
Plan of Training

PLUMBER



Government of Newfoundland and Labrador
Department of Advanced Education and Skills
Apprenticeship and Trades Certification Division

MARCH 2011

PLAN OF TRAINING

Plumber

March 2011



Government of Newfoundland and Labrador
Department of Education
Institutional and Industrial Education Division

Approved by:

A handwritten signature in cursive script that reads "Paula Flood".

Chairperson, Provincial Apprenticeship and Certification Board

Date: March 15, 2011

Preface

This Apprenticeship Standard is based on the 2010 edition of the National Occupational Analysis for Plumber trade.

This document describes the curriculum content for the Plumber apprenticeship-training program and outlines each of the technical training units necessary for the completion of apprenticeship.

Acknowledgements

Advisory committees, industry representatives, instructors and apprenticeship staff provided valuable input to the development of this Apprenticeship Curriculum Standard. Without their dedication to quality apprenticeship training, this document could not have been produced.

We offer you a sincere thank you.

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A. NOA Comparison Table

2010 NOA Task and Sub-tasks		2011 POT	
Task 1 Performs safety-related functions.			
1.01	Maintains safe work environment.	TS-1510	Occupational Health and Safety
		TS-1520	WHMIS
		TS-1530	Standard First Aid
		PF-1020	Job Site Safety
		PF-1340	Tools and Equipment
		PF-1370	Rigging
1.02	Uses personal protective equipment (PPE) and safety equipment.	PF-1340	Tools and Equipment
		TS-1510	Occupational Health and Safety
		PF-1020	Job Site Safety
1.03	Handles hazardous materials.	TS-1520	WHMIS
1.04	Performs lock-out and tag-out procedures.	PF-1020	Job Site Safety
Task 2 Uses and maintains tools and equipment.			
2.01	Maintains tools and equipment.	PF-1340	Tools and Equipment
2.02	Uses access equipment.	PF-1340	Tools and Equipment
		PF-1370	Rigging
2.03	Uses rigging, hoisting and lifting equipment.	PF-1370	Rigging
Task 3 Organizes work.			
3.01	Organizes project tasks and procedures.	PF-1370	Rigging
3.02	Organizes materials and supplies.	PF-1670	Residential Sanitary Drainage
		PF-1680	Residential Venting
		PF-2100	Blueprint 3 (Heavy Commercial/Industrial)

2010 NOA Task and Sub-tasks		2011 POT	
Task 4 Performs routine trade activities.			
4.01	Performs piping system layout.	PF-1390	Pipe and Tubing Fundamentals
		PF-1401	Steel Piping
		PF-1410	Copper Piping
		PF-1425	Plastic Piping
		PF-1610	Cast Iron Piping
		PF-1620	Non-Metallic Piping
		PF-2110	Aluminium Piping
4.02	Calculates pipe length.	PF-1390	Pipe and Tubing Fundamentals
		PF-1401	Steel Piping
		PF-1410	Copper Piping
		PF-1425	Plastic Piping
		PF-1610	Cast Iron Piping
		PF-1620	Non-Metallic Piping
		PF-2110	Aluminium Piping
4.03	Calculates piping offsets.	PF-1390	Pipe and Tubing Fundamentals
		PF-1401	Steel Piping
		PF-1410	Copper Piping
		PF-1425	Plastic Piping
		PF-1610	Cast Iron Piping
		PF-1620	Non-Metallic Piping
		PF-2110	Aluminium Piping
4.04	Installs piping with adequate support.	PF-1390	Pipe and Tubing Fundamentals
		PF-1401	Steel Piping
		PF-1410	Copper Piping
		PF-1425	Plastic Piping
		PF-1610	Cast Iron Piping
		PF-1620	Non-Metallic Piping
		PF-2110	Aluminium Piping

2010 NOA Task and Sub-tasks		2011 POT	
4.05	Installs sleeves.	PF-1390	Pipe and Tubing Fundamentals
		PF-1401	Steel Piping
		PF-1410	Copper Piping
		PF-1425	Plastic Piping
		PF-1610	Cast Iron Piping
		PF-1620	Non-Metallic Piping
		PF-2110	Aluminium Piping
4.06	Tests piping and plumbing systems.	PF-1390	Pipe and Tubing Fundamentals
		PF-1401	Steel Piping
		PF-1410	Copper Piping
		PF-1425	Plastic Piping
		PF-1610	Cast Iron Piping
		PF-1620	Non-Metallic Piping
		PF-2110	Aluminium Piping
4.07	Commissions systems.	PF-1710	Residential Appliances, Fixtures and Trim
		PF-2280	Commercial Appliances, Fixtures and Trim
		PF-3130	Commissioning
4.08	Protects piping systems, equipment and structure from damage.	PF-1450	Hydronic Heating 1
		PF-1640	Hot and Cold Water Supply
		PF-1650	Hot Water Storage Tanks and Heaters
		PF-1691	Storm Systems
		PF-2121	Hydronic Heating 2
4.09	Coordinates excavation and backfilling of trenches.	PF-1020	Job Site Safety
		PF-1700	Commercial Drainage, Waste and Venting 1
		PF-2271	Commercial Drainage, Waste and Venting 2
		PF-1630	Water Service
		PF-1691	Storm Systems

2010 NOA Task and Sub-tasks		2011 POT	
4.10		PF-1390	Pipe and Tubing Fundamentals
		PF-1401	Steel Piping
		PF-1410	Copper Piping
		PF-1425	Plastic Piping
		PF-2110	Aluminium Piping
		PF-1610	Cast Iron Piping
		PF-1620	Non-Metallic Piping
		PF-2150	Introduction to Gas Piping I (Low Pressure)
		PF-2271	Commercial Drainage, Waste and Venting 2
		PF-2320	Introduction to Gas Piping 2 (High Pressure)
Task 5 Prepares pipe.			
5.01	Inspects tube, tubing, pipe and fittings before installation.	PF-1390	Pipe and Tubing Fundamentals
		PF-1401	Steel Piping
		PF-1410	Copper Piping
		PF-1425	Plastic Piping
		PF-2110	Aluminium Piping
		PF-1610	Cast Iron Piping
		PF-1620	Non-Metallic Piping
5.02	Cuts tube, tubing and pipe.	PF-1390	Pipe and Tubing Fundamentals
		PF-1401	Steel Piping
		PF-1410	Copper Piping
		PF-1425	Plastic Piping
		PF-2110	Aluminium Piping
		PF-1610	Cast Iron Piping
		PF-1620	Non-Metallic Piping
5.03	Bends tube, tubing and pipe.	PF-1390	Pipe and Tubing Fundamentals
		PF-1401	Steel Piping
		PF-1410	Copper Piping

2010 NOA Task and Sub-tasks		2011 POT	
Task 6 Joins tube, tubing, pipe and fittings.			
6.01	Joins copper pipe.	PF-1410	Copper Piping
6.02	Joins plastic pipe.	PF-1425	Plastic Piping
6.03	Joins steel pipe.	PF-1401	Steel Piping
6.04	Joins cast iron pipe.	PF-1610	Cast Iron Piping
6.05	Joins specialized pipe.	PF-1620	Non-Metallic Piping
Task 7 Installs sewers.			
7.01		PF-1691	Storm Systems
		PF-1670	Residential Sanitary Drainage
		PF-1700	Commercial Drainage, Waste and Venting 1
		PF-1720	Rural Waste Disposal
		PF-2271	Commercial Drainage, Waste and Venting 2
		PF-2571	Commercial Drainage, Waste and Venting III
7.02	Installs manholes and catch basins.	PF-1691	Storm Systems
		PF-1700	Commercial Drainage, Waste and Venting 1
		PF-2271	Commercial Drainage, Waste and Venting 2
		PF-2571	Commercial Drainage, Waste and Venting III
7.03	Installs piping for sewers.	PF-1670	Residential Sanitary Drainage
		PF-1700	Commercial Drainage, Waste and Venting 1
		PF-1720	Rural Waste Disposal
		PF-2271	Commercial Drainage, Waste and Venting 2
		PF-2571	Commercial Drainage, Waste and Venting III
		PF-1691	Storm Systems
Task 8 Installs sewage treatment systems.			
8.01	Plans installation of sewage treatment systems.	PF-1691	Storm systems
		PF-1720	Rural Waste Disposal
		PF-2271	Commercial Drainage, Waste and Venting 2

2010 NOA Task and Sub-tasks		2011 POT	
8.02	Installs sewage treatment system components.	PF-1691	Storm systems
		PF-1720	Rural Waste Disposal
		PF-2271	Commercial Drainage, Waste and Venting 2
Task 9 Installs rough-in for interior drainage, waste and vent (DWV) systems.			
9.01	Sizes pipe for interior drainage, waste and vent (DWV) systems.	PF-1670	Residential Sanitary Drainage
		PF-1680	Residential Venting
		PF-1700	Commercial Drainage, Waste and Venting 1
		PF-2271	Commercial Drainage, Waste and Venting 2
		PF-2571	Commercial Drainage, Waste and Venting III
9.02	Installs underground piping and components for interior drainage, waste and vent (DWV) systems.	PF-1670	Residential Sanitary Drainage
		PF-1680	Residential Venting
		PF-1700	Commercial Drainage, Waste and Venting 1
		PF-2271	Commercial Drainage, Waste and Venting 2
		PF-2571	Commercial Drainage, Waste and Venting III
9.03	Installs piping and components for interior drainage, waste and vent (DWV) systems above ground.	PF-1670	Residential Sanitary Drainage
		PF-1680	Residential Venting
		PF-1700	Commercial Drainage, Waste and Venting 1
		PF-2271	Commercial Drainage, Waste and Venting 2
		PF-2571	Commercial Drainage, Waste and Venting III
Task 10 Installs water services.			
10.01	Sizes pipe for water services.	PF-1630	Water Service
		PF-1640	Hot and Cold Water Supply
		PF-1650	Hot Water Storage Tanks and Heaters
		PF-2541	Rural Water Supply
		PF-3100	Fire Protection

2010 NOA Task and Sub-tasks		2011 POT	
10.02	Installs piping for water services.	PF-1630	Water Service
		PF-1640	Hot and Cold Water Supply
		PF-1650	Hot Water Storage Tanks and Heaters
		PF-2541	Rural Water Supply
		PF-3100	Fire Protection
10.03	Installs water service equipment.	PF-1630	Water Service
		PF-1640	Hot and Cold Water Supply
		PF-1650	Hot Water Storage Tanks and Heaters
		PF-2541	Rural Water Supply
Task 11 Installs potable water distribution systems.			
11.01	Sizes piping and equipment for potable water distribution systems.	PF-1630	Water Service
		PF-1640	Hot and Cold Water Supply
		PF-1650	Hot Water Storage Tanks and Heaters
		PF-1710	Residential Appliances, Fixtures and Trim
		PF-2541	Rural Water Supply
11.02	Installs piping for potable water distribution systems.	PF-1630	Water Service
		PF-1640	Hot and Cold Water Supply
		PF-1650	Hot Water Storage Tanks and Heaters
		PF-2541	Rural Water Supply
11.03	Installs potable water distribution equipment.	PF-1630	Water Service
		PF-1640	Hot and Cold Water Supply
		PF-1650	Hot Water Storage Tanks and Heaters
		PF-2541	Rural Water Supply
		PF-1660	Water Treatment Systems
		PF-1710	Residential Appliances, Fixtures and Trim
11.04	Installs cross connection control devices.	PF-1450	Hydronic Heating 1
		PF-3100	Fire Protection
		PF-2310	Cross Connection Control

2010 NOA Task and Sub-tasks		2011 POT	
Task 12 Installs pressure systems.			
12.01	Sizes pressure systems	PF-1450	Hydronic Heating 1
		PF-1640	Hot and Cold Water Supply
		PF-1650	Hot Water Storage Tanks and Heaters
		PF-2150	Introduction to Gas Piping I (Low Pressure)
		PF-2121	Hydronic Heating 2
		PF-2320	Introduction to Gas Piping 2 (High Pressure)
		PF-2510	Compressed Air and Vacuum Systems
12.02	Installs piping for pressure systems.	PF-1450	Hydronic Heating 1
		PF-1640	Hot and Cold Water Supply
		PF-1650	Hot Water Storage Tanks and Heaters
		PF-2150	Introduction to Gas Piping I (Low Pressure)
		PF-2170	Medical Gas Systems
		PF-2121	Hydronic Heating 2
		PF-2320	Introduction to Gas Piping 2 (High Pressure)
		PF-2541	Rural Water Supply
		PF-2510	Compressed Air and Vacuum Systems

2010 NOA Task and Sub-tasks		2011 POT	
12.03	Installs equipment and components for pressure systems	PF-1450	Hydronic Heating 1
		PF-1710	Residential Appliances, Fixtures and Trim
		PF-2121	Hydronic Heating 2
		PF-2150	Introduction to Gas Piping I (Low Pressure)
		PF-2170	Medical Gas Systems
		PF-2280	Commercial Appliances, Fixtures and Trim
		PF-2320	Introduction to Gas Piping 2 (High Pressure)
		PF-2510	Compressed Air and Vacuum Systems
		PF-2580	Industrial/Commercial Appliances, Fixtures and Trim
Task 13 Installs plumbing fixtures and appliances.			
13.01	Installs fixture supports.	PF-1710	Residential Appliances, Fixtures and Trim
		PF-2280	Commercial Appliances, Fixtures and Trim
		PF-2580	Industrial/Commercial Appliances, Fixtures and Trim
13.02	Installs fixture supports.	PF-1710	Residential Appliances, Fixtures and Trim
		PF-2280	Commercial Appliances, Fixtures and Trim
		PF-2580	Industrial/Commercial Appliances, Fixtures and Trim
13.03	Installs plumbing appliances.	PF-1710	Residential Appliances, Fixtures and Trim
		PF-2580	Industrial/Commercial Appliances, Fixtures and Trim
		PF-2280	Commercial Appliances, Fixtures and Trim

2010 NOA Task and Sub-tasks		2011 POT	
Task 14 Installs water treatment systems.			
14.01	Sizes water treatment equipment	PF-1660	Water Treatment Systems
14.02	Installs water treatment equipment	PF-1660	Water Treatment Systems
Task 15 Installs low pressure steam systems.			
15.01	Sizes piping and components for low pressure steam systems.	PF-2121	Hydronic Heating 2
15.02	Installs piping and components for low pressure steam systems.	PF-2121	Hydronic Heating 2
Task 16 Installs hydronic heating and cooling piping systems.			
16.01	Sizes piping and components for hydronic systems.	PF-1450	Hydronic Heating 1
		PF-2121	Hydronic Heating 2
16.02	Installs piping for hydronic systems.	PF-1450	Hydronic Heating 1
		PF-2121	Hydronic Heating 2
16.03	Installs hydronic system components.	PF-1450	Hydronic Heating 1
		PF-2121	Hydronic Heating 2
Task 17 Installs hydronic heating and cooling generating systems and equipment.			
17.01	Installs hydronic heating generating systems.	PF-1450	Hydronic Heating 1
		PF-2121	Hydronic Heating 2
		PF-2350	Renewable Energy Systems
17.02	Installs hydronic cooling generating systems.	PF-1450	Hydronic Heating 1
		PF-2121	Hydronic Heating 2
		PF-2520	Chilled Water Systems
Task 18 Installs hydronic system controls and transfer units.			
18.01	Installs hydronic system controls.	PF-1450	Hydronic Heating 1
		PF-2121	Hydronic Heating 2
		PF-2350	Renewable Energy Systems
18.02	Installs hydronic transfer units.	PF-1450	Hydronic Heating 1
		PF-2121	Hydronic Heating 2
		PF2350	Renewable Energy Systems

