installs venting components.	OHT-220	Chimneys, Venting and Draft Control
		OHT-325	Specialized Systems
8.04	Secures venting system to structure.	OHT-220	Chimneys, Venting and Draft Control
Task 9 – Installs equipment and components for combustion air and make-up air.			
9.01	Selects equipment and components.	OHT-135	Trade Math
		OHT-155	Air-Handling Components
		OHT-205	Warm Air Furnaces
		OHT-305	Planning and Estimating
9.02	Prepares location for equipment and components for combustion air and make-up air.	OHT-175	House as a System
		OHT-305	Planning and Estimating
9.03	Assembles equipment and components.	OHT-200	Hydronic Heating Systems
		OHT-215	Fuel Pumping Systems
		OHT-220	Chimneys, Venting and Draft Control
9.04	Secures equipment and components to structure.	OHT-115	Tools and Equipment
		OHT-200	Hydronic Heating Systems
Task 10 – Installs electrical and electronic systems.			
10.01	Selects controls and components.	OHT-235	Electricity II (Electrical Devices)
		OHT-240	Controls and Wiring
10.02	Selects location of controls and components.	OHT-235	Electricity II (Electrical Devices)
		OHT-240	Controls and Wiring
10.03	Installs controls and components.	OHT-235	Electricity II (Electrical Devices)
		OHT-240	Controls and Wiring
Task 11 – Tests electrical and electronic systems.			
11.01	Cycles appliance control.	OHT-235	Electricity II (Electrical Devices)
		OHT-240	Controls and Wiring
11.02	Checks operating and safety controls.	OHT-235	Electricity II (Electrical Devices)
		OHT-240	Controls and Wiring
11.03	Checks accessories and components.	OHT-155	Air-Handling Components
		OHT-170	Electricity I (Principles of Electricity)
		OHT-225	Motors
		OHT-235	Electricity II (Electrical Devices)
		OHT-240	Controls and Wiring
11.04	Sets up operating parameters.	OHT-235	Electricity II (Electrical Devices)
		OHT-240	Controls and Wiring
Task 12 – Maintains oil-fired heating systems and components.			
12.01	Checks oil-fired heating system and components.	OHT-245	Planned Maintenance
		OHT-310	Retrofit Systems

NOA Sub-Task		AACS Unit	
		OHT-315	Troubleshooting
12.02	Cleans components.	OHT-155	Air-Handling Components
		OHT-210	Domestic Hot Water Heaters
		OHT-215	Fuel Pumping Systems
		OHT-220	Chimneys, Venting and Draft Control
		OHT-245	Planned Maintenance
		OHT-300	Combustion Chambers
		OHT-315	Troubleshooting
		12.03	Changes preventative maintenance components.
OHT-165	Fuel Storage Systems		
OHT-215	Fuel Pumping Systems		
OHT-245	Planned Maintenance		
OHT-300	Combustion Chambers		
12.04	Lubricates moving components.	OHT-155	Air-Handling Components
		OHT-225	Motors
		OHT-245	Planned Maintenance
Task 13 – Diagnoses oil-fired heating systems and components.			
13.01	Checks for electrical problems.	OHT-170	Electricity I (Principles of Electricity)
		OHT-225	Motors
		OHT-230	Ignition Systems
		OHT-235	Electricity II (Electrical Devices)
		OHT-240	Controls and Wiring
		OHT-310	Retrofit Systems
		OHT-315	Troubleshooting
13.02	Checks for burner problems.	OHT-215	Fuel Pumping Systems
		OHT-230	Ignition Systems
		OHT-245	Planned Maintenance
		OHT-310	Retrofit Systems
		OHT-315	Troubleshooting
13.03	Checks for distribution problems.	OHT-205	Warm Air Furnaces
		OHT-215	Fuel Pumping Systems
		OHT-245	Planned Maintenance
		OHT-310	Retrofit Systems
		OHT-315	Troubleshooting
13.04	Checks for problems with combustion air and make-up air.	OHT-150	Combustion Theory
		OHT-220	Chimneys, Venting and Draft Control
		OHT-245	Planned Maintenance
		OHT-310	Retrofit Systems
		OHT-315	Troubleshooting

NOA Sub-Task		AACS Unit	
Task 14 – Repairs oil-fired heating systems and components.			
14.01	Corrects electrical problems.	OHT-100	Safety Awareness
		OHT-170	Electricity I (Principles of Electricity)
		OHT-225	Motors
		OHT-235	Electricity II (Electrical Devices)
		OHT-240	Controls and Wiring
		OHT-315	Troubleshooting
		OHT-320	Zoning
14.02	Corrects burner problems.	OHT-215	Fuel Pumping Systems
		OHT-230	Ignition Systems
		OHT-315	Troubleshooting
14.03	Corrects distribution problems.	OHT-205	Warm Air Furnaces
		OHT-315	Troubleshooting
Task 15 – Removes appliances and components.			
15.01	Decommissions appliances and components.	OHT-165	Fuel Storage Systems
		OHT-200	Hydronic Heating Systems
		OHT-205	Warm Air Furnaces
		OHT-210	Domestic Hot Water Heaters
		OHT-245	Planned Maintenance
15.02	Disposes of waste products.	OHT-100	Safety Awareness
		OHT-165	Fuel Storage Systems
		OHT-300	Combustion Chambers

Level 1

OHT-100 Safety Awareness

Learning Outcomes:

- Demonstrate knowledge of safety equipment, their applications, maintenance and procedures for use.
- Demonstrate knowledge of safe work practices.

2015 National Occupational Analysis Reference:

- 1.08 Uses personal protective equipment (PPE) and safety equipment.
- 2.02 Maintains clean and safe work environment.
- 2.03 Interprets codes and documentation.
- 14.01 Corrects electrical problems.
- 15.02 Disposes of waste products.

Suggested Hours:

3 Hours

Theoretical Objectives:

1. Identify workplace hazards and describe safe work practices and equipment.
 - i) personal
 - ii) workplace
 - electrical
 - confined space (awareness)
 - fire
 - tag out/lockout
 - fall arrest
 - iii) environmental
2. Identify and interpret workplace safety and health regulations.
 - i) federal
 - MSDS
 - WHMIS
 - ii) provincial/territorial
3. Identify types of personal protective equipment (PPE) and describe their applications.
 - i) clothing
 - ii) equipment
4. Describe the procedures used to care for and maintain PPE.

Practical Objectives:

1. Select and demonstrate the proper use of PPE.
2. Inspect and maintain PPE.

OHT-105 Communications

Learning Outcomes:

- Demonstrate knowledge of effective communication practices.
- Demonstrate knowledge of communication equipment and their applications.

2015 National Occupational Analysis Reference:

2.01 Communicate with others.

Suggested Hours:

3 Hours

Theoretical Objectives:

1. Define terminology associated with effective communication practices.
2. Describe effective communication practices.
 - i) respectful
 - ii) organized
3. Describe the importance of effective communication practices.
 - i) customers
 - ii) co-workers
 - iii) related industry people
 - manufacturer
 - suppliers
 - consultants
4. Describe the importance of the coaching and mentoring relationship between journey person and apprentice.
 - i) teaching and learning on the job
 - ii) role model
5. Identify types of communication methods and equipment and describe their applications.
6. Describe the relationship between sales and service.
7. Describe practices for projecting a professional attitude.
 - i) respect the customer
 - ii) appearance

- iii) workplace behaviour
8. Describe practices for dealing with customers.
 - i) calming customers
 - ii) preventing problems
 - iii) dealing with complaints
 - iv) resolving problems
 9. Describe effective strategies for dealing with difficult customers and high-risk situations.
 10. Describe cultural differences affecting work issues and communication and strategies for overcoming them.

Practical Objectives:

1. Demonstrate ability to effectively communicate with others.

OHT-110

Trade Practices and Related Documents

Learning Outcomes:

- Demonstrate knowledge of trade related documentation and its use.

2015 National Occupational Analysis Reference:

- 1.05 Uses hoisting, lifting and rigging equipment.
- 1.06 Uses ladders and platforms.
- 1.07 Uses soldering, flaring and threading tools.
- 2.03 Interprets codes and documentation.
- 2.04 Completes documentation.
- 2.08 Commissions appliances and components.
- 3.02 Determines fuel storage tank location.

Suggested Hours:

6 Hours

Theoretical Objectives:

1. Describe responsibilities of the Oil Heat System Technician and workmanship required in the Installation Code for Oil Burning Equipment.
2. Describe responsibilities of the Oil Heat System Technician under the related codes and regulations.
 - i) workers' compensation
 - ii) Occupational Health & Safety Act
 - iii) WHIMS
 - iv) environmental regulations
 - v) regulations governing fuel tanks
 - vi) transportation of dangerous goods (TDG) regulations
 - vii) fire regulations
 - viii) plumbing codes
 - ix) electrical codes
 - x) pressure vessels act
 - xi) local and municipal regulations
3. Describe limitations of work carried out in the Oil Heat System Technician trade.

Practical Objectives:

1. Interpret various code books, regulations and acts pertaining to the Oil Heat System Technician trade.

OHT-115 Tools and Equipment

Learning Outcomes:

- Demonstrate knowledge of tools and equipment, their applications, maintenance and procedures for use.

2015 National Occupational Analysis Reference:

- 1.01 Uses hand tools.
- 1.02 Uses power tools.
- 1.03 Uses powder-actuated tools.
- 5.05 Connects electrical supply to appliance.
- 5.06 Connects vent/exhaust piping to appliance.
- 9.04 Secures equipment and components to structure.