2010 NOA Task and Sub-tasks		2011 POT	
Task 19 Installs piping and equipment for specialized systems.			
19.01	Installs piping for specialized systems.	PF-2170	Medical Gas Systems
		PF-3100	Fire Protection
		PF-2601	Swimming Pool Systems
		PF-2510	Compressed Air and Vacuum Systems
		PF-2520	Chilled Water Systems
		PF-2560	Food Processing Systems
		PF-2590	Lawn Sprinkler Systems
		PF-2350	Renewable Energy Systems
19.02	Installs equipment for specialized systems.	PF-2170	Medical Gas Systems
		PF-3100	Fire Protection
		PF-2170	Food Processing Systems
		PF-2510	Compressed Air and Vacuum Systems
		PF-2520	Chilled Water Systems
		PF-2601	Swimming Pool Systems
		PF-2590	Lawn Sprinkler Systems
		PF-2350	Renewable Energy Systems
19.03	Installs piping and equipment for nonpotable systems.	PF-1450	Hydronic Heating 1
		PF-2170	Food Processing Systems
		PF-3100	Fire Protection
		PF-2510	Compressed Air and Vacuum Systems
		PF-2520	Chilled Water Systems
		PF-2590	Lawn Sprinkler Systems
		PF-2601	Swimming Pool Systems
		PF-2350	Renewable Energy Systems
Task 20 Installs fire protection systems. (NOT COMMON CORE)			
20.01	Installs piping for standpipe systems. (NOT COMMON CORE)	PF-3100	Fire Protection
20.02	Installs equipment for standpipe systems. (NOT COMMON CORE)	PF-3100	Fire Protection

2010 NOA Task and Sub-tasks		2011 POT	
20.03	Installs fire protection systems for single family dwellings. (NOT COMMON CORE)	PF-3100	Fire Protection
20.04	Installs fire protection systems for industrial, commercial and institutional (ICI) buildings. (NOT COMMON CORE)	PF-3100	Fire Protection
Task 21 Installs process piping systems.			
21.01	Installs piping for process piping systems.	PF-2170	Food Processing Systems
		PF-2280	Commercial Appliances, Fixtures and Trim
21.02	Installs process piping system equipment.	PF-2170	Food Processing Systems
		PF-2280	Commercial Appliances, Fixtures and Trim
Task 22 Maintains systems and components.			
22.01	Monitors system performance.	PF-3130	Commissioning
22.02	Performs maintenance.	PF-3130	Commissioning
Task 23 Troubleshoots systems and components.			
23.01	Diagnoses plumbing-related systems and components.	PF-1650	Hot Water Storage Tanks and Heaters
		PF-2170	Medical Gas Systems
		PF-2541	Rural Water Supply
23.02	Repairs plumbing related systems and components.	PF-1440	Piping Valves
		PF-1450	Hydronic Heating 1
		PF-2150	Introduction to Gas Piping I (Low Pressure)
		PF-3130	Commissioning

B. Profile Chart

Occupational Skills			
TS-1510 Occupational Health and Safety	TS-1520 WHMIS	TS-1530 Standard First Aid	PF-1020 Job Site Safety
PF-1340 Tools and Equipment	PF-1370 Rigging	PF-1670 Residential Sanitary Drainage	PF-1680 Residential Venting
PF-2100 Blueprint 3 (Heavy Commercial/Industrial)	PF-1390 Pipe and Tubing Fundamentals	PF-1401 Steel Piping	PF-1410 Copper Piping
PF-1425 Plastic Piping	PF-1610 Cast Iron Piping	PF-1620 Non-Metallic Piping	PF-2110 Aluminium Piping
PF-1710 Residential Appliances, Fixtures and Trim	PF-2280 Commercial Appliances, Fixtures and Trim	PF-3130 Commissioning	PF-1450 Hydronic Heating 1
PF-1640 Hot and Cold Water Supply	PF-1650 Hot Water Storage Tanks and Heaters	PF-1691 Storm Systems	PF-2121 Hydronic Heating 2
PF-1700 Commercial Drainage, Waste and Venting 1	PF-2271 Commercial Drainage, Waste and Venting 2	PF-1630 Water Service	PF-2320 Introduction to Gas Piping 2 (High Pressure)
Piping Preparation and Assembly			
PF-1390 Pipe and Tubing Fundamentals	PF-1401 Steel Piping	PF-1410 Copper Piping	PF-1425 Plastic Piping
PF-1610 Cast Iron Piping	PF-1620 Non-Metallic Piping	PF-2110 Aluminium Piping	

Drainage, Waste, Vents and Sewage Treatment Systems			
PF-1691 Storm Systems	PF-1670 Residential Sanitary Drainage	PF-1700 Commercial Drainage, Waste and Venting 1	PF-1720 Rural Waste Disposal
PF-2271 Commercial Drainage, Waste and Venting 2	PF-2571 Commercial Drainage, Waste and Venting III	PF-1680 Residential Venting	
Water Service and Distribution			
PF-1630 Water Service	PF-1640 Hot and Cold Water Supply	PF-1650 Hot Water Storage Tanks and Heaters	PF-2541 Rural Water Supply
PF-3100 Fire Protection	PF-1630 Water Service	PF-1710 Residential Appliances, Fixtures and Trim	PF-1660 Water Treatment Systems
PF-1450 Hydronic Heating 1	PF-2310 Cross Connection Control	PF-1450 Hydronic Heating 1	PF-1640 Hot and Cold Water Supply
PF-1650 Hot Water Storage Tanks and Heaters	PF-2150 Introduction to Gas Piping I (Low Pressure)	PF-2121 Hydronic Heating 2	PF-2510 Compressed Air and Vacuum Systems
PF-2170 Medical Gas Systems	PF-2320 Introduction to Gas Piping 2 (High Pressure)	PF-1710 Residential Appliances, Fixtures and Trim	PF-2280 Commercial Appliances, Fixtures and Trim
PF-2580 Industrial/Commercial Appliances, Fixtures and Trim			

Fixtures, Appliances and Water Treatment Systems			
PF-1710 Residential Appliances, Fixtures and Trim	PF-2280 Commercial Appliances, Fixtures and Trim	PF-2580 Industrial/Commercial Appliances, Fixtures and Trim	PF-1660 Water Treatment Systems
Low Pressure Steam and Hydronic Heating and Cooling Systems			
PF-1450 Hydronic Heating 1	PF-2121 Hydronic Heating 2	PF-2350 Renewable Energy Systems	PF-2520 Chilled Water Systems
Specialized Systems			
PF-2170 Medical Gas Systems	PF-3100 Fire Protection	PF-2601 Swimming Pool Systems	PF-2510 Compressed Air and Vacuum Systems
PF-2520 Chilled Water Systems	PF-2560 Food Processing Systems	PF-2590 Lawn Sprinkler Systems	PF-2350 Renewable Energy Systems
PF-1450 Hydronic Heating 1	PF-2280 Commercial Appliances, Fixtures and Trim		
Maintenance and Repairs			
PF-1650 Hot Water Storage Tanks and Heaters	PF-2170 Medical Gas Systems	PF-2541 Rural Water Supply	PF-1440 Piping Valves
PF-1450 Hydronic Heating 1	PF-2150 Introduction to Gas Piping I (Low Pressure)	PF-3130 Commissioning	

C. Program Structure

For each and every course, a formal assessment is required for which 70% is the pass mark. A mark of 70% must be attained in both the theory examination and the practical project assignment, where applicable as documented on an official transcript.

The order of course delivery within each block can be determined by the educational agency, as long as pre-requisite conditions are satisfied.

Upon completion of an entry level program, individuals may be required to complete other certifications (employer or job site specific) in order to gain employment.

Block I			
Course No.	Course Name	Hours	Pre-Requisite(s)
TS1510	Occupational Health and Safety	6	None
TS1520	WHMIS	6	None
TS1530	Standard First Aid	14	None
PF1020	Job Site Safety	9	None
PF1340	Tools and Equipment	75	None
PF1350	Blueprint 1 (Basic Residential)	30	None
PF1360	Blueprint 2 (Advanced Residential/Light Commercial)	30	PF1350
PF1370	Rigging	39	None
PF1380	Introduction to Fuel Brazing and Cutting	45	PF1340
PF1390	Pipe and Tubing Fundamentals	15	PF1340
PF1401	Steel Piping	60	PF1340
PF1410	Copper Piping	45	PF1340
PF1425	Plastic Piping	75	PF1340
PF2110	Aluminum Piping	9	PF1340
PF1440	Piping Valves	30	None
PF1450	Hydronic Heating 1	60	PF1340
PF1610	Cast Iron Piping	18	PF1340
PF1620	Non-Metallic Piping	6	PF1340
PF1630	Water Service	6	PF1340
PF1640	Hot and Cold Water Supply	30	PF1340
PF1650	Hot Water Storage Tanks and Heaters	18	PF1340

Block I			
Course No.	Course Name	Hours	Pre-Requisite(s)
PF1660	Water Treatment Systems	6	PF1340
PF1670	Residential Sanitary Drainage	60	PF1340
PF1680	Residential Venting	45	PF1340
PF1691	Storm Systems	13	PF1680; PF1340
PF1700	Commercial Drainage, Waste and Venting 1	21	PF1680; PF1340
PF1710	Residential Appliances, Fixtures and Trim	30	PF-1340; PF-1350; PF-1360; PF-1630; PF-1640; PF-1650; PF-1660; PF-1680
PF1720	Rural Waste Disposal	15	PF1340
PF1731	Introduction to Electric Welding	24	PF1340
AP1101	Introduction to Apprenticeship	15	None
*AM1100	Math Essentials	30	None
AM1260	Pipe Trade Math Fundamentals	30	AM1100
CM2160	Communication Essentials	45	None
SD1760	Workplace Essentials	45	None
MC1060	Computer Essentials	15	None
Total Hours		1020	

Required Work Experience

***A student who can meet the mathematics requirement through an ACUPLACER® test may be exempted from AM1100 - Math Essentials. Please check with your training institution.**

Block II			
Course No.	Course Name	Hours	Pre-Requisite(s)
PF2100	Blueprint 3 (Heavy Commercial/Industrial)	30	Block I
PF2121	Hydronic Heating 2	54	Block I
PF2130	Introduction to Electricity	15	Block I
PF2150	Introduction to Gas Piping 1 (Low Pressure)	30	Block I
PF2170	Medical Gas Systems	21	Block I
PF2271	Commercial Drainage, Waste and Venting 2	30	Block I
PF2280	Commercial Appliances, Fixtures and Trim	30	Block I
PF2550	Historic Piping	6	Block I
PF2560	Food Processing Systems	6	Block I
PF3100	Fire Protection	18	Block I
Total Hours		240	

Required Work Experience

Block III			
Course No.	Course Name	Hours	Pre-Requisite(s)
PF2310	Cross Connection Control Devices	45	Block II
PF2320	Introduction to Gas Piping 2 (High Pressure)	30	Block II
PF2350	Renewable Energy Systems	21	Block II
PF2510	Compressed Air and Vacuum Systems	21	Block II
PF2520	Chilled Water Systems	12	Block II
PF2541	Rural Water Supply	39	Block II
PF2571	Commercial Drainage, Waste and Venting III	30	Block II
PF2580	Industrial/Commercial Appliances, Fixtures and Trim	18	Block II
PF2590	Lawn Sprinkler Systems	6	Block II
PF2601	Swimming Pool Systems	6	Block II
PF3130	Commissioning	12	Block II
Total Hours		240	

Total Course Hours	1500
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BLOCK I

TS1510 Occupational Health and Safety

Learning Outcomes:

- Demonstrate knowledge of interpreting the Occupational Health and Safety Act, laws and regulations.
- Demonstrate knowledge of understanding the designated responsibilities within the laws and regulations such as the right to refuse dangerous work; and the importance of reporting accidents.
- Demonstrate knowledge of how to prevent accidents and illnesses.
- Demonstrate knowledge of how to improve health and safety conditions in the workplace.

Duration: 6 Hours

Pre-requisite(s): None

Objectives and Content:

1. Interpret the Occupational Health and Safety Act laws and regulations.
 - i. explain the scope of the act
 - application of the Act
 - Federal/Provincial jurisdictions
 - Canada Labour Code
 - rules and regulations
 - private home application
 - conformity of the Crown by the Act
2. Explain responsibilities under the Act and Regulations.
 - i. duties of employer, owner, contractors, sub-contractors, employees, and suppliers
3. Explain the purpose of joint health and safety committees.
 - i. formation of committee

- ii. functions of committee
 - iii. legislated rights
 - iv. health and safety representation
 - v. reporting endangerment to health
 - vi. appropriate remedial action
 - vii. investigation of endangerment
 - viii. committee recommendation
 - ix. employer's responsibility in taking remedial action
4. Examine right to refuse dangerous work.
- i. reasonable grounds for refusal
 - ii. reporting endangerment to health
 - iii. appropriate remedial action
 - iv. investigation of endangerment
 - v. committee recommendation
 - vi. employer's responsibility to take appropriate remedial action
 - vii. action taken when employee does not have reasonable grounds for refusing dangerous work
 - viii. employee's rights
 - ix. assigning another employee to perform duties
 - x. temporary reassignment of employee to perform other duties
 - xi. collective agreement influences
 - xii. wages and benefits
5. State examples of work situations where one might refuse work.
6. Describe discriminatory action.
- i. Definition
 - ii. filing a complaint procedure
 - iii. allocated period of time a complaint can be filed with the Commission
 - iv. duties of an arbitrator under the Labour Relations Act
 - v. order in writing inclusion
 - vi. report to commission allocated period of time to request arbitrator to deal with the matter of the request
 - vii. notice of application
 - viii. failure to comply with the terms of an order
 - ix. order filed in the court

7. Explain duties of commission officers.
 - i. powers and duties of officers
 - ii. procedure for examinations and inspections
 - iii. orders given by officers orally or in writing
 - iv. specifications of an order given by an officer to owner of the place of employment, employer, contractor, sub-contractor, employee, or supplier
 - v. service of an order
 - vi. prohibition of persons towards an officer in the exercise of his/her power or duties
 - vii. rescinding of an order
 - viii. posting a copy of the order
 - ix. illegal removal of an order

8. Interpret appeals of others.
 - i. allocated period of time for appeal of an order
 - ii. person who may appeal order
 - iii. action taken by commission when person involved does not comply with the order
 - iv. enforcement of the order
 - v. notice of application
 - vi. rules of court

9. Explain the process for reporting of accidents.
 - i. application of act
 - ii. report procedure
 - iii. reporting notification of injury
 - iv. reporting accidental explosion or exposure
 - v. posting of act and regulations

Practical Requirements:

1. Conduct an interview with someone in your occupation on two or more aspects of the act and report results.

2. Conduct a safety inspection of shop area.

TS1520 Workplace Hazardous Materials Information System (WHMIS)

Learning Outcomes:

- Demonstrate knowledge of interpreting and applying the Workplace Hazardous Materials Information System (WHMIS) regulation under the Occupational Health and Safety Act.