Suggested Hours:

9 Hours

Objectives and Content:

Theoretical Objectives:

1. Identify hazards and describe safe work practices pertaining to tools and equipment.

2. Identify types of hand tools and describe their applications and procedures for use.
 - i) hammers
 - ii) screwdrivers
 - iii) wrenches
 - iv) pliers and wire cutters
 - v) rulers and measuring tools
 - vi) cutting tools
 - vii) files
 - viii) torque wrenches
 - ix) manual hand threader

3. Identify types of power tools and describe their applications and procedures for use.
 - i) drills and drill bits
 - ii) saws
 - iii) power threader and power hand threader
 - iv) power-actuated tools
 - v) sanders and grinders

4. Describe the components, applications and procedures for using compressed air systems.
5. Identify types of powder-actuated tools and describe their applications and procedures for use.
6. Identify types of specialty tools used in the Oil Heat System Technician trade, and describe their applications and procedures for use.
 - i) flame mirror
 - ii) electrode gauges
 - iii) fan-wheel puller
7. Describe the procedures used to inspect, maintain and store tools and equipment.

Practical Objectives:

1. Inspect, maintain and store tools and equipment.
2. Use compressed air systems.

OHT-120

Basic Hoisting, Rigging and Lifting

Learning Outcomes:

- Demonstrate knowledge of hoisting, lifting and rigging equipment, their applications, limitations and procedures for use.
- Demonstrate knowledge of basic hoisting, lifting and rigging techniques.
- Demonstrate knowledge of the procedures used to perform hoisting and lifting operations.
- Demonstrate knowledge of calculations required when performing hoisting and lifting operations.

2015 National Occupational Analysis Reference:

1.05 Uses hoisting, lifting and rigging equipment.

Suggested Hours:

9 Hours

Theoretical Objectives:

1. Define terminology associated with hoisting, lifting and rigging.
2. Identify hazards and describe safe work practices pertaining to hoisting, lifting and rigging.
3. Interpret codes and regulations pertaining to rigging, hoisting and lifting.
 - i) training and certification requirements
4. Identify types of rigging equipment and accessories, and describe their applications, limitations and procedures for use.
 - i) ropes
 - ii) slings
 - iii) chains
 - iv) hooks
 - v) spreader bars
 - vi) shackles
5. Identify factors to consider when selecting rigging equipment.
 - i) load characteristics
 - ii) environment
 - iii) safety factor

6. Identify factors to consider when rigging material/equipment for lifting.
 - i) load characteristics
 - ii) equipment and accessories
 - iii) environmental factors
 - iv) anchor points
 - v) sling angles
7. Identify types of hoisting and lifting equipment and accessories, and describe their applications and procedures for use.
8. Identify types of basic knots, hitches, splices and bends, and describe the procedures used to tie them.
 - i) bowline
 - ii) running bowline
 - iii) square/reef
 - iv) half-hitch
 - v) clove hitch
9. Describe the procedures used to inspect, maintain and store rigging, hoisting and lifting equipment.
10. Describe the procedures used for attaching rigging equipment to the load.
11. Describe the procedures used to communicate during hoisting, lifting and rigging operations.
 - i) hand signals
 - ii) electronic communications
 - iii) audible/visual
12. Describe the procedures used to ensure the work area is safe for lifting.
 - i) supervision of lift
 - ii) securing work area
 - iii) communication
13. Describe the procedures used to perform a lift.
 - i) load determination
 - ii) communication methods
 - iii) pre-lift checks
 - iv) placement of load
 - v) post-lift inspection
14. Describe the procedures used to perform calculations to determine the weight of a load.

Practical Objectives:

1. Inspect, maintain and store hoisting, lifting and rigging equipment.
2. Tie various knots used for lifting.
3. Perform calculations to determine the weight of a load.

OHT-125 Access Equipment

Learning Outcomes:

- Demonstrate knowledge of access equipment, their applications, limitations and procedures for use.

2015 National Occupational Analysis Reference:

1.06 Uses ladders and platforms.

Suggested Hours:

6 Hours

Theoretical Objectives:

1. Define terminology associated with ladders and elevated work platform (EWP).
2. Identify hazards and describe safe work practices pertaining to ladders and elevated work platforms.
 - i) fall protection and arrest
 - ii) power lines
 - iii) excess loads
3. Interpret codes and regulations pertaining to ladders and elevated work platform.
4. Identify types of ladders and elevated work platform, and describe their characteristics and applications.
5. Describe the procedures used to erect ladders and elevated work platforms.
 - i) limitations
6. Describe the procedures used to inspect, maintain and store ladders and elevated work platform.

Practical Objectives:

1. Use access equipment.
2. Inspect, maintain and store access equipment.

OHT-130

Drawings and Specifications

Learning Outcomes:

- Demonstrate knowledge of construction drawings and specifications.
- Demonstrate knowledge of basic sketching techniques.

2015 National Occupational Analysis Reference:

2.05 Interprets drawings.

Suggested Hours:

24 Hours

Theoretical Objectives:

1. Define terminology associated with drawings and sketches.
2. Interpret information on drawings.
 - i) lines
 - ii) legend
 - iii) symbols and abbreviations
 - iv) notes and specifications
 - v) schedules
 - vi) scales
3. Identify and interpret common symbols and abbreviations found on drawings.
 - i) duct
 - ii) welding
 - iii) electrical
 - iv) piping
 - v) architectural
4. Explain the purpose of submittals and shop drawings and describe the procedures used to interpret them.
5. Identify types of drawings and describe their applications.
 - i) civil/site
 - ii) architectural
 - iii) mechanical
 - iv) structural
 - v) electrical

- vi) shop drawings
 - vii) sketches
 - viii) as-built
6. Identify drawing projections and views and describe their applications.
- i) projections
 - orthographic
 - oblique
 - isometric
 - ii) views
 - plan
 - section
 - detail
 - elevation
 - cross section
7. Identify types of scales and describe their applications and procedures for use.
8. Identify drawing-related documentation and describe their applications.
- i) change orders
 - ii) addendums
 - iii) as-builts
9. Describe the procedures used to interpret and extract information from drawings.
10. Describe basic sketching techniques.

Practical Objectives:

- 1. Interpret and extract information on drawings.
- 2. Perform basic sketching.

OHT-135 Trade Math

Learning Outcomes:

- Demonstrate knowledge of basic math operations pertaining to Oil Heat System Technicians.

2015 National Occupational Analysis Reference:

- 1.04 Uses measuring and testing equipment.
- 2.06 Performs basic distribution layout.
- 3.03 Prepares location for fuel storage tanks.
- 6.01 Assembles ductwork.
- 8.01 Selects venting system.
- 9.01 Selects equipment and components.

Suggested Hours:

6 Hours

Theoretical Objectives:

1. Define terminology associated with piping mathematical calculations.
 - i) centre to centre
 - ii) end to end
 - iii) thread make-up
 - iv) fitting allowance
 - v) void space
 - vi) back to back of fitting
 - vii) centre to face of fitting
 - viii) offset
 - ix) run or advance
 - x) travel
 - xi) 90 degree offset calculations
 - xii) 45 degree offset calculations
 - basic
 - parallel
 - spread
 - difference in length
 - 22 1/2 degree constant
 - xiii) 22 1/2 degree offset calculations

2. Identify basic arithmetic concepts.
 - i) whole numbers
 - ii) decimal numbers
 - iii) fractions
 - iv) basic calculators
 - v) mixed numbers
3. Identify mathematical concepts relating to ratios, percentage and grade.
4. Identify procedures and formulae used to calculate perimeter, circumference and area.
 - i) rectangles
 - ii) circles
 - iii) triangles
 - iv) squares
5. Explain how to calculate volume using appropriate formulae.
 - i) rectangular tank
 - ii) round tank
 - iii) pipes
6. Describe the procedures to perform conversions.
 - i) fractions to decimals
 - ii) decimals to fractions
 - iii) SI conversions

Practical Objectives:

1. Perform basic mathematical functions necessary to perform piping related tasks.

OHT-140

Soldering, Flaring and Threading Pipe

Learning Outcomes:

- Demonstrate knowledge of soldering, flaring and threading equipment and their applications.
- Demonstrate knowledge of the procedures used to solder, flare and thread pipe.

2015 National Occupational Analysis Reference:

- 1.07 Uses soldering, flaring and threading tools.
- 1.08 Uses personal protective equipment (PPE) and safety equipment.
- 5.04 Connects fuel supply to appliance.

Suggested Hours:

12 Hours

Theoretical Objectives:

1. Define terminology associated with soldering, flaring and threading pipe.
2. Identify hazards and describe safe work practices pertaining to the use of soldering equipment.
 - i) personal
 - ii) shop/facility
 - iii) equipment
 - iv) ventilation
3. Identify types of soldering equipment and accessories, and describe their applications and procedures for use.
4. Identify materials used to solder and describe their applications.
 - i) fluxes
 - ii) solders
5. Identify types of pipe threading compounds and cutting fluids, and describe their applications and procedures for use.
6. Describe the soldering process and its application.
7. Describe the procedures used to set-up, adjust and shut-down soldering equipment.
8. Describe the procedures used to maintain and troubleshoot soldering equipment.

9. Describe the procedures used to perform soldering and brazing operations on copper tubing.
10. Describe the procedures used to flare copper tubing.

Practical Objectives:

1. Set-up, adjust and shutdown soldering equipment.
2. Maintain and troubleshoot soldering equipment.
3. Thread various pipes.
4. Perform various flares.
5. Perform soldering operations on copper tubing.

OHT-145 Fuel Oil Properties

Learning Outcomes:

- Demonstrate knowledge of fuel oil and their properties, characteristics and applications.