Duration: 6 Hours

Pre-requisite(s): None

Objectives and Content:

1. Define WHMIS safety.
 - i. rational and key elements
 - ii. history and development of WHIMIS
 - iii. WHMIS legislation
 - iv. WHMIS implementation program
 - v. definitions of legal and technical terms

2. Examine hazard identification and ingredient disclosure.
 - i. prohibited, restricted and controlled products
 - ii. classification and the application of WHMIS information requirements
 - iii. responsibilities for classification
 - the supplier
 - the employer
 - the worker - Classification: rules and criteria
 - information on classification
 - classes, divisions and subdivision in WHMIS
 - general rules for classification
 - class A - compressed gases
 - class B - flammable and combustible materials
 - class C - oxidizing material
 - class D - poisonous and infectious material
 - class E - corrosive material
 - class F - dangerously reactive material

- iv. products excluded from the application of WHMIS legislation
 - consumer products
 - explosives
 - cosmetics, drugs, foods and devices
 - pest control products
 - radioactive prescribed substances
 - wood or products made of wood
 - manufactured articles
 - tobacco or products of tobacco
 - hazardous wastes
 - products handled or transported pursuant to the Transportation of Dangerous Goods (TDG) Act
 - v. comparison of classification systems – WHMIS and TDG
 - vi. general comparison of classification categories
 - vii. detailed comparison of classified criteria
3. Explain labeling and other forms of warning.
- i. definition of a WHMIS label
 - supplier label
 - workplace label
 - other means of identification
 - ii. responsibility for labels
 - supplier responsibility
 - employer responsibility
 - worker responsibility
 - iii. introduce label content, design and location
 - supplier labels
 - workplace labels
 - other means of identification
4. Introduce material safety data sheets (MSDS).
- i. definition of a material safety data sheet
 - ii. purpose of the data sheet
 - iii. responsibility for the production and availability of data sheets
 - supplier responsibility
 - employer responsibility
 - workers responsibility

Practical Requirements:

1. Locate WHMIS label and interpret the information displayed.
2. Locate a MSDS sheet for a product used in the workplace and determine what personal protective equipment and other precautions are required when handling this product.

TS1530 Standard First Aid

Learning Outcomes:

- Demonstrate knowledge of recognizing situations requiring emergency action
- Demonstrate knowledge of making appropriate decisions concerning first aid

Duration: 14 Hours

Pre-requisite(s): None

Objectives and Content:

1. Complete a St. John Ambulance or Canadian Red Cross Standard First Aid Certificate course.

PF1020 Job Site Safety

Learning Outcomes:

- Demonstrate knowledge of safety equipment, its applications, maintenance and procedures for use.
- Demonstrate knowledge of safe work practices.
- Demonstrate knowledge of regulatory requirements pertaining to safety.

Duration: 9 Hours

Pre-requisite(s): None

Objectives and Content:

1. Identify types of personal protective equipment (PPE) and clothing and describe their applications, limitations and procedures for use.
2. Describe the procedures used to care for, maintain and store PPE.
3. Identify hazards and describe safe work practices.
 - i. personal
 - ii. workplace
 - iii. electrical
 - iv. isolation and deenergizing procedures
 - v. tag out/lockout
 - vi. confined space
 - vii. trenches
 - viii. fire
 - ix. heights
 - x. asbestos
 - xi. environment

4. Identify and describe workplace safety and health regulations and certification requirements.
 - i. Federal
 - ii. Transportation of Dangerous Goods (TDG)
 - iii. provincial/territorial

Practical Requirements

None

PF1340 Tools and Equipment

Learning Outcomes:

- Demonstrate knowledge of the care and safe use of tools and equipment.

Duration: 75 Hours

Pre-requisite(s): None

Objectives and Content:

1. Describe general safety requirements for using tools.
 - i. guarding, shielding when using tools
 - ii. body positioning
 - iii. pinch points
2. Describe the properties of metals used in hand and power tools.
 - i. tool steels for wrenches
 - ii. tool steels for saws and blades
3. Explain terminology associated with metals used in hand and power tools.
 - i. oxidation
 - ii. corrosion
 - iii. tensile strength
 - iv. shear strength
4. Identify types measuring tools and describe their purpose, applications, safe use and care.
 - i. tapes, rules, scale rules, straight edges
 - ii. calipers, micrometers, gauges
 - iii. plumb bobs, squares and levels
 - iv. torque wrench
 - v. scribes, markers, dividers and compasses

5. Identify types of hand tools and describe their purpose, applications, safe use and care.
 - i. punches, chisels, files and saws
 - ii. twist drills and drill bits
 - iii. hacksaws
 - iv. files
 - v. chisels
 - vi. hammers
 - vii. pliers
 - viii. pipe wrenches

6. Identify types of cutting, drilling and reaming tools and describe their applications and procedures for use.
 - i. snips and shears
 - ii. drills and reamers
 - iii. bolt cutters

7. Identify types of threading devices and describe their purpose, applications, safe use and care.
 - i. threading tools
 - ii. internal thread
 - iii. external thread
 - iv. tap and drill charts
 - v. bolt and pipe threads

8. Identify types of power tools and describe their purpose, applications, safe use and care.
 - i. portable power tools
 - ii. threading machines
 - iii. reaming tools
 - iv. core drill

9. Identify types of grinding tools and describe their purpose, applications, safe use and care.
 - i. portable and stationary grinders
 - ii. grinding and cutting wheels
 - iii. grinding discs
 - iv. grinder dressers
 - v. rotary wire brushes
 - vi. specialty flapper wheels
 - vii. rotary files

10. Identify types of drills and their accessories and describe their purpose, applications, safe use and care.
 - i. sizes and speed requirements
 - ii. power drilling equipment (hammer and portable drill)
 - iii. cutting fluids
 - iv. clamping devices
 - v. drill presses
 - vi. portable drills
 - vii. hot tap

11. Identify the tools used to cut metals and describe the procedures for their use.
 - i. saws
 - ii. power operated saws
 - iii. friction cut-off equipment
 - iv. shears
 - v. metal cutting power tools
 - vi. abrasives and blades

12. Identify shop equipment and hydraulic tools and describe their purpose, applications, safe use and care.
 - i. jacks
 - ii. shop cranes
 - iii. chain hoists
 - iv. solvent cleaning tanks
 - v. pullers, drivers and presses
 - vi. hydraulic benders
 - vii. pipe positioners

13. Identify types of power actuated tools and describe their applications.
 - i. describe the procedures used to inspect, maintain and store power actuated tools

Practical Requirements:

1. Use and maintain gripping and turning tools, measuring devices and levels.
2. Use and maintain various types of hand tools.
3. Use and maintain various types of power tools.
4. Use and maintain various types of threading devices.
5. Use and maintain various types of grinding tools.
6. Use and maintain various types of power operated cutting tools.
7. Use and maintain various types of shop equipment.

PF1350 Blueprint 1 (Basic Residential)

Learning Outcomes:

- Interpret piping drawings in orthographic and isometric views for residential dwellings.
- Complete single line sketches from drawings and blueprints.
- Convert orthographic piping drawings to isometric drawings.
- Convert isometric piping drawings to orthographic drawings.
- Apply compass and elevations to pipe drawings.
- Produce simple orthographic sketches.

Duration: 30 Hours

Pre-requisite(s): None

Objectives and Content:

Fundamentals of Blueprint Reading

1. Describe types of drawings and sketches and their significance and use in the piping trades.
 - i. orthographic drawings (series of drawings make plan)
 - ii. isometric sketches
 - iii. single line sketches

2. Explain the importance of and procedures for proper care and handling of drawings.
 - i. plastic
 - ii. tape edges
 - iii. notes/changes
 - iv. filing/rolling
 - v. storage

3. Explain visualization and its' associated views.
 - i. vertical up/down
 - ii. horizontal side/side
 - iii. plan view
 - iv. elevation view
 - v. front, rear, left, right views

Architectural Drawing Symbols

4. Identify and interpret the common lines found on a residential blueprint.
 - i. center line
 - ii. hidden line
 - iii. cutting plane line
 - iv. break line
 - v. dimension line
 - vi. extension line
 - vii. object line
 - viii. leader line
5. Identify and interpret basic architectural symbols.
 - i. earth
 - ii. concrete
 - iii. block
 - iv. metal
 - v. structural steel
 - vi. wood
 - vii. gyproc over wood
 - viii. insulation
 - ix. windows, doors
6. Explain the terms "scale" and "dimension" and their use and location on drawings.
7. Identify and interpret the components of a sketch or drawing.
 - i. title block
 - ii. name
 - iii. address
 - iv. date
 - v. materials
 - vi. system

- vii. view
- viii. measurements
- ix. orientation
- x. north
- xi. elevation orientation
- xii. legibility
- xiii. revisions

Sketches and Symbols

- 8. Identify basic plumbing symbols.
 - i. water closet
 - ii. lavatory
 - iii. bathtub
 - iv. shower
 - v. kitchen sink
 - vi. laundry tub
 - vii. hot water tank
 - viii. water meter

- 9. Identify basic piping system symbols.
 - i. piping
 - ii. fittings
 - iii. valves
 - iv. pumps
 - v. drains (roof and floor)

- 10. Identify single line sketch symbols.
 - i. fittings
 - ii. facing viewer
 - iii. facing away
 - iv. horizontal
 - v. changes in direction
 - vi. valves, unions, reducers

- 11. Identify and interpret isometric drawings.
 - i. vertical lines
 - ii. angles relating to horizontal
 - iii. 45 degree angle
 - iv. floor penetrations

12. Identify and interpret roughing-in dimensions for residential piping fixtures.
 - i. manufactures literature
 - ii. rough-in books
 - iii. building codes
 - iv. barrier free requirements

Practical Requirements:

1. Interpret and sketch basic drawings and diagrams.

PF1360 Blueprint 2 (Advanced Residential/Light Commercial)

Learning Outcomes:

- Interpret piping drawings in both orthographic and isometric views for advanced residential/commercial buildings.
- Complete single line sketches from advanced residential/commercial drawings and blueprints.
- Convert orthographic piping drawings to isometric drawings.
- Convert isometric piping drawings to orthographic drawings.
- Apply compass and elevations to advanced residential/commercial pipe drawings.
- Perform orthographic sketches for advanced residential/commercial installations.
- Interpret architectural drawings for advanced residential/commercial installations.

Duration: 30 Hours

Pre-requisite(s): PF1350

Objectives and Content:

Architectural Drawings and Symbols

1. Describe divisions, their content, relationship and numbering systems.
 - i. architectural
 - ii. mechanical
 - iii. electrical

2. Describe plans, their content and use in job planning.
 - i. plot (site)
 - ii. foundation
 - iii. floor plans
 - basement
 - first floor
 - second (subsequent) floor plans

- iv. exterior elevations
 - v. sections, details
 - vi. reflected ceiling drawings
 - vii. room finish schedules
3. Identify steps required in job planning.
 - i. job requirements
 - ii. work schedule
 - iii. access to work location
 - iv. worksite inspection
 - v. equipment and piping
 - vi. materials list
 4. Identify features found on architectural drawings and describe their use.
 - i. grid lines
 - ii. exploded views
 - iii. sections
 - iv. details
 - v. finish schedule
 - vi. page references
 - vii. elevations
 - viii. architectural symbols
 5. Explain the procedures used to determine accurate dimensions from a drawing, their purpose and importance.
 - i. how measurements are indicated (engineer vs. architect)
 - ii. start and finish
 - iii. wall locations
 - iv. pipe penetrations
 - v. use of scaling
 6. Describe the purpose and importance of specifications.

Sketches and Symbols

7. Identify plumbing symbols and interpret rough-in dimensions found on a set of commercial drawings.
 - i. wall hung toilet
 - ii. wall hung lavatory
 - iii. wall hung urinal
 - iv. janitors sink

- v. triple compartment sink
 - vi. drinking fountain
 - vii. grease interceptor
 - viii. bidets
8. Identify commercial piping system symbols and explain their importance and use.
- i. piping
 - ii. building sewer
 - iii. building drain
 - iv. soil and waste stacks
 - v. fixture drains and branches
 - vi. venting
 - vii. domestic hot and cold
 - viii. re-circulation lines
 - ix. storm building drains and sewers
 - x. compressed air
 - xi. trap priming
 - xii. fittings
 - xiii. elbows
 - xiv. wye's
 - xv. tees
 - xvi. cleanouts
 - xvii. reducers
 - xviii. unions
 - xix. flanges
 - xx. valves
 - ball
 - check
 - gate
 - globe
 - backwater
 - xxi. pressure reducing
 - trap primer
 - xxii. hangers and supports
 - xxiii. heating
 - piping
 - heating water supply
 - water return
 - anchors

- guides
 - xxiv. heating equipment
 - xxv. boilers
 - xxvi. oil tanks
 - xxvii. radiation
 - xxviii. exchangers
 - xxix. expansion tanks
 - xxx. thermometers
 - xxxi. pressure gauges
 - xxxii. auto air vents
 - xxxiii. flex connections/loops
 - xxxiv. heating valves
 - circuit setters
 - flow control
 - pressure relief
 - control
 - 3-way
9. Identify basic welding symbols and explain their use.
10. Identify and interpret interference drawings.
- i. mechanical
 - ii. electrical
 - iii. architectural
 - iv. structural
11. Identify and interpret rough-in dimensions for commercial piping fixtures.
- i. manufactures literature
 - ii. rough-in books
 - iii. building codes
 - iv. barrier free requirements
 - v. fixture carriers

Practical Requirements:

1. Read and interpret architectural, mechanical and electrical drawings.
2. Determine, sketch and apply dimensioning.
3. Read and interpret specifications.
4. Complete a material take-offs.

PF1370 Rigging

Learning Outcomes:

- Identify the limitations of equipment used for rigging.
- Demonstrate knowledge of safe operating procedures for slings, cables and cranes.
- Select rigging and lifting equipment using rigging charts and manuals as well as rule of thumb methods.

Duration: 39 Hours

Pre-requisite(s): None

Objectives and Content:

1. Identify the Occupational Health and Safety Regulations for rigging.
2. Describe responsibilities and liabilities in the use of rigging, lifting and hoisting equipment.
 - i. equipment.
3. Identify types of fibre ropes and describe their care, inspection and related safety procedures.
 - i. types
 - natural fibre,
 - synthetic fibre
 - ii. considerations for selection and use
4. Describe kinds of knots, hitches and bends and their applications.
5. Explain angle considerations when using rigging.
 - i. rigging charts
 - ii. rule of thumb formulas
 - iii. compensation for angles in lifting of loads

6. Identify types of wire rope and accessories and describe their care, inspection and safety considerations for use.
 - i. construction
 - ii. clips and attachments
 - iii. slings and end rigging
 - iv. measurement
 - v. clamps and rigging
 - vi. splicing
 - vii. shackles and turnbuckles

7. Describe synthetic sling types, their characteristics, applications and limitations.
 - i. polyethylene slings
 - ii. polyester slings
 - iii. nylon slings
 - iv. mylar
 - v. kevlar

8. Describe chains and chain slings, their characteristics, applications and limitations.

9. Identify types of scaffolds and describe their characteristics and applications.
 - i. tube and clamp
 - ii. manufactured platforms and scaffolding
 - iii. suspended scaffolding

10. List safety rules for erecting and working on scaffolding.
 - i. kickplates
 - ii. braces
 - iii. ties
 - iv. planking
 - v. permits
 - vi. tagging

11. Describe special problems of rolling and suspended scaffolding and safety guidelines for their use.

12. Identify hydraulic lifts and describe their applications.

13. Identify types of ladders and describe their applications and safety factors to be considered.

14. Describe procedures prior to and during the movement of objects with rigging equipment.
15. Identify jacks and describe their applications and procedures for use.
16. Identify methods of communications.
 - i. hand signals
 - ii. two-way radios
17. Identify types of cranes used in rigging.
 - i. mobile
 - ii. boom truck
 - iii. overhead

Practical Requirements:

1. Assemble knots, bends and hitches.
2. Use various types of slings and related equipment.
3. Erect scaffolding and use as work platforms.
4. Use various types of ladders.
5. Set up rigging equipment to perform a safe lift.