2015 National Occupational Analysis Reference:

N/A

Suggested Hours:

6 Hours

Theoretical Objectives:

1. Define terminology associated with fuel oil properties.
2. Identify hazards and describe safe work practices associated with fuel oil properties.
3. Interpret information pertaining to the composition and origin of heating oil.
4. Explain the characteristics of fuel oil and their relevance to burning.
 - i) flash point
 - ii) pour point
 - iii) water and sediment
 - iv) volatility
 - v) viscosity
 - vi) calorific value
 - vii) gravity
 - viii) sulfur content
 - ix) colour
 - x) BTU
5. Explain the effects of water and sediment in fuel tanks.
6. Identify the significance of regional variations of fuel properties.
7. Identify the refining processes and their products.
8. Identify types of fuel oils and describe their applications.

9. Describe the procedures used to the safely handle and store fuel oil.
 - i) storage temperature
 - ii) cross-contamination with other fuels

Practical Objectives:

N/A

OHT-150 Combustion Theory

Learning Outcomes:

- Demonstrate knowledge of combustion theory, their properties, characteristics and applications.

2015 National Occupational Analysis Reference:

13.04 Checks for problems with combustion and make-up air.

Suggested Hours:

15 Hours

Theoretical Objectives:

1. Define terminology associated with combustion theory.
2. Identify the relevance of combustion theory to the trade.
3. Explain the effect of combustion and describe the process and its products.
4. Describe composition of air and its role in the combustion process.
5. Describe the physical requirements for oil burning.
6. Describe fuel/air ratios and their importance.
7. Describe the process of atomization and vaporization in the burning of fuel oil.
8. Describe incomplete combustion, its causes and dangers.
9. Describe the relationship between excess combustion air and efficiency.
10. Describe efficiency test equipment.

Practical Objectives:

1. Troubleshoot incorrect fuel oil combustion:
 - to “smoke” (not enough air)
 - create aldehyde (excess air)
 - determine adequate air/oil mixture
 - measure products with gauges

OHT-155 Air-Handling Components

Learning Outcomes:

- Demonstrate knowledge of air-handling components.
- Demonstrate knowledge of the procedures used to clean and maintain air-handling components.

2015 National Occupational Analysis Reference:

- 2.05 Interprets drawings.
- 9.01 Selects equipment and components.
- 11.03 Checks accessories and components.
- 12.02 Cleans components.
- 12.03 Changes preventative maintenance components.
- 12.04 Lubricates moving components.

Suggested Hours:

6 Hours

Theoretical Objectives:

1. Define terminology associated with air-handling components.
2. Identify hazards and describe safe work practices associated with air-handling components.
3. Explain the relationship between the air-handling parts to the combustion of the fuel oil.
 - i) air/oil ratio
 - ii) turbulator
 - iii) air band/air gate
 - iv) efficiency
4. Explain the effects of draft on air delivery.
5. Identify types of air-handling components and describe their purpose and operation.
 - i) burner fans
 - ii) turbulators
 - iii) blowers
 - iv) spinners
 - v) end cones
 - vi) static plates
 - vii) gaskets

6. Identify types of combustion heads and describe their purpose and operation.
 - i) retention head
 - ii) non-retention head
 - iii) motor speed

7. Describe the procedures used to select, size and install air-handling components on oil burners.

Practical Objectives:

1. Select and install air-handling components on oil burners.

OHT-160

Combustion Efficiency Testing

Learning Outcomes:

- Demonstrate knowledge of combustion efficiency testing, their components, applications and operation.
- Demonstrate knowledge of combustion efficiency testing used in venting systems.
- Demonstrate knowledge of the procedures used to install, maintain, repair, test and troubleshoot combustion efficiency testing.

2015 National Occupational Analysis Reference:

- 1.04 Uses measuring and testing equipment.
- 2.01 Communicates with others.
- 8.01 Selects venting system.

Suggested Hours:

21 Hours

Theoretical Objectives:

1. Define terminology associated with combustion efficiency testing.
2. Identify hazards and describe safe work practices pertaining to combustion efficiency testing.
3. Explain poor draft and its causes.
4. Explain the principles of a smoke tester, its purpose, operation and procedures for adjustment and use.
5. Explain the CO₂ tester using the Orsat method and its purpose, operation and procedures for adjustment and use.
6. Identify tools and equipment relating to combustion testing and describe their applications and procedures for use.
7. Identify types of combustion testing equipment and describe their purpose, operation and main measurements included in combustion testing.
 - i) thermocouples
 - ii) pressure sensor
 - iii) O₂ sensor
 - iv) CO sensor

8. Identify types of draft gauge and describe its purpose, operation, adjustment and procedures for use.
9. Identify the methods used to install dial type stack thermometer and describe their associated procedures.
 - i) drilling holes
 - ii) stable stack temperature
10. Identify types of diagnostic combustion test equipment and describe their characteristics and operation.
11. Identify types of test indications and their significance.
12. Describe the procedures used to perform accurate testing interpretation and documentation.
 - i) efficiency
 - ii) customer
 - iii) technician
 - iv) safety
13. Describe the procedures used to select and adjust the draft regulator/barometric damper.
14. Describe the procedures used to adjust the burner and components.

Practical Objectives:

1. Adjust draft.
2. Adjust burner and analyze the results.

OHT-165

Fuel Storage Systems

Learning Outcomes:

- Demonstrate knowledge of fuel storage tanks, their applications, maintenance and procedures for use.
- Demonstrate knowledge of the procedures used to select, install, maintain, remove and dispose of fuel storage tanks.
- Demonstrate knowledge of municipal, provincial and federal code as it pertains to fuel storage systems.

2015 National Occupational Analysis Reference:

- 1.07 Uses soldering, flaring and threading tools.
- 3.01 Selects fuel storage tanks.
- 3.02 Determines storage tank location.
- 3.03 Prepares location for fuel storage tanks.
- 3.04 Positions fuel storage tanks.
- 3.05 Installs fuel storage tanks components.
- 3.06 Installs fill and vent pipes.
- 4.01 Selects fuel supply components.
- 4.02 Installs fuel supply components.
- 12.03 Changes preventative maintenance components.
- 15.01 Decommissions appliance and components.
- 15.02 Disposes of waste products.

Suggested Hours:

21 Hours

Theoretical Objectives:

1. Define terminology associated with fuel storage tanks.
2. Identify hazards and describe safe work practices pertaining to fuel storage tanks.
3. Interpret codes and regulations pertaining to fuel storage tanks.
 - i) metallic storage tanks
 - ii) non-metallic storage tanks
4. Identify tools and equipment relating to fuel storage tanks and describe their applications and procedures for use.

5. Describe the procedures used to select a location as per the characteristics and specifications of tanks.
 - i) inside
 - ii) outside
 - iii) single wall
 - iv) double wall
6. Interpret information pertaining to the system for pipe sizing.
7. Identify considerations when locating and placing an oil tank, both steel and non-metallic.
 - i) inside
 - ii) outside
8. Explain the effects of condensation and methods for detection, remedy and prevention.
9. Describe the procedures used to select and size pipe used in tank installation and their applications.
10. Describe the procedures used to install fill and venting pipes.
11. Describe the procedures used to install tubing.
 - i) cutting and joining
 - ii) fittings
 - iii) clamping and supporting
 - iv) methods of channeling in floors
12. Identify the type, location and placement of tank ancillaries and their procedures for installation.
 - i) gauging devices
 - ii) vent alarm
 - iii) check valves
13. Identify types of shut-off valves and describe their purpose and operation.
14. Describe the procedures used to flush fuel delivery systems.
15. Identify types of the oil filter assembly and describe their characteristics and applications.
16. Describe the procedures used to install oil filter assembly.
17. Describe the procedures used to perform visual inspection of fuel storage tanks and installations.

18. Describe the procedures used to compile materials list.
19. Describe the procedures used to test oil tanks.
 - i) pre-installation
 - ii) post installation
20. Describe regulations and procedures for dealing with fuel oil spillages and containment.
 - i) secondary containment
 - ii) double wall requirements
21. Describe the procedures used to remove and dispose of oil tanks.
 - i) regulations
 - ii) safety
22. Describe the procedures used to connect fuel supply systems.
 - i) top connect
 - ii) bottom connect
 - iii) end connect
23. Describe the procedures used to install multiple end or bottom connected tanks.
 - i) sizing manifold pipes
 - ii) sizing fill and vent pipes
24. Perform calculations of piping material requirements for a given installation.
25. Perform calculations of tank size.

Practical Objectives:

Instructor Demonstration:

1. Install a fuel storage tank.
 - i) select a location for fuel storage tank
 - ii) select and size pipe
 - iii) install fill and venting pipes
 - iv) install tubing
 - v) flush fuel delivery systems
 - vi) install oil filter assembly
 - vii) perform visual inspection of fuel storage tanks
 - viii) compile materials list
 - ix) test oil tanks

OHT-170 Electricity I (Principles of Electricity)

Learning Outcomes:

- Demonstrate knowledge of the basic concepts of electricity.

2015 National Occupational Analysis Reference:

- 1.04 Uses measuring and testing equipment.
- 5.05 Connects electrical supply to appliance.
- 11.03 Checks accessories and components.
- 13.01 Checks for electrical problems.
- 14.01 Corrects electrical problems.

Suggested Hours:

30 Hours

Theoretical Objectives:

1. Define terminology associated with electricity and units of measurement as related to the trade.
2. Identify hazards and describe safe work practices pertaining to electricity.
3. Interpret electrical-related information found on drawings and specifications.
4. Interpret the abbreviations, formula and circuit symbols found in circuit diagrams.
5. Explain theory of electron.
6. Explain factors that affect resistance in a circuit.
7. Explain Ohm's law and describe its applications and associated calculations.
8. Explain the principles of electromagnetism and describe how it can be used to produce voltage.
9. Explain the causes of excessive current.
10. Explain the effect of overload protection circuits.
11. Identify considerations when selecting conductors and insulators size, and describe their characteristics and applications.

12. Identify types of current and describe their characteristics and applications.
 - i) direct current (DC)
 - ii) alternating current (AC)

13. Identify terms associated with alternating current.
 - i) cycle
 - ii) hertz
 - iii) effective value
 - iv) electrical characteristics

14. Identify the layout of a typical home distribution panel and its relationship to the heating system.

15. Identify types of conductors and describe their components, operation and applications.
 - i) line
 - ii) ground
 - iii) neutral wire

16. Identify types of electrical circuits and describe their characteristics, operation and applications.
 - i) series
 - ii) parallel
 - iii) series-parallel

17. Identify the sections of the Canadian Electrical Code related to oil burner installation and service.

18. Identify the basic electrical properties and describe their relationship.
 - i) voltage
 - ii) current
 - iii) resistance

19. Describe the procedures used to wire a heating system.
 - i) size of conductor
 - ii) type of conductor

20. Identify types of electrical test meters and describe their applications and procedures for use.
 - i) ohmmeter
 - ii) ammeter/amperage
 - iii) multimeter

21. Describe the procedure used to test basic wiring components and circuits.
 - i) fuses
 - ii) terminals
 - iii) circuit breakers
 - iv) resistors
 - v) switches
 - vi) polarity

Practical Objectives:

1. Perform basic Ohm's law calculations.
2. Wire a low voltage circuit.
 - i) series
 - ii) parallel
 - iii) series-parallel
3. Test basic wiring components and circuits.

OHT-175 House as a System

Learning Outcomes:

- Demonstrate knowledge of the relationship between combustion/ventilation and oil heating systems.
- Demonstrate knowledge of the relationship between make-up air and oil heating systems.
- Demonstrate knowledge of the relationship between building construction and oil heating systems.

2015 National Occupational Analysis Reference:

9.02 Prepares location of equipment and components for combustion air and make-up air.

Suggested Hours:

30 Hours

Theoretical Objectives:

1. Define terminology associated with house as a system.
2. Explain the relationship between combustion/ventilation and oil heating systems.
3. Explain the relationship between make-up air and oil heating systems.
4. Explain movement of heat.
 - i) convection
 - ii) conduction
 - iii) radiation
5. Interpret the CSA codes regarding air supply.
6. Explain the importance of air change and its effects on humidity.
7. Explain the causes and effects of depressurization by an exhaust appliance.
8. Identify factors to consider related to humidity and the importance of correct relative humidity.
9. Identify and interpret problems related to oil heating equipment created by changes to a building structure.

10. Identify types of humidifiers and describe their characteristics and operations.
11. Identify types of exterior wind barriers and describe their purpose and operation.
12. Identify types of vapour barriers and describe their purpose and operation.
13. Identify types of building insulation, their characteristics and effect on heating requirements.
14. Identify types of air cleaner devices, their components, operation and procedures for use.
15. Identify the effects that contribute to air and moisture flow in a building.
16. Describe the procedures used to install and maintain humidifiers.
17. Perform heat loss calculations.
18. Perform calculations to determine the amount of combustion air required for a particular system.

Practical Objectives:

1. Perform calculations to determine the amount of combustion and ventilation air required for a particular system.
2. Install and maintain humidifiers.
3. Perform heat loss calculations.

OHT-180 Mentoring I

Learning Outcomes:

- Demonstrate knowledge of strategies to assist in learning skills in the workplace.

2015 National Occupational Analysis Reference:

N/A

Suggested Hours:

3 Hours

Theoretical Objectives:

1. Describe the importance of your own experiences.
2. Identify partners involved in apprenticeship.
3. Describe the shared responsibilities for workplace learning.
4. Identify learning preferences.
5. Determine your own learning preferences and explain how these relate to learning new skills.
6. Identify different ways of learning.
7. Identify different learning needs and strategies to meet learning goals.
8. Identify techniques for effective communication.
9. Identify strategies to assist in learning a skill.
10. Describe the importance of different types of skills in the workplace.
11. Describe the importance of essential skills in the trade.

Practical Objectives:

N/A

Level 2

OHT-200

Hydronic Heating Systems

Learning Outcomes:

- Demonstrate knowledge of hydronic heating systems, their components, applications and operation.
- Demonstrate knowledge of the procedures used to install, maintain, repair, test and troubleshoot hydronic heating systems.

2015 National Occupational Analysis Reference:

- 5.01 Selects appliance.
- 5.02 Positions appliance.
- 5.03 Installs components on appliance.
- 5.04 Connects fuel supply to appliance.
- 5.05 Connects electrical supply to appliance.
- 5.06 Connects vent/exhaust piping to appliance.
- 5.08 Connects drain to appliance.
- 7.01 Assembles boilers.
- 7.02 Installs hydronic distribution system.
- 7.05 Installs hydronic heating system components.
- 9.03 Assemble equipment and components.
- 9.04 Secures equipment and components to structure.
- 15.01 Decommissions appliance and components.

Suggested Hours:

30 Hours

Theoretical Objectives:

1. Define terminology associated with hydronic heating systems.
2. Identify hazards and describe safe work practices pertaining to hydronic heating systems.
3. Explain boiler rating systems.
 - i) net ratings
 - ii) gross ratings
 - iii) operating pressure
4. Explain the operation of a gravity type open system.
5. Identify types of hot water boilers components, their purpose and operation.

- i) combustion chamber
 - ii) heating surfaces
 - iii) baffles or turbulators
 - iv) insulation
6. Identify types of forced circulation closed system and describe their characteristics and operation.
- i) one-pipe
 - ii) two-pipe
 - iii) reverse return
 - iv) in-floor radiant
 - v) series loop
7. Identify hot water boiler components and describe their purpose and operation.
- i) circulator
 - ii) pressure reducing valve
 - iii) flow control valve
 - iv) air elimination devices
 - v) expansion tanks
 - vi) zone control
 - vii) tempering valves
 - viii) coils
 - tankless
 - indirect water heater
 - ix) couplings
 - x) pressure relief valves
 - xi) tridicator valve
 - xii) low water cut-off
 - xiii) wood/oil combination
 - xiv) backflow preventer
 - xv) shut-off valves
 - ball
 - gate
 - globe
8. Explain the operation and application of a wood/oil add-on hot water boiler.
9. Explain backflow and its causes.
10. Explain the benefits of pipe insulation.
11. Identify types of piping systems used for heat delivery and their applications.

12. Identify types of radiation and air purging devices, and describe their characteristics and operation.
13. Describe the procedures used to select and install a hot water boiler and its components.
14. Describe the procedures used to maintain and repair hot water heating systems.
15. Describe the procedures used to test and troubleshoot potential boiler problems, diagnostic procedures and solutions.
16. Describe the procedures used to layout a hydronic heating system and the sizing of radiation.
17. Describe the process of sizing a circulator.
18. Describe the operation of a steam heat system.
 - i) one pipe
 - ii) two pipe
19. Identify types of boilers and describe their characteristics.
 - i) steel
 - ii) cast-iron

Practical Objectives:

N/A

OHT-205

Warm Air Furnaces

Learning Outcomes:

- Demonstrate knowledge of warm air furnaces, their components, applications and operation.
- Demonstrate knowledge of the procedures used to install, maintain and troubleshoot warm air furnaces.

2015 National Occupational Analysis Reference:

- 5.01 Selects appliance.
- 5.02 Positions appliance.
- 5.03 Installs components on appliance.
- 5.04 Connects fuel supply to appliance.
- 5.05 Connects electrical supply to appliance.
- 5.06 Connects vent/exhaust piping to appliance.
- 6.01 Assembles ductwork.
- 6.02 Installs ductwork.
- 9.01 Selects equipment and components.
- 13.03 Checks for distribution problems.
- 14.03 Corrects distribution problems.
- 15.01 Decommissions appliance and components.

Suggested Hours:

18 Hours

Theoretical Objectives:

1. Define terminology associated with warm air furnaces.
2. Identify hazards and describe safe work practices pertaining to warm air furnaces.
3. Describe types of warm air furnaces.
4. Identify types of warm air system components and describe their purpose and applications.
 - i) circulating fan and heat exchanger
 - ii) system fittings
 - boots
 - take offs
 - iii) metal gauging
 - iv) connection types

5. Identify types of warm air system controls and other devices and describe their purpose and applications.
 - i) oil
 - ii) wood/oil combination
 - iii) wood add-on

6. Identify warm air distribution systems components and describe their purpose and applications.
 - i) oil
 - ii) wood/oil combination
 - iii) wood add-on

7. Describe the procedures used to test, adjust and balance air flow systems.
 - i) static pressure
 - ii) temperature rise
 - iii) air velocity meter
 - iv) duct thermometer
 - v) draft gauge

8. Explain the basic procedures for the design and installation of a warm air system.
 - i) duct sizing
 - ii) heat loss
 - iii) size and type of furnace
 - iv) CFM air flow
 - v) system requirements
 - vi) code requirements
 - vii) manufacturer specifications
 - viii) diffusers and registers
 - ix) venting
 - x) combustion air requirements

9. Describe the procedures used to test a new oil burner firing process.

10. Describe the procedures used to maintain and repair a warm air heating systems.

11. Describe the procedures used to troubleshoot potential problems in warm air systems.

12. Describe the procedures used to test heat exchangers for leakage.

Practical Objectives:

1. Install a warm air system.
2. Commission a warm air system.
3. Test a new oil burner firing process.
4. Maintain and repair a warm air heating system.
5. Troubleshoot potential problems in warm air systems.
6. Test heat exchangers for leakage.