PF1380 Introduction to Fuel Brazing and Cutting

Learning Outcomes:

- Use fuel cutting and brazing equipment.

Duration: 45 Hours

Pre-requisite(s): PF1340

Objectives and Content:

Safety and Equipment

1. Identify types of heating/cutting equipment and describe their applications and procedures for use.
 - i. air-propane equipment
 - ii. air-acetylene system
 - iii. oxy-acetylene system
 - iv. oxy-propane
 - v. accessories and related equipment
 - vi. lighting and adjusting operations
 - vii. shut down
2. Describe the possible hazards of using heating/cutting equipment and procedures.
 - i. burns
 - ii. fires
 - iii. explosions
 - iv. injuries
 - v. fumes
3. Describe safety practices for use in brazing and cutting operations.
 - i. clothing
 - ii. location
 - iii. protective equipment
 - iv. work permits

4. Describe heating/cutting equipment and accessories, their components, purpose and characteristics.
 - i. cylinders
 - ii. gas
 - iii. regulators
 - iv. flashback arrestor
 - v. gauges
 - vi. hoses and connections
 - clamps,
 - y-connecters,
 - coupler-T
 - vii. fibre washers
 - viii. equipment wrench
 - ix. torches
 - x. mixer
 - xi. tips
 - xii. cutting attachment

5. Describe the use and care of oxygen cylinders.
 - i. characteristics of oxygen
 - ii. cylinder components and capacity
 - iii. storage and safety considerations
 - iv. individual cylinder
 - v. bulk packs

6. Describe the use and care of acetylene and propane cylinders.
 - i. characteristics of acetylene and propane
 - ii. cylinder components and capacity
 - iii. storage and safety considerations
 - iv. individual cylinder
 - v. bulk packs

7. Describe the types of cylinder trucks and lifting cages.

8. Describe the procedures for assembling, testing, lighting and shutting down heating/cutting equipment.

Brazing

9. Describe the principles of the brazing process and the differences between welding and brazing.
10. Describe fluxes, their applications and procedures for use.
 - i. soldering, brazing fluxes
 - ii. components and classifications of brazing fluxes
11. Describe the brazing process as applied to various metals.
12. Describe the flame adjustment for brazing various materials.
13. Describe the considerations, preparation, process and precautions used to produce various types of joints.
 - i. face feed brazed joints
 - ii. pre-inserted ring joints

Cutting

14. List metals that can be cut using oxy-fuel equipment.
15. Describe the various styles and designs of standard cutting torches.
16. Describe the various cutting tips, their care and maintenance.
 - i. sizes, styles and indexing
 - ii. accessories and tip cleaners
17. Describe the various types of cutting flames and procedures used for flame adjustment.
 - i. oxidizing
 - ii. carburizing
 - iii. neutral
18. Describe cutting procedures.
 - i. free hand
 - ii. straight edge

Practical Requirements:

1. Set-up, test, use and shut down heating/cutting equipment.
2. Perform various types of cuts.
3. Perform various brazing processes.

PF1390 Pipe and Tubing Fundamentals

Learning Outcomes:

- Demonstrate knowledge of the types of piping systems and their characteristics.
- Demonstrate knowledge of the materials used in the construction and installation of pipe and piping systems.

Duration: 15 Hours

Pre-requisite(s): PF1340

Objectives and Content:

1. Identify types of pipe, tube, tubing and describe their applications.
 - i. steel
 - ii. plastic
 - iii. copper
 - iv. brass
 - v. aluminum
 - vi. cast iron
 - ductile
 - duriron
 - grey
 - vii. historic
 - viii. glass
 - ix. asbestos-cement
 - x. reinforced concrete
 - xi. stainless steel
 - xii. fiberglass

2. Identify the types of piping and tubing systems.
 - i. potable/non-potable water supply
 - ii. sanitary drainage, waste and vent systems
 - iii. storm drainage systems
 - iv. heating systems
 - v. sprinkler systems

- vi. gas systems (fuel, medical)
 - vii. process and power generating systems
3. Identify pipe and tubing sizes.
- i. dimensions
 - ii. lengths
 - iii. wall thickness/schedule
4. Describe the terms ferrous and non-ferrous and their significance to the trade.
5. Describe the forces that act on piping systems.
- i. thermal expansion and contraction
 - ii. weight
 - iii. electrolysis
 - iv. friction loss
 - v. turbulence
 - vi. galvanic action
 - vii. environmental
6. Describe the types of sealants used in the trade and their applications.
- i. thread compounds
 - ii. gaskets
 - iii. packing
 - iv. cements/glue

Practical Requirements:

None

PF1401 Steel Piping

Learning Outcomes:

- Select materials.
- Demonstrate knowledge of steel pipe and fittings and their assembly.
- Carry out work in compliance with codes, standards and manufacturer's literature.

Duration: 60 Hours

Pre-requisite(s): PF1340

Objectives and Content:

1. List the properties and applications of steel pipe and fittings.
2. Identify ferrous piping systems.
 - i. heating systems
 - ii. cooling systems
 - iii. drainage, waste and vent systems
 - iv. compressed air systems
 - v. fuel oil/gas systems
 - vi. steam, humidification systems
 - vii. industrial, marine, food processing
3. List the types of ferrous piping, their characteristics and applications.
 - i. steel
 - ii. galvanized
 - iii. stainless
 - iv. cast iron

4. List the information required to select and order steel pipe.
 - i. material (steel, galvanized, stainless)
 - ii. size (diameter, length, standard lengths)
 - iii. schedule (wall thickness, grade)
 - iv. characteristics (welded, seamless)
 - v. end finishes (plain end, thread, grooved, beveled)

5. Identify the tools and methods used for cutting steel, galvanized and stainless steel pipe.
 - i. pipe cutters, reamers
 - ii. cut-off saw
 - iii. oxy-acetylene pipe beveller
 - iv. plasma arc cutter
 - v. angle grinder
 - vi. carbon arc cutter

6. Identify the methods of joining steel, galvanized and stainless steel pipe and describe their associated procedures.
 - i. threading and grooving
 - ii. welding
 - iii. flanging
 - iv. press-fit

7. Identify the tools used to prepare and assemble steel, galvanized and stainless steel pipe and describe procedures for their use.
 - i. hand and power threaders
 - ii. hand and power roll groovers
 - iii. cut groovers
 - iv. welding and cutting equipment
 - v. oxy/acetylene
 - vi. electric
 - vii. mig/tig
 - viii. press-fit crimper
 - ix. vice, wrenches
 - x. beveller

8. Identify fittings used to assemble steel, galvanized and stainless steel pipe and describe their characteristics and applications.
 - i. terminology
 - ii. types
 - iii. parts
 - iv. abbreviations

9. Identify and describe the tools and procedures used to hang and support steel pipe and fittings.
 - i. code
 - ii. specifications
 - iii. grade
 - iv. components
 - v. fire stopping systems

10. Describe an angle and its parts.
 - i. vertex
 - ii. degrees
 - iii. letters

11. Describe a circle and its parts.
 - i. centre
 - ii. circumference
 - iii. diameter
 - iv. radius
 - v. cord
 - vi. arc
 - vii. concentric and eccentric circle

12. Describe pipe measurement terms and their use.
 - i. end to end
 - ii. end to centre
 - iii. centre to centre
 - iv. back to back
 - v. centre to back
 - vi. centre to throat
 - vii. face to face
 - viii. overall

13. Calculate the perimeter and areas of:
 - i. squares
 - ii. rectangles
 - iii. triangles
 - iv. circles

14. Calculate the volume of:
 - i. cubes
 - ii. rectangular prisms and cylinders

15. Explain the Metric and Imperial systems and its use in the building trades.
 - i. length
 - ii. area
 - iii. volume
 - iv. temperature
 - v. pressure
 - vi. mass

16. Calculate piping measurements.
 - i. run and branch
 - ii. fitting allowance
 - iii. center
 - iv. face
 - v. back
 - vi. throat

17. Calculate piping measurements with various degree fittings.
 - i. diagonal
 - ii. offset
 - iii. travel
 - iv. rise and run
 - v. factors

18. Perform piping calculations using:
 - i. grade
 - ii. drop
 - iii. rise and run

19. Identify and describe methods of pipe bending.
 - i. calculations
 - ii. bend locations
 - iii. determine gain
 - iv. determine length of bend
 - v. determine angle

Practical Requirements:

1. Measure, cut and prepare various types of ferrous pipe.
2. Assemble various types of ferrous pipe by the following methods.
 - i. thread
 - ii. groove
 - iii. bevel
 - iv. flange
 - v. tack-weld
 - vi. mechanical
3. Bend steel pipe using hydraulic benders.
4. Perform various types of pressure testing.

PF1410 Copper Piping

Learning Outcomes:

- Select materials.
- Demonstrate knowledge of non-ferrous pipe/tubing and its assembly.
- Carry out work in compliance with codes, standards and manufacturer's literature.

Duration: 45 Hours

Pre-requisite(s): PF1340

Objectives and Content:

1. Describe the properties and applications of copper pipe and fittings, and describe the methods and colors used to identify the following associated systems:
 - i. underground water service
 - ii. domestic hot and cold water systems
 - iii. drainage, waste and vent systems
 - iv. hot water heating systems
 - v. medical gas systems
 - vi. refrigeration systems
 - vii. compressed air
2. Identify the systems and criteria used in referencing, selecting and ordering copper tube and tubing.
 - i. size
 - ii. I.D./O.D. dimension standards
 - iii. length
 - iv. type
 - heating (H)
 - K
 - L
 - M
 - drainage, waste and vent (DWV)
 - Medical Gas

- air conditioning and refrigeration (ACR)
 - gas (G)
 - general purpose (GP)
 - v. color coding (white, green, blue, red, yellow)
3. Describe the tools and procedures used to cut and prepare copper pipe.
- i. tube cutter
 - ii. reamer
 - iii. cut off saw
 - iv. chop saw
 - v. hacksaw
4. Describe the tools and procedures used to join copper pipe.
- i. solder/braze
 - ii. compression
 - iii. grooved
 - iv. swaged
 - v. flared
 - vi. press fit
 - vii. crimped
5. Describe the tools and procedures used for soldering, bending and annealing copper pipe and fittings.
6. Identify fittings used for joining copper pipe and describe their characteristics and applications.
- i. terminology
 - ii. types
 - iii. parts
 - iv. acronyms and abbreviations
7. Identify and describe the tools and procedures used to hang, support and fasten copper pipe and fittings.
- i. codes
 - ii. specifications
 - iii. grade
 - iv. components
 - v. fire stopping systems

8. Describe the procedures used to calculate fitting allowances.
 - i. tees
 - ii. elbows
 - iii. 45 degrees
9. Identify brass pipe and fittings and describe their properties and applications.
10. Describe methods used to cut and prepare brass pipe and their associated procedures.

Practical Requirements:

1. Measure, cut and prepare various types of copper pipe.
2. Assemble various types of copper pipe and tubing by the following methods.
 - i. solder
 - ii. braze
 - iii. compression
 - iv. swaged
 - v. grooved
 - vi. flaring
3. Bend copper tubing using tube benders.
4. Perform various types of pressure testing.

PF1425 Plastic Piping

Learning Outcomes:

- Select materials.
- Demonstrate knowledge of plastic pipe and fittings and their assembly.
- Carry out work in compliance with codes, standards and manufacturer's literature.

Duration: 75 Hours

Pre-requisite(s): PF1340

Objectives and Content:

1. Identify types of plastics and describe their characteristics and applications.
 - i. thermoplastics
 - ii. thermosetting plastics
2. Identify the types of plastic piping, their properties and applications.
 - i. ABS (Acrylonitrile-Butadiene-Styrene)
 - ii. CPVC (Chlorinated Polyvinyl Chloride)
 - iii. PE (Polyethylene)
 - iv. PP (Polypropylene)
 - v. PVC (Polyvinyl Chloride)
 - vi. PEX (Cross-linked Polyethylene)
 - vii. with/without oxygen barrier
 - viii. PTFE (Teflon)
 - ix. PEX/Aluminum/PEX
3. Describe the labelling system used to identify plastic pipe and fittings.
4. Identify tools used to cut and prepare plastic pipe and describe the procedures for their use.
 - i. tube cutter
 - ii. file
 - iii. chop saw

- iv. hacksaw
 - v. handsaw
 - vi. tube coiler
 - vii. deburring tool
5. Describe methods used to join plastic pipe and describe their associated procedures.
- i. solvent weld
 - ii. fusion weld
 - iii. plastic welding
 - iv. thread
 - v. compression
 - vi. flare
 - vii. mechanical joint
 - viii. insert
 - ix. crimp
6. Identify types of fittings used for joining the various types of plastic pipe and describe their characteristics and applications.
- i. terminology
 - ii. types
 - iii. parts
 - iv. acronyms and abbreviations
7. Identify and describe the tools and procedures used to hang, support and fasten plastic pipe and fittings.
- i. codes
 - ii. specifications
 - iii. grade
 - iv. components
 - v. fire stopping systems
8. Describe the procedures used to calculate fitting allowances.
- i. tees
 - ii. elbows
 - iii. 45 degrees

Practical Requirements:

1. Measure, cut and prepare various types of plastic pipe.
2. Assemble various types of plastic pipe by the following methods.
 - i. solvent weld
 - ii. thread
 - iii. compression
 - iv. mechanical joint
 - v. insert
 - vi. crimp

PF2110 Aluminum Piping

Learning Outcomes:

- Demonstrate knowledge of aluminum pipe and tubing.

Duration: 9 Hours

Pre-requisite(s): PF1340

Objectives and Content:

1. Describe the properties and applications of aluminum pipe and tubing.

Practical Requirements:

None

PF1440 Piping Valves

Learning Outcomes:

- Demonstrate knowledge of piping valves and their installation.

Duration: 30 Hours

Pre-requisite(s): None

Objectives and Content:

1. Describe the materials and service ratings for valves.
2. Explain valve terminology.
3. Identify the principle types of valves and describe their purpose, design, components, operation and applications.
 - i. gate
 - ii. globe
 - iii. ball/plug
 - iv. butterfly (gear or lever)
 - v. check
 - vi. temperature / pressure relief
 - vii. pressure reducing
 - viii. float operated
 - ix. diaphragm
 - x. mixing
 - xi. pop safety valve
4. Describe procedures used to install valves.
 - i. position
 - ii. location
 - iii. accessibility
 - iv. joining methods

5. Describe the types, construction and operation of control valves.
 - i. two-way
 - ii. three-way
 - iii. actuated

6. Describe the care and maintenance of valves.
 - i. disassembly/reassembly
 - ii. replacement of parts
 - iii. re-packing
 - iv. tools

Practical Requirements:

1. Install various types of valves.

PF1450 Hydronic Heating 1

Learning Outcomes:

- Demonstrate knowledge of the operation of hot water boilers and heating systems, their component parts and control systems.