OHT-210

Domestic Hot Water Heaters

Learning Outcomes:

- Demonstrate knowledge of domestic hot water heaters, their components, applications and operation.
- Demonstrate knowledge of the procedures used to install, maintain, repair, test and troubleshoot domestic hot water heaters.

2015 National Occupational Analysis Reference:

- 5.01 Selects appliance.
- 5.02 Positions appliance.
- 5.03 Installs components on appliance.
- 5.04 Connects fuel supply to appliance.
- 5.05 Connects electrical supply to appliance.
- 5.06 Connects vent/exhaust piping to appliance.
- 7.03 Installs indirect water heater.
- 7.04 Installs oil-fired water heater.
- 12.02 Cleans components.
- 15.01 Decommissions appliance and components.

Suggested Hours:

12 Hours

Theoretical Objectives:

1. Define terminology associated with domestic hot water heaters.
2. Identify hazards and describe safe work practices pertaining to domestic hot water heaters.
3. Interpret codes and regulations pertaining to domestic hot water heaters.
4. Identify tools and equipment relating to domestic hot water heaters and describe their applications and procedures for use.
5. Identify types of domestic hot water heaters and describe their characteristics and applications.
 - i) indirect fired hot water heaters
 - ii) direct fired hot water heaters

6. Identify types of domestic hot water heater components and describe their purpose and operation.
 - i) vacuum relief/breaker valve
 - ii) temperature and pressure relief valves
 - iii) backflow preventers
 - iv) tempering/mixing valves
 - v) dielectric fittings
 - vi) pressure reducing valves
 - vii) anode rod
 - viii) potable water expansion tanks
7. Describe the procedures to install indirect fired hot water heaters (tankless coil).
8. Describe the procedures to install direct-fired hot water heaters.
9. Describe the procedures to maintain and repair domestic hot water heaters.
 - i) draining of water
 - ii) anode protection
10. Describe the procedures used to troubleshoot problems in hot water heaters and corrective action to be taken.
11. Describe recirculation systems and components.

Practical Objectives:

Instructor Demonstration:

1. Install indirect fired hot water heaters (tankless coil).
2. Install direct-fired hot water heaters.
3. Maintain and repair domestic hot water heaters.
4. Troubleshoot problems in hot water heaters and identify the corrective action to be taken.

OHT-215 Fuel Pumping Systems

Learning Outcomes:

- Demonstrate knowledge of fuel pumping systems, their components, applications and operation.
- Demonstrate knowledge of the procedures used to install, maintain, repair, test and troubleshoot fuel pumping systems.

2015 National Occupational Analysis Reference:

- 4.01 Selects fuel supply components.
- 4.02 Installs fuel supply components.
- 5.04 Connects fuel supply to appliance.
- 9.03 Assembles equipment and components.
- 12.02 Cleans components.
- 12.03 Changes preventative maintenance components.
- 13.02 Checks for burner problems.
- 13.03 Checks for distribution problems.
- 14.02 Corrects burner problems.

Suggested Hours:

18 Hours

Theoretical Objectives:

1. Define terminology associated with fuel pumping systems.
2. Identify hazards and describe safe work practices pertaining to fuel pumping systems.
3. Interpret codes and regulations pertaining to fuel pumping systems.
4. Identify types of fuel pumping systems and describe their characteristics and applications.
 - i) one pipe
 - ii) two pipe single stage
 - iii) two-stage fuel units
 - iv) auxiliary pumping systems
5. Identify types of fuel pumping system components and describe their purpose and applications.
6. Describe the procedures used to install fuel pumping systems.

- i) pump selection
 - ii) proper rotation
 - iii) alignment
 - iv) sizing of fuel lines
 - v) pump couplings
 - vi) bypass plug
 - vii) head pressure
 - viii) pressure gauge
 - ix) vacuum gauge
 - x) de-aerator
 - xi) check valves
 - xii) secure and protect fuel lines
7. Describe the procedures used to install auxiliary pumps.
- i) pump selection
 - ii) proper rotation
 - iii) alignment
 - iv) sizing of fuel lines
 - v) pump couplings
 - vi) return line systems
 - pressurized system
 - vacuum break system
 - vii) pressure adjustment/control
8. Describe the procedures used to maintain fuel pumping systems.
- i) primary venting and bleeding
 - ii) cleaning and replacement of pump screen
 - iii) pressure regulation
 - iv) pressure and vacuum
 - v) gasket replacement
 - vi) oil safety valve (OSV)
9. Describe the procedures used to maintain auxiliary pumps.
- i) primary venting and bleeding
 - ii) cleaning and replacement of pump screen
 - iii) pressure regulation
 - iv) pressure and vacuum
 - v) gasket replacement
 - vi) priming of oil pump
10. Identify types of couplings and describe their characteristics and applications.
11. Describe the procedures used to test and inspect fuel pumping systems.

12. Describe the procedures used to test and inspect auxiliary pumps.
13. Describe the procedures used to troubleshoot and repair fuel pumping systems.
14. Describe the procedures used to troubleshoot and repair auxiliary pump.
15. Describe the purpose and function of nozzles.
16. Identify types of nozzles and nozzle adapters, and describe their characteristics and applications.
 - i) determine required gph (capacity)
 - ii) spray angle
 - iii) spray pattern
17. Explain how pump pressure, specific gravity and viscosity have an effect on nozzles.
18. Describe the procedures used to install and maintain nozzles.
19. Describe the procedures used to test nozzles.
 - i) nozzle application test
 - ii) complete combustion analysis
20. Describe the procedures used to install and replace oil filters, their purpose and applications.
21. Describe the procedures used to troubleshoot and repair possible problems encountered in working with nozzles and oil filters.
22. Describe the procedures used to maintain test equipment and instruments.
23. Describe how test readings are used to diagnose fuel delivery problems.
 - i) check burner shutdown
 - ii) observe flame
 - iii) look for air leaks
 - iv) check burner operating period
24. Describe common problems indicated by test readings.
25. Describe the procedures used to estimate fuel savings.

Practical Objectives:

N/A

OHT-220

Chimneys, Venting and Draft Control

Learning Outcomes:

- Demonstrate knowledge of chimneys, venting and draft control and their components.
- Demonstrate knowledge of the procedures used to install, maintain, troubleshoot and repair chimneys, venting and draft.

2015 National Occupational Analysis Reference:

- 5.06 Connects vent/exhaust piping to appliance.
- 8.01 Selects venting systems.
- 8.02 Prepares location for termination.
- 8.03 Installs venting components.
- 8.04 Secures venting system to structure.
- 9.03 Assembles equipment and components.
- 12.02 Cleans components.
- 13.04 Checks for problem with combustion air and make-up air.

Suggested Hours:

18 Hours

Theoretical Objectives:

1. Define terminology associated with chimneys, venting and draft control.
2. Identify hazards and safe work practices associated with chimneys, venting and draft control.
3. Interpret codes, standards and regulations pertaining to chimneys.
4. Explain the effect of draft and describe its purpose.
 - i) natural
 - ii) mechanical
 - iii) induced
5. Describe the procedures used to maintain adequate chimney draft.
 - i) location
 - ii) chimney size
 - iii) temperature
6. Describe the procedures used to troubleshoot and repair potential chimney problems affecting draft and their symptoms.

7. Explain how chimney draft is measured.
8. Explain the effects of improper draft.
 - i) air leakage
 - ii) standby losses
 - iii) burner air delivery
 - iv) spillage
9. Identify types of draft regulators and describe their purpose and operation.
10. Identify direct venting, draft inducers, power venting, and explain their operation and applications.
11. Identify the considerations of a sealed combustion direct vent system, its operation and applications.
12. Interpret the CSA codes related to venting.
 - i) draft regulator
 - ii) blocked vent switch
 - iii) venting clearance to combustibles
13. Describe the procedures used to install and size a stainless steel chimney.
14. Identify types of sealants.
 - i) high-temperature silicone
 - ii) refractory/cement

Practical Objectives:

Instructor Demonstration:

1. Install and size a stainless steel chimney.
2. Regulate chimney draft.
3. Troubleshoot and repair potential chimney problems affecting draft.

OHT-225

Motors

Learning Outcomes:

- Demonstrate knowledge of motors, their components, applications and operation.
- Demonstrate knowledge of the procedures used to select, replace, troubleshoot and maintain motors and their components.

2015 National Occupational Analysis Reference:

- 11.03 Checks accessories and components.
- 12.04 Lubricates moving components.
- 13.01 Checks for electrical problems.
- 14.01 Corrects electrical problems.

Suggested Hours:

15 Hours

Theoretical Objectives:

1. Define terminology associated with motors.
2. Identify hazards and describe safe work practices associated with motors.
3. Identify types of motors found on heating systems and describe their characteristics and applications.
4. Identify types of split phase centrifugal switch motors and describe their characteristics.
 - i) starting draw
5. Identify types of split phase centrifugal switch motor components and describe their purpose and applications.
 - i) start switch
 - ii) overload switch
 - iii) internal wiring
 - iv) connections
 - v) capacitors
 - vi) rotation
6. Identify types of bearings and describe their purpose and applications.
 - i) lubrication
7. Describe the procedures used to select and replace motors.