Duration: 60 Hours

Pre-requisite(s): PF1340

Objectives and Content:

1. Define terminology associated with hydronic heating.
2. Identify sources of heat used in hydronic systems.
 - i. oil
 - ii. gas
 - iii. geothermal
 - iv. solar
3. Identify types of heating systems, their components and operation
 - i. one pipe
 - ii. directional flow (monoflo)
 - iii. series loop
 - iv. two pipe
 - v. direct
 - vi. reverse return
 - vii. primary loop
 - viii. secondary circuit
 - ix. gravity systems

Boiler and Components

4. Describe boiler components and their purpose.
 - i. burner
 - ii. wiring
 - iii. tridicator
 - iv. aquastat
 - v. relief valve
 - vi. boiler water feed valve
 - vii. boiler fittings
 - viii. boiler drain
 - ix. tank fittings and valves
 - x. airtrol system
 - xi. air venting
 - xii. backflow prevention device

5. Describe expansion tanks and air control devices and procedures for their installation.
 - i. air control
 - automatic
 - manual
 - ii. tanks
 - diaphragm
 - compression

6. Describe the procedures used to remove air from hydronic systems.

7. Describe circulating pumps, their components and operation.
 - i. circulating pumps
 - ii. low head pumps

8. Describe equipment used for erecting boilers.
 - i. dog and clamps
 - ii. tie rods
 - iii. corrugated expansion washers
 - iv. rigging equipment

9. Describe the construction of modern package boilers.
 - i. components
 - ii. section assemblies
 - iii. top clean out openings
 - iv. integral flue gas collector and smoke collar
 - v. tank-less water heaters

10. Describe procedures used to install packaged boilers.
 - i. general erection instructions
 - ii. boiler foundations
 - iii. codes and regulations

Piping

11. Describe zone valves, their purpose and operation.
 - i. electric motor
 - ii. orifice seat sizes
 - iii. end switch
 - iv. thermostats
 - v. three-way valves

12. Describe piping arrangements used with heating systems.
 - i. piping layout and system components
 - ii. piping systems
 - iii. types and rating of heat distributing units

13. Describe the factors that affect pipe sizing and piping arrangement.
 - i. equivalent direct radiation
 - ii. piping systems
 - iii. changes in pipe size
 - iv. heat loss calculations

14. Describe zone control systems, their types, characteristics and operation.

15. Describe thermostats, their characteristics and controls.
 - i. differential
 - ii. adjustment
 - iii. sensitivity
 - iv. classification
 - v. installation procedures

16. Describe feedwater treatment systems and additives.
 - i. chemicals used in boiler feedwater
 - ii. methl hydrate
 - iii. glycol

17. Identify and interpret codes and regulations pertaining to the installation of piping systems.

Heat Transfer

18. Describe methods of heat transfer.
 - i. radiation
 - ii. conduction
 - iii. convection

19. Identify types of heat transfer equipment and describe their characteristics, piping arrangements and installation procedures.
 - i. heating units
 - ii. radiators
 - iii. baseboard heating
 - iv. wall fin
 - v. convectors
 - vi. pipe coils
 - vii. unit heaters horizontal and vertical unit heaters

Radiant Floor Heating

20. Describe the principles and operating characteristics of radiant floor heating.

21. Describe types of tubing used for radiant in-floor hydronic systems.
 - i. polymer piping materials
 - ii. PEX tubing
 - iii. rubber-based tubing
 - iv. steel
 - v. copper

22. Identify types of mixing components and describe their operation and applications.
 - i. three-port valves
 - ii. four-port valves
 - iii. thermostatic valves
 - iv. motorized-actuated valves
 - v. injection pump

23. Describe slab-on-grade in-floor heating, preparation and installation procedures.
 - i. tie spacing
 - ii. wire mesh
 - iii. plastic tracks
 - iv. spacing tubing
 - v. tubing depth
 - vi. insulation
 - vii. installation procedure
 - viii. floor preparation

24. Identify requirements for manifold stations and tubing installations.
 - i. mark out on plan
 - ii. studded wall cavities
 - iii. use of template block
 - iv. centers on block
 - v. plastic bed supports
 - vi. label circuits
 - vii. pressure test
 - viii. control joints

Practical Requirements:

1. Install hydronic heating boiler and trim.
2. Install maintain and repair various types of hydronic heating systems.
 - i. series loop
 - ii. direct return
 - iii. reverse return
 - iv. primary loop
 - v. secondary circuit
 - vi. in-floor

PF1610 Cast Iron Piping

Learning Outcomes:

- Select materials.
- Demonstrate knowledge of cast iron pipe and fittings and their assembly.
- Carry out work in compliance with codes and standards.

Duration: 18 Hours

Pre-requisite(s): PF1340

Objectives and Content:

1. Identify and interpret applicable sections of the National Plumbing Code.
2. Describe the properties and applications of cast iron pipe and fittings.
 - i. drainage
 - ii. waste
 - iii. vent
 - iv. potable water
3. Identify the systems and criteria used in referencing, selecting and ordering cast iron and duriron soil pipe.
 - i. diameter
 - ii. length
 - iii. end finishes
4. List the information required to select and order cast iron water pipe.
 - i. material (ductile)
 - ii. diameter
 - iii. length
 - iv. schedule - wall thickness, schedule or grade
 - v. end finishes - plain end, cut grooved

5. Explain the tools and procedures used to cut cast iron soil pipe.
 - i. snap cutters
 - ii. cut off saw
 - iii. chop saw
 - iv. hacksaw
 - v. hammer/chisel

6. Describe the tools and procedures used to cut ductile and duriron pipe.
 - i. cut off saw
 - ii. chop saw
 - iii. hydraulic pipe cutters

7. Describe the tools used to join cast iron soil pipe, ductile and duriron pipe.
 - i. bi-seal puller
 - ii. torque and hand wrenches

8. Explain the methods of joining cast iron soil pipe, ductile and duriron pipe.
 - i. caulked joint
 - ii. mechanical joint
 - iii. bi-seal

9. Identify the fittings used for joining cast iron soil pipe, ductile and duriron pipe and describe their characteristics and applications.
 - i. terminology
 - ii. types
 - iii. parts
 - iv. acronyms and abbreviations

10. Identify and describe the tools and procedures used to hang, support, and fasten cast iron pipe and fittings.
 - i. plumbing codes
 - ii. specifications
 - iii. grade
 - iv. components
 - v. fire stopping systems

Practical Requirements:

1. Measure, cut, and install cast iron pipe.
 - i. mechanical joint
 - ii. bi-seal
 - iii. cold caulking

PF1620 Non-Metallic Piping

Learning Outcomes:

- Select non-metallic piping materials.
- Demonstrate knowledge of non-metallic piping and fittings and their assembly.
- Carry out work in compliance with codes and standards.

Duration: 6 Hours

Pre-requisite(s): PF1340

Objectives and Content:

1. Identify and interpret applicable sections of the National Plumbing Code.
2. Identify types of non-metallic piping and describe their properties and applications.
 - i. glass
 - ii. concrete
3. Explain the tools and methods used to cut and join glass pipe.
4. Identify the types of fittings used for joining glass pipe and describe their characteristics and applications.
 - i. terminology
 - ii. types
 - iii. parts
 - iv. abbreviations and acronyms
5. Describe the methods and tools used to hang, support, and fasten glass pipe and fittings.
 - i. specifications
 - ii. grade
 - iii. components
 - iv. firestopping systems

6. Identify the applications of concrete pipe and codes references.

Practical Requirements:

None

PF1630 Water Service

Learning Outcomes:

- Demonstrate understanding of how water supply equipment functions.
- Install piping systems for potable and non-potable water supplies.

Duration: 6 Hours

Pre-requisite(s): PF1340

Objectives and Content:

1. Identify and interpret applicable sections of the National Plumbing Code.
2. Describe the procedures used to determine elevations and grades for water supply piping.
3. Describe the procedures used to lay out and shore trenches.
4. Describe the procedures used to make connections to curb stops.
 - i. service pipe
 - ii. main valves and water meters
5. Identify and interpret the National Plumbing Code sections that apply to the fabrication, application and testing of water service pipe.
6. Describe the procedures used to install water services to buildings.
 - i. purpose
 - ii. equipment and materials
 - iii. installation
 - iv. safety
 - v. plumbing requirements

7. Describe water service component parts and their applications.
 - i. water main
 - ii. corporation stop or cock
 - iii. curb stop
 - iv. meters
 - v. meter yoke
 - vi. by-pass
 - vii. strainers
 - viii. flow meters
 - ix. check valves
 - x. back flow preventers

8. Identify types of water meters and describe their purpose and operation.
 - i. types
 - ii. positive displacement
 - iii. turbine
 - iv. location

9. Identify and interpret code regulations pertaining to the installation of water meters.

10. Describe the procedures used to install water supply for outbuildings.
 - i. pumping system components
 - ii. tasks and uence
 - iii. piping practices

11. Describe gravity water supply systems.
 - i. classes
 - ii. with or without pump
 - iii. installation

12. Identify and interpret code regulations pertaining to the selection and installation of water pipes.

13. Describe the procedures used to determine water piping requirements and procedures.
 - i. drawings
 - ii. specifications
 - iii. manufacturer's literature

14. Interpret plumbing code requirements and define the requirements for support of piping.
15. Describe the procedures used to install supports.
 - i. elevations and grades
 - ii. trenches
 - iii. anchors, tie rods and thrust blocks
16. Describe the procedures used for supporting, anchoring, and rodding cold water pipe.
 - i. pipe protection
 - ii. freezing
 - iii. settling
 - iv. blowouts
 - v. blocking and rodding
 - vi. changes of direction
 - vii. backfilling
17. Describe the procedures used to install anchors, tie rods, thrust blocks and supports for water service.

Practical Requirements:

1. Install, flush and test a corporation stop, curb stop, service box, and stop and drain valve.

PF1640 Hot and Cold Water Supply

Learning Outcomes:

- Demonstrate understanding of procedures used to rough-in and install hot and cold water systems.
- Install piping systems for potable and non-potable water supplies.

Duration: 30 Hours

Pre-requisite(s): PF1340

Objectives and Content:

1. Identify and interpret applicable sections of the National Plumbing Code.
2. Explain the term “roughing-in”.
 - i. considerations
 - ii. importance of code
3. Describe procedures used to lay out the locations of fixtures and piping.
4. Describe procedures used to rough-in and install hot and cold water piping.
 - i. valves
 - ii. shock absorbers
 - iii. air chambers
 - iv. recirculating lines and pumps
 - v. connections to hot water storage tanks
 - vi. piping fabrication and testing
5. Describe the procedures used to layout and install water supply lines.
 - i. water distribution system
 - ii. typical installation
 - iii. definitions
 - iv. expansion of hot water lines
 - v. installation methods and procedures
 - vi. considerations

- vii. types of pipes and fittings
 - viii. types of solder
 - ix. location and types of valves (access panels)
 - x. purpose and types of insulation
 - xi. location and size of sleeving
 - xii. pressure reducing valves
 - xiii. booster pumps
 - xiv. trap primers (cross connections)
 - xv. hangers
 - xvi. frost protection
6. Describe the purpose and installation of recirculating lines.
- i. gravity circulation
 - ii. forced circulation
 - iii. piping arrangements
 - iv. circulating pumps
7. Describe the procedures used to install supports.
- i. considerations
 - ii. materials
 - iii. code information
 - iv. types of hangers and supports
8. Describe the procedures used to install hose bibs and non-freeze hydrants.
9. Explain the term water hammer, its causes, problems and methods of controlling in a residential application.
- i. air chambers
 - ii. water hammer arrestors
10. Describe procedures used for testing installations.
11. Describe the procedures used to size water supply systems.

Practical Requirements:

1. Size, install, test and maintain a potable hot and cold-water distribution system with each of the following materials.
 - i. pex
 - ii. copper
 - iii. pex- al-pex
 - iv. pe-al-pe
 - v. cpvc

PF1650 Hot Water Storage Tanks and Heaters

Learning Outcomes:

- Demonstrate knowledge of how hot water heaters function.
- Install domestic hot water heaters and storage tanks.

Duration: 18 Hours

Pre-requisite(s): PF1340

Objectives and Content:

1. Identify and interpret applicable sections of the National Plumbing Code.
2. Identify and interpret drawings, specifications and manufacturer's literature.
3. Describe the procedures used to install storage tanks and heaters.
 - i. related piping
 - ii. safety valves and controls
 - iii. dip tubes in hot water storage tanks
4. Describe the procedures used to connect heat exchanger coils to storage tanks.
5. Describe safety regulations and precautions for the installation of storage tanks and heaters.
6. Identify and interpret National Plumbing Code sections which apply to the application, installation and testing of hot water storage tanks and heaters.
7. Describe common sources of heat for tanks.
 - i. oil
 - ii. gas
 - iii. electric

8. Describe domestic hot water heating equipment, their components and operation.
 - i. electrolysis
 - ii. dip tube
 - iii. magnesium rod
 - iv. insulation
 - v. sizing
 - vi. piping
 - vii. source of heat
 - viii. direct heat
 - ix. indirect heat
 - x. controls and safety devices
 - xi. pressure relief valves
 - xii. temperature relief valves
 - xiii. combined pressure/temperature relief valve
 - xiv. aquastats and thermostats

9. Describe the procedures used to perform various hot water tank installations.
 - i. direct heating
 - ii. indirect heating
 - iii. water volume expansion
 - iv. considerations

10. Describe the procedures used to plan and carry out installation of water heaters.
 - i. selecting location
 - ii. installing water pipes and shut off valve
 - iii. installing relief valves
 - iv. filling
 - v. wiring (electrician)
 - vi. vacuum relief

11. Identify tests required for hot water heaters and describe their associated procedures.
 - i. electric
 - ii. mineral
 - iii. bacteria

12. Describe the procedures used to estimate materials.

Practical Requirements:

1. Install and test a domestic hot water heater.

PF1660 Water Treatment Systems

Learning Outcomes:

- Demonstrate knowledge of how water treatment systems function.
- Install domestic water treatment equipment and component parts.

Duration: 6 Hours

Pre-requisite(s): PF1340

Objectives and Content:

1. Identify and interpret applicable sections of the National Plumbing Code.
2. Identify and interpret drawings, specifications, manufacturer's literature and regulatory guidelines.
3. Describe testing procedures used to determine treatment required.
4. Describe the procedures used to size water treatment equipment.
5. Describe the procedures used to install water treatment equipment and component parts.
6. Describe potential dangers of and methods of preventing cross connection.
7. Describe water problems, their causes and effects.
 - i. hardness
 - ii. minerals
 - iii. contamination
 - iv. acid
 - v. taste and odor

8. Describe the devices used to correct water problems, their types and characteristics.
 - i. filters
 - ii. softeners
 - iii. conditioners
 - iv. purifiers

9. Describe the procedures and safety considerations used to treat water contamination.
 - i. ultraviolet

Practical Requirements:

None

PF1670 Residential Sanitary Drainage

Learning Outcomes:

- Size building sewers and sanitary drainage systems.
- Install basic domestic drainage systems.