8. Describe the procedures used to troubleshoot and maintain motors and remedial action to be taken.
 - i) malfunction
 - ii) motor replacement
 - iii) inspection
 - iv) amperage draw
 - lock rotor amperage

9. Identify types of permanent split capacitor motor components and describe their purpose and applications.
 - i) internal wiring
 - ii) connections
 - iii) capacitors
 - iv) rotation
 - v) impedance protection

10. Identify types of electronically commutated motor components and describe their purpose and applications.
 - i) internal wiring
 - ii) connections
 - iii) capacitors
 - iv) rotation
 - v) impedance protection

Practical Objectives:

1. Select and replace motors.
2. Troubleshoot and maintain motors and capacitors.

OHT-230

Ignition Systems

Learning Outcomes:

- Demonstrate knowledge of ignition systems, their components, applications and operation.
- Demonstrate knowledge of the procedures used to set up, test, maintain and troubleshoot transformers and ignitors.

2015 National Occupational Analysis Reference:

- 13.01 Checks for electrical problems.
- 13.02 Checks for burner problems.
- 14.02 Corrects burner problems.

Suggested Hours:

15 Hours

Theoretical Objectives:

1. Define terminology associated with ignition systems.
2. Identify hazards and describe safe work practices pertaining to ignition systems.
3. Explain the purpose of ignition system and their operation.
4. Identify tools and equipment relating to ignition systems and describe their applications and procedures for use.
5. Identify types of ignition transformer components and describe their purpose and operation.
6. Describe primary and secondary voltage and their relationship.
7. Explain the relationship between voltage and amperage, and the dangers presented through handling transformers as a result.
8. Identify the factors to consider when selecting ignition transformers, ignitors and the significance of each.
 - i) mounting plates
 - ii) terminals

9. Describe the procedures used to wire an ignition transformer into the circuit.
 - i) interrupted ignition
 - ii) intermittent ignition
10. Explain the characteristics of the solid state electronic ignition.
11. Identify types of insulators and describe their characteristics and operation.
12. Identify the methods used to provide an efficient path to the ignition electrodes and describe their associated procedures.
 - i) ignition cable
 - ii) buss bars
 - iii) spring clips
13. Identify types of ignition electrodes and their components and describe their applications and procedures for use.
 - i) rods
 - ii) holders
 - iii) porcelain/ceramic insulators
14. Describe the procedures used to set up electrode adjustment.
15. Describe the procedures used to test transformers and ignitors.
16. Identify types of problems caused by improper electrode adjustment.
17. Describe the procedures used to test and set electrodes.
18. Describe the procedures used to maintain ignition equipment.
19. Identify types of common ignition failure problems and describe their characteristics and causes.
20. Identify types of ignition control systems and describe their purpose and operations.
 - i) intermittent ignition
 - ii) interrupted ignition
21. Explain the effect of defective ignition and describe their causes.
22. Describe the procedures used to inspect and troubleshoot ignition systems.

Practical Objectives:

1. Set up or adjust electrodes.
2. Test transformers and ignitors.
3. Test and inspect electrodes.
4. Maintain ignition equipment.
5. Inspect and troubleshoot ignition systems.

OHT-235

Electricity II (Electrical Devices)

Learning Outcomes:

- Demonstrate knowledge of electrical devices components, their accessories and characteristics.
- Demonstrate knowledge of the procedures used to select, install, maintain, test and troubleshoot electrical devices.

2015 National Occupational Analysis Reference:

- 10.01 Selects controls and components.
- 10.02 Selects location of controls and components.
- 10.03 Installs controls and components.
- 11.01 Cycles appliance controls.
- 11.02 Checks operating and safety controls.
- 11.03 Checks accessories and components.
- 11.04 Set up operating parameters.
- 13.01 Checks for electrical problems.
- 14.01 Corrects electrical problems.

Suggested Hours:

30 Hours

Theoretical Objectives:

1. Define terminology associated with electrical devices as related to the trade.
2. Identify hazards and describe safe work practices pertaining to electrical devices.
3. Identify the components of an electronic system.
4. Identify tools and equipment used to test electrical devices and describe their applications and procedures for use.
5. Identify types of relay circuits and describe their applications, principles and operation.
6. Explain principles of electromagnetic (solenoid) valves and their function.
7. Identify switching relays and describe their characteristics and purpose.
8. Describe the procedures used to install relays.

9. Explain the purpose and operation of transformers.
10. Describe the procedures used to troubleshoot and maintain relays.
11. Identify types of resistors and circuit breakers, and describe their characteristics and purpose.
12. Identify types of timing devices and describe their purpose.
13. Explain the operating principles of electric motors.
14. Identify types of switches and describe their applications.
 - i) main switch
 - ii) burner control
 - iii) limit control
 - iv) timers
 - v) thermostats
 - vi) relays
 - vii) safety switches
15. Explain switch terminology.
 - i) SPST
 - ii) SPDT
 - iii) DPST
 - iv) DPDT
 - v) direct
 - vi) reverse acting
16. Explain electrical switches and describe their operating principles and applications.
 - i) safety
 - lockout/tag out procedures
 - ii) interlock system
17. Identify types of switches and describe their characteristics and applications.
 - i) micro
 - snap-acting
 - ii) mercury switches
 - hazardous waste disposal
18. Describe the procedures used to troubleshoot, test and maintain switches.

Practical Objectives:

1. Install relays.
2. Troubleshoot and test switches.

OHT-240

Controls and Wiring

Learning Outcomes:

- Demonstrate knowledge of controls and wiring, their characteristics and applications.
- Demonstrate knowledge of controls and wiring components and accessories, their applications and operation.
- Demonstrate knowledge of the procedures used to install, connect, troubleshoot, maintain, repair and test controls and wiring.
- Demonstrate knowledge of solid state and programmable controls.
- Demonstrate knowledge of the procedures used to select and install controls and their components.
- Demonstrate knowledge of the procedures used to troubleshoot and maintain solid state and programmable controls.

2015 National Occupational Analysis Reference:

- 10.01 Selects controls and components.
- 10.02 Selects location of controls and components.
- 10.03 Installs controls and components.
- 11.01 Cycles appliance controls.
- 11.02 Checks operating and safety controls.
- 11.03 Checks accessories and components.
- 11.04 Set-up operating parameters.
- 13.01 Checks for electrical problems.
- 14.01 Corrects electrical problems.

Suggested Hours:

30 Hours

Theoretical Objectives:

1. Define terminology associated with controls and wiring.
2. Identify hazards and describe safe work practices pertaining to controls and wiring.
3. Define terminology associated with solid state and programmable controls.
4. Identify hazards and describe safe work practices pertaining to solid state and programmable controls.
5. Explain the theory of electronics, solid state and programmable controls.

6. Interpret codes and regulations pertaining to controls and wiring.
7. Interpret and use schematic and pictorial diagrams.
8. Identify types of thermostats and describe their characteristics and applications.
 - i) low voltage
 - ii) line voltage
 - iii) mercury switch
 - iv) snap-acting switch (gas)
 - v) programmable
 - function of the battery
 - programming (night setback)
9. Describe the function of a thermostat.
 - i) heat anticipation
 - ii) differential
 - iii) cycle rate
10. Describe the procedures used to install types of thermostats.
11. Describe the procedures used to install thermostat accessories.
 - i) size of wires
 - ii) wiring
 - iii) mercury switch (level)
 - iv) location
 - v) height
 - vi) connections to associated controls
 - vii) code and MFG instructions
12. Describe the procedures used to troubleshoot and maintain thermostats.
13. Describe the function of a limit control.
 - i) operating limit
 - ii) low limit
 - iii) high limit
 - iv) combination limit controls (fan & limit, indoor/outdoor)
 - v) direct
 - vi) reverse acting
 - vii) air proving switch
14. Describe the procedures used to install limit controls.
 - i) airstat
 - ii) aquastat
 - surface mount

- immersion
 - wells
 - iii) pressuretrol
 - iv) code rulings for limit controls
 - v) setting of limit controls
 - wiring of limit controls
 - MFG instructions
 - low water cut-off (level)
15. Describe the procedures used to troubleshoot, test and maintain limit controls.
 - i) contact position
 - ii) arcing
 - iii) expected voltage
 - iv) electric meter
 - v) sensing elements
 - vi) pigtail for a pressuretrol
 - vii) blow down and check the LWCO
 16. Describe the procedures to verify operation for safety and function of limit controls.
 17. Identify types of primary controls used in the oil heat industry and describe their purpose.
 18. Identify types of stack mounted primary controls and describe their applications and sequence of operation.
 19. Identify types of Cad Cell primary controls and describe their applications and sequence of operation.
 20. Identify the tools used to troubleshoot Cad Cell primary controls.
 21. Describe the procedures used to locate and wire controls to perform a specific function.
 22. Describe the procedures used to test controls for proper operation.
 23. Describe the procedures used to troubleshoot, locate and maintain controls.
 24. Describe the procedures used to program controls.
 - i) outdoor reset controls
 - ii) prioritizing functions
 25. Identify types of oil burning equipment components used with electronic controls and describe their applications.

26. Describe the procedures used to troubleshoot electronic circuits.
 - i) locate the defective components
 - ii) test methods
 - iii) interpretation of test results
 - iv) corrective action
27. Describe the procedures used to test operation for safety and efficiency.
28. Describe the procedures used to interpret results of the tests related to controls and wiring.

Practical Objectives:

1. Install and program thermostats and components.
2. Troubleshoot thermostats.
3. Install, troubleshoot and test limit controls.
4. Locate and wire controls.
5. Test, troubleshoot and locate controls.
6. Interpret and use schematic and pictorial diagrams.