Duration: 60 Hours

Pre-requisite(s): PF1340

Objectives and Content:

1. Identify and interpret applicable sections of the National Plumbing Code.
2. State the purpose and theory of drainage and venting systems.
 - i. health and sanitation
 - ii. liquids and water-borne waste
 - iii. circulation of air within plumbing system
 - iv. siphoning and back pressure
3. Identify types of building sewers, describe their characteristics and the methods and piping used in connection.
 - i. sanitary
 - ii. storm
 - iii. combined
4. Explain the methods of sizing the building sewer.
 - i. interpret code requirements
 - ii. determine hydraulic load (fixture units)
5. Describe the procedures for installing piping and services in trenches.
 - i. safety factors
 - ii. tools/equipment
 - iii. support
 - iv. protection

6. Describe the purpose of grading pipes.
 - i. waste
 - ii. vent
 - iii. heating

7. Describe the methods of calculating grade and percent of grade.
 - i. fall
 - ii. grade/percent of grade
 - iii. run

8. Describe the tools used for grading pipes.
 - i. level
 - ii. builders level/transit
 - iii. laser
 - iv. tape measure

9. Describe the procedures used to perform measurements and determine elevations on vertical pipe.

10. Define common terminology associated with residential drainage and waste systems.

11. Describe the components of a residential plumbing drainage system.
 - i. building drain
 - ii. branch
 - iii. stack
 - iv. fixture
 - v. fixture drain
 - vi. trap arm
 - vii. fixture outlet pipe
 - viii. clean-out
 - ix. floor drain

12. Describe the sequencing of procedures used to rough-in a complete residential plumbing drainage system.
 - i. review drawings and specifications
 - ii. sizing, material list take off
 - iii. scheduling and planning
 - iv. excavation, cutting holes, installation, testing, inspection
13. Define the terms fixture unit and hydraulic load.
14. Identify types of common residential plumbing fixtures.
15. Describe the relationship of plumbing fixtures to the sizing of drainage and vent systems.
 - i. outlet size
 - ii. volume/capacity
 - iii. waste and water connections
16. Describe the angles of branches and bends in a drainage or venting system.
 - i. wye
 - ii. sanitary tee
 - iii. elbow/bend
17. Explain the methods of sizing the building drain.
 - i. interpret plumbing code requirements
 - ii. determine hydraulic load (fixture units)
 - iii. determine grade
18. Describe the procedures used to install the building drain.
 - i. location of fixtures/services
 - ii. material lists
 - iii. excavation
 - iv. installation/support
 - v. protection/identification
 - vi. testing and inspection
19. Describe the procedures used to size the soil or waste stack.
 - i. interpret plumbing code requirements
 - ii. determine hydraulic load (fixture units)

20. Describe the procedures used to install the soil or waste stack.
 - i. location of fixtures/services
 - ii. material lists
 - iii. interference
 - iv. locate and cut openings
 - v. installation/support
 - vi. testing and inspection

21. Describe procedures used to size fixture drains and branches.
 - i. interpret plumbing code requirements
 - ii. determine hydraulic load (fixture units)

22. Describe the methods of locating services and cutting/modifying structural members to rough-in plumbing systems.

23. Identify types of cleanouts and describe their purpose and applications.
 - i. type
 - ii. size
 - iii. location/accessibility
 - iv. interpret plumbing code requirements

24. Identify traps, trap seals, floor drains and describe their purpose and applications.
 - i. size
 - ii. type
 - iii. trap primers
 - iv. interpret plumbing code requirements

25. Describe the methods used in locating floor drains and cleanouts in slabs to achieve finished elevations.

26. Describe trap seal loss and how to prevent it.
 - i. siphonage
 - ii. back pressure
 - iii. capillary attraction
 - iv. interpret plumbing code requirements

27. Identify code requirements for and explain the acceptable methods of testing drainage systems.
 - i. underground drainage systems
 - ii. above ground drainage, waste and vent systems
 - iii. fixtures
28. Describe the methods of providing back flow protection for drainage systems.
 - i. back water valve
 - ii. plug
 - iii. gate valve
29. Describe the procedures used to perform material list take-off from plans.
30. Interpret plumbing code requirements and define the requirements for non-metallic pipe fittings.
31. Interpret plumbing code requirements and define the requirements for ferrous pipe and fittings.
32. Interpret plumbing code requirements and define the requirements for non-ferrous pipe and fittings.
33. Interpret plumbing code requirements and define the requirements for joints and connections.

Practical Requirements:

1. Size, install, test, maintain and repair a soil and waste residential drainage system (upstream of the building sewer).

PF1680 Residential Venting

Learning Outcomes:

- Plan residential venting systems.
- Install basic venting systems in compliance with codes and regulations.

Duration: 45 Hours

Pre-requisite(s): PF1340

Objectives and Content:

1. Identify and interpret applicable sections of the National Plumbing Code.
2. Define common terminology associated with residential venting systems.
3. Describe the possible elements of a residential plumbing venting system.
 - i. stack vent
 - ii. individual vent
 - iii. dual vent
 - iv. branch vent
 - v. header
 - vi. continuous vent
 - vii. wet vent (four fixtures or less)
4. Describe the procedures for installing the various residential vent systems.
 - i. material lists
 - ii. interference
 - iii. locate and cut openings
 - iv. installation/support
 - v. protection
 - vi. testing and inspection

5. Explain the methods of sizing a stack vent.
 - i. interpret plumbing code requirements
 - ii. determine hydraulic load (fixture units)
 - iii. determine developed length
6. Describe various types of individual vents, their characteristics and applications.
7. Explain the methods of sizing an individual vent.
 - i. interpret plumbing code requirements
 - ii. determine largest trap served
8. Explain the methods of sizing a dual vent.
 - i. interpret plumbing code requirements
 - ii. determine largest trap served
9. Explain the methods of sizing a branch vent.
 - i. hydraulic load (fixture units)
 - ii. developed length
10. Explain the methods of sizing a header.
 - i. interpret plumbing code requirements
 - ii. determine hydraulic load (fixture units)
 - iii. determine developed length
11. Explain the methods of sizing a continuous vent.
 - i. interpret plumbing code requirements
 - ii. determine size of trap
 - iii. determine hydraulic load (fixture units)
 - iv. determine developed length
12. Explain the methods of sizing wet vents (four fixtures or less).
 - i. interpret plumbing code requirements
 - ii. determine fixture type/trap sizes
 - iii. determine hydraulic load (fixture units)
 - iv. number of storeys
 - v. offset length

13. Describe vent terminals, their purpose and operating principles.
 - i. interpret plumbing code requirements
 - ii. frost protection
 - iii. flashing
 - iv. installation methods

Practical Requirements:

1. Size, install, test, maintain and repair a residential venting system.

PF1691 Storm Systems

Learning Outcomes:

- Size building storm drains and storm drainage systems.
- Install building storm drains and storm drainage systems.

Duration: 13 Hours

Pre-requisite(s): PF1680; PF1340

Objectives and Content:

1. Identify and interpret applicable sections of the National Plumbing Code.
2. Describe the purpose, properties and theories of storm drain systems and combined systems.
3. Explain common terminology associated with storm drainage systems.
4. Describe the components of a commercial storm drainage system:
 - i. storm building sewer and storm building drain
 - ii. combined building sewer and storm building drain
 - iii. combined sewer
 - iv. sub-soil drains
 - v. roof drains
5. Describe the procedures used to determine the hydraulic load from roofs or paved surfaces and explain rainfall intensities.
6. Identify and interpret plumbing code requirements for storm drain systems.

7. Explain the procedures of sizing the storm building drain or sewer or combined building sewer.
 - i. interpret plumbing code requirements
 - ii. determine hydraulic load
 - iii. determine grade

8. Explain the procedures of sizing rain water leaders.
 - i. interpret plumbing code requirements
 - ii. circular/non-circular
 - iii. determine hydraulic load

9. Describe the procedures for installing rain water leaders.
 - i. piping materials
 - ii. interference
 - iii. hangers and support
 - iv. protection and identification
 - v. testing and inspection

10. Explain the methods of sizing roof gutters.
 - i. interpret plumbing code requirements
 - ii. determine hydraulic load
 - iii. determine grade
 - iv. determine area of gutter

11. Describe the following roof drain terminology:
 - i. drain body
 - ii. receiver
 - iii. dome
 - iv. extension
 - v. clamping ring
 - vi. gasket
 - vii. deck clamp

12. Describe the procedures used to locate and install roof and area drains.
 - i. determine low point
 - ii. layout
 - iii. cut and sleeve openings
 - iv. installation
 - v. secure/protection
 - vi. connection to piping

13. Describe the methods of protecting rain water leaders from the following:
- i. sweating
 - ii. frost/freezing
 - iii. expansion
 - iv. thrust

Practical Requirements:

None

PF1700 Commercial Drainage, Waste And Venting I

Learning Outcomes:

- Size commercial drainage systems.
- Install drainage systems for commercial applications according to codes and regulations.

Duration: 21 Hours

Pre-requisite(s): PF1680, PF1340

Objectives and Content:

1. Identify and interpret applicable sections of the National Plumbing Code.
2. Identify and interpret the National Plumbing Code sections which apply to the
 - i. fabrication, application and testing of interceptors.
3. Describe the tools, methods and procedures used to size and install a building sewer for a commercial complex.
 - i. tools used for grading pipes
 - ii. plumbing code requirements
 - iii. installing piping and services in trenches
4. Describe the procedures used to determine elevations and grades.
5. Describe the procedures used to size grease interceptors.
6. Describe the procedures used to lay out and install grease interceptors.
7. Describe the maintenance and cleaning of interceptors.

8. Describe the purpose, planning and installation of cleanouts and manholes in a commercial complex.
 - i. types, identification
 - ii. locations/spacing
 - iii. access and accessibility
 - iv. plumbing code requirements
9. Describe the types of traps used in plumbing systems, their purpose, components and applications.
10. Describe the various methods and systems of maintaining trap seals.
 - i. trap seal primers
 - ii. indirectly connected fixtures
 - iii. manual replenishment
11. Describe the various types of trap seal primers.
 - i. single and multiple distribution units
 - ii. electronic systems
 - iii. flush tanks
 - iv. individual fixtures
12. Explain floor drain terminology.
 - i. drain body
 - ii. receiver
 - iii. grate/strainer
 - iv. flashing collar/gasket
 - v. leveling screws
 - vi. primer connection
 - vii. floor sink
 - viii. flushing drain
13. Describe the procedures used to locate and install floor drains.
 - i. determine low point
 - ii. layout
 - iii. cut/sleeve openings
 - iv. installation/secure/protection
 - v. connection to piping
14. Explain the procedures for installing drains and vents for dishwashers and garbage grinders.

15. Describe the sequencing and procedures used to rough-in a complete commercial plumbing drainage system.
 - i. review drawings and specifications
 - ii. sizing
 - iii. material list take off
 - iv. scheduling and planning
 - v. excavation, coring/sleeving
 - vi. installation, testing, inspection

Practical Requirements:

None

PF1710 Residential Appliances, Fixtures and Trim

Learning Outcomes:

- Select and install plumbing fixtures, appliances and trim for a variety of residential applications.

Duration: 30 Hours

Pre-requisite(s): PF1340; PF1350; PF1360; PF1630; PF1640; PF1650; PF1660; PF1680

Objectives and Content:

Common Bathroom Fixtures and Trim

1. Identify and interpret applicable sections of the National Plumbing Code.
2. Describe common fixtures, their manufacturer and characteristics.
 - i. importance of completing the job well
 - ii. common fixtures
 - iii. receiving and handling of fixtures
 - iv. use of manufacturers' instructions
3. Describe the procedures used to install common bath and shower trim and/or accessories.
 - i. bath and shower
 - ii. water supply and drainage connections
 - iii. bath and shower trim
 - iv. shower heads
4. Describe the procedures used to install common types of lavatories.
 - i. wall hung lavatory
 - ii. water supply and drainage connections
 - iii. lavatory on concealed supports
 - iv. counter top lavatory
 - v. lavatory fittings, trim and accessories

5. Describe the procedures used to install common types of water closets, bowls, trim and accessories including water supply and drainage connections.
6. Describe the procedures used to install shower stalls including water supply and
 - i. drainage connections.
7. Describe the procedures used to install bidet and parts including water supply and drainage connections.
8. Identify and interpret the National Plumbing Code Sections which apply to the
 - i. installation and testing of common bathroom fixtures and trim.

Kitchen Sinks and Accessories

9. Identify and interpret sources of information and instructions.
 - i. drawings
 - ii. specifications
 - iii. manufacturer's literature
10. Describe the types of sinks, their trim and accessories.
11. Describe procedures used for installation of kitchen sinks.
 - i. installation
 - ii. drain connection
12. Describe the procedures used for installation of a garbage grinder or garburator.
 - i. installation
 - ii. drain connection
 - iii. electrical connections (safety)
13. Describe the procedures used for installation of dishwashers.
14. Describe the procedures used for installation of hot water dispensers.
15. Identify and interpret the National Plumbing Code Sections that apply to the
 - i. installation and testing of kitchen sinks and accessories.

Washing Machines and Laundry Trays

16. Identify and interpret sources of information for installation.
 - i. drawings
 - ii. specifications
 - iii. manufacturer's literature
17. Describe the types of laundry trays and accessories, their characteristics and applications.
18. Describe the procedures used to install washing machines.
 - i. procedures
 - ii. cross connections prevention
 - iii. water supply connections
 - iv. waste connections
 - v. check operating cycle
19. Identify and interpret the National Plumbing Code sections that apply to the
 - i. installation and testing of laundry trays and washing machines.

Plumbing Accessories

20. Describe the types of plumbing accessories, their characteristics and
 - i. applications.
 - ii. grab bars
 - iii. soap dispenser
 - iv. paper towel dispenser
 - v. toilet paper holder
 - vi. towel shelves
 - vii. towel pins
 - viii. single and double hooks
 - ix. soap holders and dishes
 - x. paraplegic equipment
 - xi. shower curtain rods
 - xii. shower doors
21. Describe procedures used to install the various types of plumbing accessories.

22. Identify and interpret the National Building Code sections which apply to the requirements and installation of plumbing accessories.

Practical Requirements:

1. Install and test residential plumbing appliances, accessories, fixtures and trim.

PF1720 Rural Waste Disposal

Learning Outcomes:

- Demonstrate knowledge of the sizing, planning and installation of rural waste disposal systems.

Duration: 15 Hours

Pre-requisite(s): PF1340

Objectives and Content:

Septic Tanks and Disposal Fields

1. Identify and interpret applicable sections of the National Plumbing Code.
2. Describe the location of a septic tank.
 - i. house
 - ii. well
 - iii. property lines
3. Describe the design features of a septic tank.
 - i. size
 - ii. materials liquid capacity
 - iii. measurements
 - iv. manholes
 - v. covers
 - vi. tank extensions
 - vii. tees
 - viii. baffles
 - ix. drop through tank

4. Describe the procedures used to install a septic tank.
 - i. building drain height
 - ii. depth in ground
 - iii. set tank level
 - iv. tank test
 - v. correct in and outlet
 - vi. tank covering
5. Describe the purpose and operation of a septic tank scum.
6. Describe the purpose and operation of a syphon or a lift pump in the septic tank.
7. Describe the purpose and components of an on-site sewage system.
 - i. tank
 - ii. pipe
 - iii. gravel
 - iv. soil
8. Describe the elements of site evaluation.
 - i. lot size and dimensions
 - ii. lot topography
 - iii. water table
 - iv. bedrock
 - v. minimum distances
9. Describe the textural properties of soils and their significance to rural waste disposal.
10. Describe the operation for disposal field soils.
 - i. aerobic bacteria
 - ii. anaerobic bacteria
 - iii. maximum loading rates
 - iv. soil permeability

11. Describe the types of materials used for disposal fields and the procedures used for installation.
 - i. pipe
 - ii. fittings
 - iii. grades
 - iv. gravel
 - v. geotextile
 - vi. sand
 - vii. imported fill
12. Describe a leaching chamber disposal system, its design and applications.
13. Describe some of the dangers of unregulated sewage and liquid-borne waste.
 - i. danger to health
 - ii. transmission of communicable diseases
 - iii. danger to wells and water sources
 - iv. danger to aquatic and animal life

Inspection, Maintenance and Regulations

14. Explain the inspection points:
 - i. pre-inspection
 - ii. final inspection
15. Describe the care and maintenance of septic tanks and disposal systems.
16. Describe the purpose and content of provincial regulations respecting on-site sewage disposal systems.
 - i. definitions
 - ii. permits
 - iii. lot category
 - iv. clearances
 - v. manufacture of septic tank or other disposal system appurtenances
 - vi. licensing of installers
 - vii. licensing of septic tank cleaners
 - viii. percolation test procedure

Practical Requirements:

None

PF1731 Introduction to Electric Welding

Learning Outcomes:

- Demonstrate knowledge of electrically operated welding and cutting equipment and associated safety procedures.

Duration: 24 Hours

Pre-requisite(s): PF1340

Objectives and Content:

1. Explain the terminology associated with electric welding methods.
2. Describe types of welding and their applications.
 - i. SMAW
3. Explain the safe handling requirements used when handling shielding gas cylinders.
 - i. transportation
 - ii. storage
4. Describe electric welding equipment, its operating principles and components.
 - i. AC/DC rectifiers
5. Describe the basic classifications and applications of electrodes.
6. Describe procedures used to prepare for electric welding operations.
 - i. electrode selection
 - ii. current
 - iii. polarity settings
 - iv. special applications
7. Describe the safety procedures required in electric welding processes.

8. Explain stress relief of piping materials.
 - i. methods used to normalize materials after welding

Practical Requirements:

1. Set up welding equipment.
2. Weld basic joint configurations using various electrodes.

AP1101 Introduction to Apprenticeship

Learning Outcomes:

- Demonstrate knowledge of how to become a registered apprentice.
- Demonstrate knowledge of the steps to complete an apprenticeship program.
- Demonstrate knowledge of various stakeholders in the apprenticeship process.
- Demonstrate knowledge of the Red Seal Program.

Duration: 15 Hours

Pre-Requisite(s): None

Objectives and Content:

1. Define the following terms:
 - i. apprenticeship
 - ii. apprentice vs. registered apprentice
 - iii. Journeyperson vs. Certified Journeyperson
 - iv. Certificate of Apprenticeship
 - v. Certificate of Qualification
 - vi. Recognition of Prior Learning
 - vii. dual certification

2. Explain the apprenticeship system in Newfoundland and Labrador and the roles and responsibilities of those involved.
 - i. registered apprentice
 - ii. training institution
 - iii. employer
 - iv. Journeyperson
 - v. Department of Advanced Education and Skills
 - Industrial Training Section
 - Standards and Curriculum Section
 - vi. Provincial Trade Advisory Committees
 - vii. Provincial Apprenticeship and Certification Board

3. Identify the Conditions Governing Apprenticeship.
4. Describe the training and educational requirements.
 - i. pre-employment (entry level) training
 - ii. block release
 - iii. on-the-job
5. Explain the steps in the registered apprenticeship process.
 - i. criteria for eligibility
 - entrance requirements as per Conditions of Apprenticeship
 - employment
 - ii. registration process
 - application requirements
 - iii. Memorandum of Understanding
 - probation period
 - cancellation
 - iv. Record of Occupational Progress (Logbook)
 - signing off skills
 - recording hours
 - updating PDO on progress
 - v. class calls
 - schedule
 - EI Eligibility
 - Direct Entry
 - advanced level
 - vi. Block Exams
 - vii. progression
 - schedule
 - wage rates
 - viii. cancellation of apprenticeship
 - ix. Practical Examinations
 - x. Provincial and Interprovincial examinations
 - xi. certification
 - Certification of Apprenticeship
 - Certification of Qualification
 - Provincial certification
 - Interprovincial Red Seal endorsement

6. Explain the Interprovincial Standards Red Seal Program.
 - i. designated Red Seal trade
 - ii. the National Occupational Analysis (NOA)
 - iii. Interprovincial (IP) Red Seal Endorsement Examination
 - iv. relationship of NOA to IP Examination
 - v. qualification recognition and mobility
7. Identify the current financial incentives available to apprentices.
8. Explain the NL apprenticeship and trades certification division's out-of- province apprenticeship policy.

Practical Requirements:

1. Use the Provincial Apprenticeship and Trades Certification web site at www.gov.nl.ca/app to:
 - i. locate, download, and complete the Application for Apprenticeship and Memorandum of Understanding (MOU)
 - ii. locate, download, and complete the Out of Province registration forms
 - Application for Apprenticeship (out of province)
 - Letter of Understanding (LOU)
 - Acceptance of Conditions Letter
 - iii. locate, download, and complete the Work Experience Credits form
 - iv. identify the locations of all Industrial Training offices
 - v. locate and review the following learning resources relevant to the trade:
 - Study Guide
 - Exam Preparation Guide
 - Plan of Training
2. Use a logbook for this trade to:
 - i. identify the hours for the trade (in-school and on-the-job)
 - ii. identify the number of blocks
 - iii. identify the courses in each block
 - iv. identify the workplace skills to be completed and verified

3. Use the Red Seal Web site, <http://www.red-seal.ca> to retrieve the National Occupational Analyses (NOA) for this trade.
 - i. identify the following components of the NOA:
 - Trends
 - Scope
 - Key Competencies
 - Blocks
 - Tasks
 - Subtasks
 - Pie Charts
 - Table of Specifications

AM1100 Math Essentials

Note: It is recommended that AM1100 be delivered in the first semester of the Entry Level training program.

Learning Outcomes:

- Demonstrate knowledge of the numeracy skills required to begin the 2nd level math course.
- Demonstrate knowledge of mathematics as a critical element of the trade environment.
- Demonstrate knowledge of mathematical principles in trade problem solving situations.
- Demonstrate the ability to solve simple mathematical word problems.

Duration: 30 Hours

Pre-Requisite(s): None

Objectives and Content:

Wherever possible, the instructor should use trade specific examples to reinforce the course objectives

1. Use multiplication tables from memory.
2. Perform whole number operations.
 - i. read, write, count, round off, add, subtract, multiply and divide whole numbers
3. Apply the order of operations in math problems.
4. Perform fraction and mixed number operations.
 - i. read, write, add, subtract, multiply and divide fractions

5. Perform decimal operations.
 - i. read, write, round off, add, subtract, multiply and divide decimals
6. Perform percent/decimal/fraction conversion and comparison.
 - i. convert between fractions, decimals and percents
7. Perform percentage operations.
 - i. read and write percentages
 - ii. calculate base, rates and percentages
8. Perform ratio and proportion operations.
 - i. use a ratio comparing two quantities with the same units
 - ii. use a proportion comparing two ratios
9. Use the imperial measurement system in math problems.
 - i. identify units of measurement for:
 - length
 - mass
 - area
 - volume
 - capacity
10. Use the metric measurement system in math problems.
 - i. identify units of measurement for:
 - length
 - mass
 - area
 - volume
 - capacity

Practical Requirements:

1. To emphasize or further develop specific knowledge objectives, students will be asked to complete practical demonstrations which confirm proper application of mathematical theory to job skills.

AM1260 Pipe Trade Math Fundamentals

Learning Outcomes:

- Demonstrate knowledge of mathematical concepts in the performance of trade practices.
- Demonstrate knowledge of mathematics as a critical element of the trade environment.
- Demonstrate knowledge of solving mathematical word problems.
- Demonstrate knowledge of mathematical principles for the purposes of problem solving, job and materials estimation, measurement, calculation, system conversion, diagram interpretation and scale conversions, formulae calculations, and geometric applications.

Duration: 30 Hours

Pre-Requisite(s): AM1100

Objectives and Content:

The instructor is required to use trade specific examples to reinforce the course objectives.

1. Employ percent/decimal/fraction conversion and comparison in trade specific situations.
2. Apply ratios and proportions to trade specific problems.
3. Use the Imperial Measurement system in trade specific applications.
4. Use the Metric Measurement system in trade specific applications.
5. Complete Imperial/Metric conversions in trade specific situations.
 - i. convert between imperial and metric measurements
 - ii. convert to another unit within the same measurement system

6. Manipulate formulas using cross multiplication, dividing throughout, elimination, and substitution to solve trade specific problems, such as:
 - i. right angle triangles
 - ii. area
 - iii. volume
 - iv. perimeter

7. Perform calculations involving geometry that are relevant to the trade, such as:
 - i. angle calculations
 - ii. circle calculations

8. Use practical math skills to complete administrative trade tasks.
 - i. material estimation
 - ii. material costing
 - iii. time & labour estimates
 - iv. taxes & surcharges
 - v. markup & projecting revenue

Practical Requirements:

1. To emphasize or further develop specific knowledge objectives, students will be asked to complete practical demonstrations which confirm proper application of mathematical theory to job skills.

Note:

This course has been designated as NON-TRANSFERABLE to other trades programs, and NOT ELIGIBLE FOR PRIOR LEARNING ASSESSMENT. Students completing training in this trade program are required to complete this math course.

CM2160 Communication Essentials

Learning Outcomes:

- Demonstrate knowledge of the importance of well-developed writing skills in the workplace and in career development.
- Demonstrate knowledge of the purpose of various types of workplace correspondence.
- Demonstrate knowledge of the principles of effective workplace writing.
- Demonstrate knowledge of standard formats for letters and memos.
- Demonstrate knowledge of principles related to writing effective letters and memos.
- Demonstrate the ability to prepare and deliver an oral presentation.
- Demonstrate knowledge of the importance of effective interpersonal skills in the workplace.

Duration: 45 Hours

Pre-Requisite(s): None

Objectives and Content:

Wherever possible, the instructor is expected to use trade specific examples to reinforce the course objectives.

1. Identify the principles for writing clear, concise, complete sentences and paragraphs which adhere to the conventions of grammar, punctuation, and mechanics.
2. Identify the principles of effective workplace writing.
 - i. describe the value of well-developed writing skills to career success
 - ii. discuss the importance of tone, and language or word choice in workplace communication, regardless of the circumstances
 - iii. demonstrate an awareness of cultural differences when preparing workplace correspondence
 - iv. describe the writing process as it applies to workplace communication
 - planning

- writing
 - editing/revising
 - v. identify the parts of a business letter and memo, and when each should be used in the workplace
 - vi. identify the standard formats for business letters and memos
 - vii. identify guidelines for writing sample letters and memos which convey:
 - acknowledgment
 - routine request
 - routine response
 - complaint
 - refusal
 - persuasive request
 - letters of appeal
- 3. Identify types of informal workplace documents.
 - i. identify types & purposes of reports
 - incident
 - process
 - progress
 - ii. identify common trade specific forms
 - iii. describe primary and secondary methods used to gather information
 - iv. discuss the importance of accuracy and completeness in reports and forms
- 4. Identify the elements of presentations used in the workplace.
 - i. identify presentation types
 - impromptu
 - informative
 - demonstration
 - persuasive
 - ii. identify the components of an effective presentation
 - eye contact
 - body language
 - vocal qualities
 - audience analysis
 - multimedia tools
 - keeping on topic

5. Demonstrate an understanding of interpersonal communications in the workplace.
 - i. identify listening techniques
 - ii. demonstrate an understanding of group dynamics
 - iii. describe the importance of contributing information and expertise in the workplace
 - iv. describe the importance of respectful and open communication in the workplace
 - v. identify methods to accept and provide feedback in a constructive and considerate manner
 - vi. explain the role of conflict in a group to reach solutions

6. Identify acceptable workplace uses of communication technologies.
 - i. cell / Smart Phone etiquette
 - ii. voice mail
 - iii. e-mail
 - iv. teleconferencing / videoconferencing for meetings and interviews
 - v. social networking
 - vi. other emerging technologies

Practical Requirements:

1. Write well-developed, coherent, unified paragraphs.
2. Write sample letters and memos.
3. Write one short informal report.
4. Complete a selection of at least 3 trade-related forms.
5. Deliver an effective oral presentation.

SD1760 Workplace Essentials

Note: It is recommended that SD1760 be delivered in the second half of the Entry Level training program.

Learning Outcomes:

- Demonstrate knowledge of workplace essentials in the areas of meetings, unions, workers compensation, workers' rights, and human rights.
- Demonstrate knowledge of good customer service practices.
- Demonstrate knowledge of effective job search techniques.

Duration: 45 Hours

Pre-Requisite(s): None

Objectives and Content:

Wherever possible, the instructor is expected to use trade specific examples to reinforce the course objectives.

1. Identify common practices related to workplace meetings.
 - i. identify and discuss meeting format and preparation required for a meeting
 - ii. explain the purpose of an agenda
 - iii. explain the expected roles, responsibilities, and etiquette of meeting participants

2. Define unions and identify their role in the workplace.
 - i. identify the purpose of unions
 - ii. identify a common union structure
 - iii. identify the function of unions in this trade

3. Demonstrate an understanding of the Worker's Compensation process.
 - i. describe the aims, objectives, regulations and benefits of the Workplace Health, Safety and Compensation Commission
 - ii. explain the role of the Workers Advisor
 - iii. explain the internal review process

4. Demonstrate an understanding of workers' rights.
 - i. define labour standards
 - ii. identify regulations, including:
 - hours of work & overtime
 - termination of employment
 - minimum wages & allowable deductions
 - statutory holidays, vacation time, and vacation pay

5. Demonstrate an understanding of Human Rights issues.
 - i. examine the Human Rights Code and explain the role of the Human Rights Commission
 - ii. define harassment in various forms and identify strategies for prevention
 - direct
 - systemic
 - adverse effect
 - iii. identify gender and stereotyping issues in the workplace
 - iv. define basic concepts and terms related to workplace diversity including age, race, culture, religion, socio-economic status, and sexual orientation

6. Demonstrate an understanding of quality customer service.
 - i. explain why quality service is important
 - ii. identify barriers to quality customer service
 - iii. identify customer needs & common methods for meeting them
 - iv. identify and discuss the characteristics & importance of a positive attitude
 - v. identify the importance of demonstrating good communication skills including body language, listening, questioning, and when using electronic communication devices
 - vi. identify techniques for interacting with challenging customers to address complaints and resolve conflict

7. Demonstrate an understanding of effective job search techniques.
 - i. identify and explain employment trends, opportunities, and sources of employment
 - ii. identify and discuss essential skills for the trades as outlined by Human Resources and Skills Development Canada
 - iii. review job ads and identify the importance of fitting qualifications to job requirements
 - iv. identify the characteristics of effective resumes, the types of resumes, and principles of resume formatting
 - v. identify the characteristics of an effective cover letter
 - vi. identify the components of a portfolio, and discuss the value of establishing and maintaining a personal portfolio
 - vii. identify the common characteristics of the job interview process:
 - pre-interview preparation
 - interview conduct
 - post-interview follow up

Practical Requirements:

1. Create a resume.
2. Create a cover letter.
3. Participate in a mock job interview.

MC1060 Computer Essentials

Learning Outcomes:

- Demonstrate knowledge of computer systems and their operation.
- Demonstrate knowledge of popular software packages and their applications.
- Demonstrate knowledge of security issues related to computers.

Duration: 15 Hours

Pre-Requisite(s): None

Objectives and Content:

Wherever possible, the instructor is expected to use trade specific examples to reinforce the course objectives.