OHT-245 Planned Maintenance

Learning Outcomes:

- Demonstrate knowledge of testing, repairing, lubricating and decommissioning procedures for heating systems.

2015 National Occupational Analysis Reference:

- 2.01 Communicates with others.
- 2.04 Completes documentation.
- 12.01 Checks oil-fired heating system and components.
- 12.02 Cleans components.
- 12.03 Changes preventative maintenance components.
- 12.04 Lubricates moving components.
- 13.02 Checks for burner problems.
- 13.03 Checks for distribution problems.
- 13.04 Checks for problems with combustion air and make-up air.
- 15.01 Decommissions appliance and components.

Suggested Hours:

24 Hours

Theoretical Objectives:

1. Define terminology associated with testing, repairing, lubricating and decommissioning heating systems.
2. Identify hazards and describe safe work practices pertaining to testing, repairing, lubricating and decommissioning heating systems.
3. Interpret codes and regulations pertaining to testing, repairing, lubricating and decommissioning heating systems.
4. Explain the importance of testing, repairing, lubricating and decommissioning to ensure optimal system performance.
 - i) reduction of service calls
 - ii) efficiency
 - iii) life of equipment
 - iv) customer comfort and satisfaction
 - v) safety

5. Identify requirements and limitations pertaining to testing, repairing, lubricating and decommissioning heating systems.
6. Identify tools and instruments used in testing, repairing, lubricating and decommissioning heating systems, and describe their applications and procedures for use.
7. Identify types of components to be serviced during annual maintenance.
8. Describe the procedures used to adopt a systematic approach and sequence to planned maintenance.
9. Describe the procedures used to inspect and maintain types of heating systems.
10. Describe the procedures for testing limit and safety controls on appliances.
11. Describe the procedures used to check heating systems and their components during their annual maintenance.
12. Describe the procedures used to disassemble and clean or replace components of types of heating systems.
13. Describe the procedures used to reassemble and set up types of heating systems.
14. Identify factors to consider when evaluating system efficiency and adjustments made to ensure safe and efficient operation of the system.

Practical Objectives:

1. Inspect various types of heating systems, test components and complete any required adjustments.
2. Disassemble, clean and reassemble components of various types of heating systems.
3. Perform and complete efficiency test and documentation.

Level 3

OHT-300 Combustion Chambers

Learning Outcomes:

- Demonstrate knowledge of combustion chambers, their components, applications and operation.
- Demonstrate knowledge of the procedures used to dispose of waste products.
- Demonstrate knowledge of the procedures used to size, select, install, maintain, repair, test and troubleshoot combustion chambers (prefabricated).

2015 National Occupational Analysis Reference:

- 1.08 Uses personal protective equipment (PPE) and safety equipment.
- 12.02 Cleans components.
- 12.03 Changes preventative maintenance components.
- 15.02 Disposes waste products.

Suggested Hours:

6 Hours

Theoretical Objectives:

1. Define terminology associated with combustion chambers.
2. Describe the characteristics of combustion chambers and the relationship to efficient combustion.
 - i) size
 - ii) shape
3. Identify hazards and describe safe work practices pertaining to combustion chambers.
4. Interpret codes and regulations pertaining to combustion chambers.
5. Identify hazardous materials and practices for safe handling.
6. Identify types of manufactured combustion chamber components and describe their characteristics and applications.
 - i) common fire brick
 - ii) insulating fire brick
 - iii) metal
 - iv) ceramic
 - v) soft fibre materials-wet and dry

7. Identify types of insulation and describe their applications and procedures for use.
8. Describe the procedures used to install and replace combustion chambers.
9. Describe the relationship of the nozzle location to the combustion chamber.
10. Describe the procedures used to clean, repair and inspect combustion chambers.
11. Describe chamberless firing.

Practical Objectives:

1. Inspect combustion chambers.

OHT-305 Planning and Estimating

Learning Outcomes:

- Demonstrate knowledge of the procedures used to plan and organize jobs.
- Demonstrate knowledge of the procedures used to produce material take-off lists.
- Demonstrate knowledge of the procedures used to take field measurements.

2015 National Occupational Analysis Reference:

- 2.06 Performs basic distribution layout.
- 2.07 Organizes material and components.
- 9.01 Selects equipment and components.
- 9.02 Prepares location of equipment and components for combustion air and make-up air.

Suggested Hours:

24 Hours

Theoretical Objectives:

1. Define terminology associated with planning and estimating.
2. Identify types of material take-off lists and describe their applications and the procedures used to produce them.
 - i) material estimation
 - ii) material installation
 - iii) material layout
3. Identify sources of information relevant to job planning.
 - i) documentation
 - ii) drawings
 - iii) specifications
 - iv) related professionals
 - v) clients
 - vi) leadership in energy and environmental design (LEED) requirements
 - vii) computer technology
 - viii) codes
4. Describe the procedures used to take field measurements.

5. Describe the considerations for determining job requirements.
 - i) personnel
 - ii) tools and equipment
 - iii) material and supplies
 - iv) permits
6. Describe the procedures used to plan job tasks.
 - i) scheduling
 - ii) estimating
7. Describe the procedures used to organize, store and maintain inventory.
8. Describe safety requirements for handling materials and equipment.
9. Describe the procedures used to plan for a job.
 - i) equipment requirements
 - ii) duct sizing
 - iii) penetration locations
 - iv) site measurements
 - v) demolishing and removing existing systems and components
 - vi) on-site coordination
 - vii) staging
 - storing material
 - viii) distributing
 - material to installation area
 - ix) sectioning
 - pre-assembling on-site
 - x) final inspection and commissioning
 - xi) type and size of piping
 - xii) type of venting systems
 - xiii) type of fuel storage systems

Practical Objectives:

1. Take field measurements.
2. Complete estimates and plan materials.

OHT-310 Retrofit Systems

Learning Outcomes:

- Demonstrate knowledge of retrofit systems, their components, applications and operation.
- Demonstrate knowledge of the procedures used to install, maintain, repair, test and troubleshoot retrofit systems.
- Demonstrate knowledge of the procedures used to connect fuel and electrical supply to an appliance.

2015 National Occupational Analysis Reference:

- 5.03 Installs components to appliance.
- 5.04 Connects fuel supply to appliance.
- 5.05 Connects electrical supply to appliance.
- 5.06 Connects vent/exhaust piping to appliance.
- 6.01 Assembles ductwork.
- 12.01 Checks oil-fired heating system and components.
- 13.01 Checks for electrical problems.
- 13.02 Checks for burner problems.
- 13.03 Checks for distribution problems.
- 13.04 Checks for problems with combustion air and make-up air.

Suggested Hours:

21 Hours

Theoretical Objectives:

1. Define terminology associated with retrofit systems.
2. Identify hazards and describe safe work practices pertaining to retrofit systems.
3. Interpret codes and regulations pertaining to retrofit systems.
4. Identify tools and equipment relating to retrofit systems and describe their applications and procedures for use.
5. Identify sources of heat loss and their effects on efficiency.
 - i) off-cycle
 - ii) on-cycle
 - iii) jacket loss
 - iv) pipe and duct loss

6. Identify factors to consider for draft regulators/barometric dampers and describe their operation and contribution to the reduction of heat loss.
7. Identify the methods of heat loss reduction used in retrofit systems and describe their associated procedures.
 - i) insulation and air sealing
 - ii) appliance turbulator (baffle) replacement
 - iii) venting system
 - iv) appliance location
 - v) burner
8. Identify the advantages of regular system tune ups and describe their characteristics and procedures for use.
9. Describe the procedures used to tune up a heating system.
10. Describe the procedures used to calculate heating requirements.
11. Describe the procedures used to safely remove an existing appliance or system.
12. Describe the procedures used to remove an existing oil fired appliance.
13. Describe the procedures used to install a retrofit system.
14. Describe the procedures used to test a fire-heating unit.
15. Describe the procedures used to install an outdoor reset or boiler reset control and its effects on efficiency.

Practical Objectives:

Instructor Demonstration:

1. Tune up a heating system.
2. Calculate heating requirements.
3. Install a retrofit system.
4. Test fire-heating unit.

OHT-315 Troubleshooting

Learning Outcomes:

- Demonstrate knowledge of the procedures used to troubleshoot oil-fired heating systems and its components.

2015 National Occupational Analysis Reference:

- 12.01 Checks oil-fired heating system and components.
- 12.02 Cleans components.
- 13.01 Checks for electrical problems.
- 13.02 Checks for burner problems.
- 13.03 Checks for distribution problems.
- 13.04 Checks for problems with combustion air and make-up air.
- 14.01 Corrects electrical problems.
- 14.02 Corrects burner problems.
- 14.03 Corrects distribution problems.

Suggested Hours:

36 Hours

Theoretical Objectives:

1. Define terminology associated with the troubleshooting of an oil-fired heating system and its components.
2. Identify hazards and describe safe work practices pertaining to the troubleshooting of an oil-fired heating system and its components.
3. Interpret codes and regulations pertaining to the troubleshooting of an oil-fired heating system and its components.
4. Identify tools and equipment used to troubleshoot oil-fired heating system components, and describe their applications, limitations and procedures for use.
5. Identify types of oil-fired heating system components and describe their applications.
6. Identify possible causes of no heat and the procedures used to prevent and repair.
7. Describe the procedure used to diagnose system faults in oil-fired heating system components.

8. Describe the procedures used to diagnose system faults and their components.
 - i) oil delivery
 - ii) electrical circuit
 - iii) flame adjustment
 - iv) heating systems
 - v) venting systems
 - vi) mechanical components

9. Describe the procedures used to repair system faults and their components.

Practical Objectives:

1. Diagnose system faults and their components.
2. Repair system faults and their components.

OHT-320

Zoning

Learning Outcomes:

- Demonstrate knowledge of zoning systems.
- Demonstrate knowledge of the procedures used to install zones for wood/oil systems.

2015 National Occupational Analysis Reference:

- 5.07 Installs zones for wood/oil systems.
- 14.01 Corrects electrical problems.

Suggested Hours:

21 Hours

Objectives and Content:

1. Define terminology associated with zoning systems.
2. Identify hazards and describe safe work practices pertaining to zoning systems.
3. Interpret related information associated with zoning.
4. Explain the benefits of zoning and its applications.
 - i) operation of burner
 - ii) systems efficiency
5. Identify types of zone valves and describe their characteristics and applications.
 - i) water
 - ii) steam
6. Interpret information founding on wiring schematics for hot water zoning installations.
 - i) troubleshoot zone valves
 - ii) switching relays
 - iii) zone control panels
 - iv) circulators
 - v) thermostatic valves
7. Describe the procedures used to size and design zoning systems.
 - i) warm air
 - ii) hot water

8. Describe the procedures used to install a 3-zone hot water system.
 - i) normally opened (N/O) zone valves
 - ii) normally closed (N/C) zone valves
 - iii) end switch
 - iv) pressure differential bypass valve
9. Describe the procedures used to install circulators and flow control valves for hot water zoning.
10. Interpret the wiring schematics for warm air zoning installations.
11. Identify types of warm air zone dampers and describe their characteristics, operation and applications.
12. Describe the procedures used to install dump zones.
 - i) warm air
 - ii) hot water
13. Describe the procedures used to troubleshoot, repair and maintain zoning systems.
 - i) warm air
 - ii) hot water

Practical Objectives:

Instructor Demonstration:

1. Install circulators for hot water zoning.
2. Install dump zones.
3. Troubleshoot and repair zoning systems.
4. Balance the system during commissioning.

OHT-325

Specialized Systems

Learning Outcomes:

- Demonstrate knowledge of specialized systems and their applications.
- Demonstrate knowledge of the procedures used to select and install fuel and electrical supply components to appliances.

2015 National Occupational Analysis Reference:

- 1.04 Uses measuring and testing equipment.
- 4.01 Selects fuel supply components.
- 4.02 Installs fuel supply components.
- 5.01 Selects appliance.
- 5.02 Positions appliance.
- 5.03 Installs components to appliance.
- 5.04 Connects fuel supply to appliance.
- 5.05 Connects electrical supply to appliance.
- 5.06 Connects vent/exhaust piping to appliance.
- 8.02 Prepares location for termination.
- 8.03 Installs venting components.

Suggested Hours:

36 Hours

Theoretical Objectives:

1. Define terminology associated with specialized systems.
2. Identify hazards and describe safe work practices pertaining to specialized systems.
3. Identify types of used oil burners and describe their characteristics and applications.
 - i) high pressure
 - ii) low pressure
4. Describe types of used oil storage systems.
5. Interpret codes and regulations pertaining to specialized systems.
6. Explain the oil supply system for vapourizing burners.
 - i) wall lift pump
 - ii) day tank
 - iii) installation

7. Identify tools and equipment used for the installation of specialized systems and describe their application, limitations and procedures for use.
8. Identify types of vapourizing oil burners and describe their characteristics and applications.
 - i) natural draft pot-type
 - ii) forced draft
9. Describe the procedures used to service, adjust and calibrate a constant level valve.
10. Describe the procedures used to install and service natural and forced draft vapourizing burners.
 - i) code requirements
 - ii) oil flow control valve
 - iii) level seating of the burner
 - iv) draft requirements
11. Describe the procedures used to troubleshoot and maintain vapourizing oil burners.
 - i) position of flame rings
 - ii) oil flow control valve
 - iii) draft regulator
12. Identify types of combo systems and their components, and describe their applications, principles and operation.
 - i) fan coil
13. Describe the procedures used to install a combo-system.
14. Describe the procedures used to perform routine maintenance of a combo-system.

Practical Objectives:

1. Service, adjust and calibrate a constant level valve.
2. Install and service natural and forced draft vapourizing burners.
3. Troubleshoot vapourizing oil burners.
4. Install and service a combo-system.

OHT-330

Mentoring II

Learning Outcomes:

- Demonstrate knowledge of strategies for teaching workplace skills.

2015 National Occupational Analysis Reference:

N/A

Suggested Hours:

6 Hours

Theoretical Objectives:

1. Explain how one's own learning preferences relate to learning new skills.
2. Identify different learning styles.
 - i) seeing it
 - ii) hearing it
 - iii) trying it
3. Identify different learning needs and strategies to meet learning needs.
 - i) learning disabilities
 - ii) learning preferences
 - iii) language proficiency
4. Identify strategies to assist in learning a skill.
 - i) understanding the principles of instruction
 - ii) developing coaching skills
 - iii) being mature and patient
 - iv) providing feedback
5. Identify different roles played by a workplace mentor.
6. Describe the importance of individual experience.
7. Describe the shared responsibilities for workplace learning.
8. Describe the importance of different types of skills in the workplace.

9. Describe the importance of essential skills in the workplace.
 - i) reading
 - ii) writing
 - iii) document use
 - iv) oral communication
 - v) numeracy
 - vi) thinking
 - vii) working with others
 - viii) digital technology
 - ix) continuous learning
10. Describe teaching skills.
11. Explain the importance of identifying the point of a lesson.
12. Identify how to choose a good time to present a lesson.
13. Explain the importance of linking the lessons.
14. Explain how to adjust a lesson to different situations.
15. Identify the components of the skill (context).
16. Describe considerations in setting up opportunities for skill practice.
17. Explain the importance of providing feedback.
18. Identify techniques for giving effective feedback.
19. Identify methods of assessing progress.
20. Describe a skills assessment.

Practical Objectives:

N/A

OHT-335

Program Review

Learning Outcomes:

- Demonstrate knowledge of the National Occupational Analysis (NOA) and its relationship to the Interprovincial Examination.
- Demonstrate knowledge of overall comprehension of the trade in preparation for the Interprovincial Examination.

2015 National Occupational Analysis Reference:

N/A

Suggested Hours:

30 Hours

Theoretical Objectives:

1. Define terminology associated with a National Occupational Analysis (NOA).
 - i) major work activities
 - MWA/block
 - ii) tasks
 - iii) sub-tasks
2. Explain how a NOA is developed and the link it has to the Interprovincial Examination.
 - i) development
 - ii) validation
 - iii) MWA/block and task weighting
 - iv) examination breakdown
3. Identify Red Seal products and describe their use when preparing for the Interprovincial Examination.
 - i) red seal website
 - ii) examination preparation guide
 - iii) examination counselling sheets
 - iv) sample questions
 - v) preparation checklists
4. Explain the relationship between the NOA and the Curriculum Standard.

5. Review common occupational skills for the Oil Heat System Technician trade as identified in the NOA.
 - i) uses tools and equipment
 - ii) organizes work
6. Review fuel supply and storage systems for the for the Oil Heat System Technician trade as identified in the NOA.
 - i) install fuel storage tanks
 - ii) installs fuel system
7. Review oil-fired heating systems for Oil Heat System Technician trade as identified in the NOA.
 - i) installs and retrofits oil-fired and wood/oil appliances and components
 - ii) installs forced-air heating systems
 - iii) installs hydronic heating systems
8. Review venting, combustion air and make-up air for the Oil Heat System Technician trade as identified in the NOA.
 - i) selects venting system
 - ii) installs equipment and components for combustion air and make-up air
9. Review electrical and electronic Systems for the Oil Heat System Technician trade as identified in the NOA.
 - i) installs electrical and electronic systems
 - ii) tests electrical and electronic systems
10. Review maintenance, diagnosis, repair and removal systems and components for the Oil Heat System Technician trade as identified in the NOA.
 - i) maintains oil-fired heating systems and components
 - ii) diagnoses oil-fired heating systems and components
 - iii) repairs oil-fired heating systems and components
 - iv) removes appliances and components

Practical Objectives:

N/A

Feedback and Revisions

This AACS will be amended periodically; comments or suggestions for improvements should be directed to:

New Brunswick:

Apprenticeship and Occupational
Certification
Post-Secondary Education, Training and
Labour
470 York St., Rm. 110, PO Box 6000
Fredericton, NB E3B 5H1
Tel: 506-453-2260
Toll Free in NB: 1-855-453-2260
www.gnb.ca

Prince Edward Island:

Apprenticeship, Training and Certification
Workforce and Advanced Learning
176 Great George St., PO Box 2000
Charlottetown, PE C1A 7N8
Tel: 902-368-4460
www.apprenticeship.pe.ca

Newfoundland and Labrador:

Apprenticeship and Trades Certification
Immigration, Population Growth and Skills
Confederation Building, West Block
Prince Philip Dr., PO Box 8700
St. John's, NL A1B 4J6
Toll Free: 877-771-3737
<https://www.gov.nl.ca/atcd/>

Nova Scotia:

Nova Scotia Apprenticeship Agency
2021 Brunswick St., PO Box 578
Halifax, NS B3J 2S9
Tel: 902-424-5651
Toll Free in NS: 1-800-494-5651
www.nsapprenticeship.ca

Any comments or suggestions received will be reviewed and considered to determine the course of action required. If the changes are deemed to be minor, they will be held for implementation during the next review cycle. If immediate change is deemed appropriate and approved by the Atlantic Trade Advisory Committee, it will result in a revision to this version of the AACS and will be detailed in the following section.

Version Changes

Revision Date	Section	Description of Change