1. Identify the major external components of a microcomputer system.
 - i. input devices
 - ii. output devices
 - iii. central control unit

2. Use operating system software.
 - i. start and quit a program
 - ii. use the help function
 - iii. use the find function
 - iv. maximize and minimize a window
 - v. use the task bar
 - vi. adjust desktop settings such as screen savers, screen resolution, and backgrounds
 - vii. shut down a computer

3. Perform file management commands.
 - i. create folders
 - copy files and folders
 - move files and folders
 - rename files and folders
 - delete files and folders

4. Use word processing software to create documents.
 - i. enter text
 - ii. indent and tab text
 - iii. change text attributes (bold, underline, font, etc.)
 - iv. change layout format (margins, alignment, line spacing)
 - v. spell check and proofread
 - vi. edit text
 - vii. save document
 - viii. print document
 - ix. close document
 - x. retrieve documents

5. Use spreadsheet software to create spreadsheets.
 - i. enter data in cells
 - ii. create formulas to add, subtract, multiply and divide
 - iii. save spreadsheet
 - iv. print spreadsheet
 - v. close spreadsheet
 - vi. retrieve spreadsheet

6. Access the Internet.
 - i. access websites using the world wide web(www)
 - ii. identify examples of web browsers
 - iii. use search engines with common searching techniques
 - iv. describe security issues

7. Use electronic mail.
 - i. describe e-mail etiquette
 - grammar and punctuation
 - privacy and legal issues when sharing and forwarding e-mail
 - work appropriate content
 - awareness of employer policies
 - ii. manage e-mail using the inbox, sent, and deleted folders
 - iii. send an e-mail message with attachment(s)
 - iv. print e-mail

Practical Requirements:

None.

BLOCK II

PF2100 Blueprint 3 (Heavy Commercial/Industrial)

Learning Outcomes:

- Interpret industrial piping drawings in both orthographic and isometric and sketch views.
- Interpret architectural drawings and specifications for commercial/industrial installations.
- Complete single line sketches from commercial/industrial drawings and blueprints.
- Convert orthographic commercial/industrial pipe drawings to isometrics pipe drawings.
- Apply compass and elevations to commercial/industrial pipe drawings.
- compile as-built, design built and shop drawings.
- Demonstrate understanding of system identification procedures.
- Determine measurements and elevations using a builders level.
- Compile materials lists from sketches.

Duration: 30 Hours

Pre-requisite(s): Block I

Objectives and Content:

1. Identify the types of plans and describe their purpose and use for commercial/industrial projects.
 - i. plot (site)
 - ii. foundation
 - iii. floor plans
 - iv. elevations
 - v. sections
 - vi. details
 - vii. reflected ceiling drawings
 - viii. room finish schedules

- ix. revisions
2. Describe the features contained in commercial/industrial drawings, their importance and use.
 - i. grid lines
 - ii. exploded views
 - iii. sections
 - iv. details
 - v. finish schedules
 - vi. page references
 - vii. elevations
 - viii. architectural symbols
 3. Describe the sequencing and procedures used to plan materials for hangers, sleeves, and fixture carriers.
 - i. floor/slab construction
 - ii. wall construction
 - iii. structural supports
 4. Identify and explain industrial mechanical, architectural and electrical symbols and abbreviations.
 5. Identify and explain specifications.
 - i. breakdown of divisions
 - ii. trade responsibilities
 6. Identify the use of computer aided drafting in the piping trades.
 7. Identify and interpret the various piping related symbols found in a set of commercial or institutional drawings.
 - i. fixtures/piping/valve
 - ii. equipment
 8. Identify and interpret the various heating related symbols found in a set of commercial or institutional drawings.
 - i. heating and cooling systems
 - ii. heating equipment
 - iii. heating valves
 - iv. fuel oil systems
 - v. fuel gas systems

9. Identify piping related systems from drawings.
 - i. kitchen equipment
 - ii. medical gas
 - iii. compressed air

10. Identify systems and their components found on institutional/commercial drawings.
 - i. mechanical
 - ii. electrical
 - iii. fire protection
 - iv. control systems

11. Describe the purpose and applications of the following information systems.
 - i. as-built/engineered drawings
 - ii. shop drawings

12. Explain the significance of providing system identification.
 - i. colour coding
 - ii. pipe identification
 - iii. valve tags, tabs, charts
 - iv. equipment identification

13. Explain the procedures used to compile material lists from drawings.

Builder's Level/Transit/Laser Level

14. Identify the parts of a builder's level/transit/laser level and describe their purpose.
 - i. telescope
 - ii. level bubbles
 - iii. leveling screws
 - iv. eye piece
 - v. focusing
 - vi. locking screws
 - vii. protective lens

15. Identify the extension rod and describe its purpose and procedures for use.
 - i. height of rod
 - ii. holding the rod
 - iii. markings on rod
 - iv. readings on rod

16. Explain leveling terms.
 - i. line of sight
 - ii. instrument location
 - iii. station
 - iv. bench mark
 - v. height of instrument
 - vi. back sight
 - vii. fore sight
 - viii. turning point

17. Describe the procedures used to determine measurements and elevations using a builder's level.

18. Describe the procedures used to lay out pipe lines and grades with a builder's level.
 - i. turn angle
 - ii. name station
 - iii. locate and number stations

Practical Requirements:

1. Read and interpret architectural, mechanical, electrical, as-built, and shop drawings.
2. Determine, sketch and apply dimensioning.
3. Read and interpret specifications.
4. Complete a material take-offs.
5. Use builders' level.

PF2121 Hydronic Heating 2

Learning Outcomes:

- Demonstrate knowledge of the operation of commercial heating systems, their associated piping and control systems.
- Demonstrate knowledge of the operation and controls of multi-zone hydronic heating systems.

Duration: 54 Hours

Pre-requisite(s): Block I

Objectives and Content:

1. Identify and interpret hydronic heating schematic symbols.
2. Define the following terms:
 - i. cross connection
 - ii. back flow prevention
3. Identify types of devices used for protection of cross connection control and describe their applications.
4. Describe the operation and applications of thermostats.
 - i. line voltage
 - ii. low voltage
 - iii. automatic set back
 - iv. multiple fuel supply applications
5. Describe the operation and specify the use of hot water control systems.
6. Describe the operation and specify the use of primary controls.
7. Explain the operation of outdoor temperature sensors.
8. Describe the operation and applications of heat exchanger vacuum valves.

9. Describe the operation and applications of flow-control-control valves.
10. Describe the operation and applications of motorized valves.
11. Identify types of safety controls and describe their operation and applications.
 - i. low water cutoff and fusible plugs
 - ii. feeder cutoff combinations
 - iii. high and low water alarms
 - iv. pressure controls
 - v. gauge glass
 - vi. boiler trim
 - vii. drain and blow-down valves, pigtails and steam gauges

Practical Requirements:

None

PF2130 Introduction to Electricity

Learning Outcomes:

- Demonstrate knowledge of the basic concepts of electricity.

Pre-requisite(s): Block I

Duration: 15 Hours

Objectives and Content:

1. Define terminology associated with electricity as related to the trade.
2. Identify hazards and describe safe work practices pertaining to electricity.
3. Identify tools and equipment used to test electrical circuits and describe their applications and procedures for use.
4. Identify types of current and describe their characteristics and applications.
 - i. direct current (DC)
 - ii. alternating current (AC)
5. Identify types of electrical circuits and describe their characteristics, operation.

Practical Requirements:

None

PF2150 Introduction to Gas Piping 1(Low Pressure)

Learning Outcomes:

Upon successful completion of this unit, the apprentice will be able to:

- Demonstrate knowledge of the combustion process.
- Demonstrate knowledge of gas piping installation according to code.

Duration: 30 Hours

Pre-requisite(s): Block I

Objectives and Content:

1. Identify types of gas piping systems and describe their characteristics and applications.
 - i. natural gas
 - liquefied
 - compressed
 - ii. liquid petroleum gas
 - iii. petroleum
 - iv. inert gas
2. Identify and interpret regulations governing:
 - i. natural gas and propane systems.
 - ii. transportation and storage of gas cylinders.
3. Describe the properties and characteristics of natural gas.
 - i. odor, color and taste
 - ii. state
 - iii. composition
 - iv. toxicity
 - v. specific gravity
 - vi. flame type
 - vii. excess air
 - viii. air composition

- ix. heating value
 - x. flame temperature and speed
 - xi. limits of flammability
 - xii. ignition temperature
 - xiii. combustion process
4. Define terminology relating to gas piping.
- i. gas main
 - ii. gas service
 - iii. shut-off valves
 - iv. branch line
 - v. riser
 - vi. drop line
 - vii. dirt pocket
 - viii. piping extension
 - ix. concealed piping
 - x. flexible connector
5. Describe safe gas piping practices and procedures.
- i. gas code
 - ii. materials
 - iii. pipe coating
 - iv. reaming
 - v. threading
 - vi. bushings
 - vii. brazing
 - viii. joint compounds
 - ix. gasket material
 - x. grades
 - xi. supports
 - xii. prohibited practices
 - xiii. limitations at certain locations
 - xiv. outlets
 - xv. concealed piping
 - xvi. pipe identification
6. Describe the procedures used to test a gas line.
- i. before appliance is connected
 - ii. purging a gas line

7. Describe the factors that determine the correct pipe sizing for gas systems 2 PSI or lower installations.
 - i. length of pipe
 - ii. allowable pressure loss
 - iii. system capacity
 - iv. specific gravity of gas

Practical Requirements:

1. Install and test a low pressure gas piping system.

PF2170 Medical Gas Systems

Learning Outcomes:

- Demonstrate knowledge of medical gas systems.

Duration: 21 Hours

Pre-requisite(s): Block I

Objectives and Content:

1. Identify and interpret sources of information pertaining to installation of medical gas systems.
 - i. drawings
 - ii. specifications
 - iii. manufacturers literature
 - iv. codes
2. Describe medical gas systems, their components, materials and operation.
3. Describe materials and procedures required to join piping for medical gas systems.
 - i. degreasing
 - ii. purging
4. Describe oxygen supply systems, their components and installation.
 - i. piping and fittings
 - ii. jointing methods
 - iii. wall outlets
 - iv. valves
 - v. testing
5. Describe vacuum systems, their components and installation.
 - i. vacuum pumps and receivers
 - ii. piping and fittings
 - iii. wall outlets

- iv. valves
 - v. testing
6. Describe anesthetic gas systems, their components and installation.
- i. piping and fittings
 - ii. wall outlets
 - iii. valves
 - iv. testing
7. Describe nitrogen gas systems, their components and installation.
- i. piping and fittings
 - ii. wall outlets
 - iii. valves
 - iv. safety devices
 - v. testing
8. Describe vacuum and medical air systems.
- i. compressors
 - ii. piping and fittings
 - iii. reducing stations
 - iv. valves and strainers
 - v. pressure gauges and controls
 - vi. safety devices
 - vii. testing
 - viii. air dryers
9. Describe the color coding of medical gas systems.
10. Describe provincial regulations that may apply to the installation of medical gas systems.

Practical Requirements:

1. Perform procedure for brazing a purged and non-purged medical gas joint.

PF2271 Commercial Drainage, Waste and Venting 2

Learning Outcomes:

- Size commercial venting systems.
- Install venting systems for commercial applications according to codes and regulations.

Duration: 30 Hours

Pre-requisite(s): Block I

Objectives and Content:

1. Identify and interpret applicable sections of the National Plumbing Code.
2. Describe the components, purpose and applications of the following venting systems:
 - i. stacks over 3 storeys
 - ii. individual
 - iii. dual
 - iv. branch
 - v. header
 - vi. continuous
 - vii. vent stack
 - viii. relief vent
 - ix. wet vents
 - x. stack offsets
 - xi. single story wet vent (over four fixtures)
3. Identify and interpret plumbing codes for commercial venting systems.
4. Describe the criteria and procedures for installation of:
 - i. vent pipes for traps
 - ii. miscellaneous vent pipes
 - iii. arrangement of vent pipes
 - iv. minimum size of vent pipes

5. Explain the procedures for connecting fixtures, offsets and vents to venting systems.
6. Describe the procedures used to install the various commercial vent systems.
 - i. material lists
 - ii. interference
 - iii. location and cutting of openings
 - iv. installation and support
 - v. protection
 - vi. testing and inspection
7. Describe the location and sizing of vent pipe terminals.
8. Describe the purpose and installation of fresh air inlets and building traps.
9. Describe the purpose and procedures for testing DWV systems.

Practical Requirements:

None

PF2280 Commercial Appliances, Fixtures and Trim

Learning Outcomes:

- Select, install plumbing fixtures, appliances and trim for a variety of commercial applications.

Duration: 30 Hours

Pre-requisite(s): Block I

Objectives and Content:

1. Identify and interpret applicable sections of the National Plumbing Code.
2. Describe the types of fixture carriers, their parts, characteristics and
 - i. applications
 - ii. water closet connection
 - iii. urinal wall carrier
 - iv. lavatory supports
3. Describe and identify the sources of information relevant to installation.
 - i. drawings
 - ii. specifications
 - iii. manufacturers' literature
4. Describe carriers for batteries of fixtures.
 - i. determination of left-hand and right-hand systems
5. Describe typical installations.
 - i. residential
 - ii. commercial/industrial

6. Describe the various types of connections used for fixtures.
 - i. floor style back outlet closet connection
 - ii. lead pipe connection
 - iii. tapered thread connection
 - iv. o-ring seal connection

7. Describe the procedures used to install the following:
 - i. water closet carriers
 - ii. basin and sink carrier
 - iii. urinal carrier

Practical Requirements:

1. Install and test commercial plumbing fixtures and trim.

PF2550 Historic Piping

Learning Outcomes:

- Demonstrate knowledge of historic piping materials.

Duration: 6 Hours

Pre-requisite(s): Block 1

Objectives and Content:

1. Identify and interpret applicable sections of the National Plumbing Code.
2. Identify less common plumbing related piping and describe their properties and applications.
 - i. lead
 - ii. bituminized fiber
 - iii. plastic lined metal
 - iv. vitrified clay
 - v. aluminum DWV
 - vi. asbestos cement
 - vii. polybutylene
3. Describe the characteristics of lead pipe and procedures for its use.

Practical Requirements:

None

PF2560 Food Processing Systems

Learning Outcomes:

- Demonstrate knowledge of food processing systems and their installation.

Duration: 6 Hours

Pre-requisite(s): Block I

Objectives and Content:

1. Identify and interpret applicable sections of the National Plumbing Code.
2. Identify and interpret sources of information pertaining to installation of food processing systems.
 - i. drawings
 - ii. specifications
 - iii. manufacturers' literature
 - iv. regulations and codes
3. Identify types of food processing systems and describe their purpose, components and operation.
4. Describe indirect waste connections, their purpose and installation.
5. Describe venting requirements and arrangements for food processing systems.
6. Describe traps and trap primers, their purpose, operation and location.
7. Describe cleanouts, their purpose and location.

8. Identify types of food processing equipment and accessories and describe their purpose and operating principles
 - i. ice makers
 - ii. potato peelers
 - iii. drink dispensers
 - iv. food coolers
 - v. food processing tables
 - vi. steam table
9. Describe procedures used to install food processing systems.
10. Describe procedures used to install food processing equipment.

Practical Requirements:

None

PF3100 Fire Protection

Learning Outcomes:

- Demonstrate knowledge of fire protection systems and their installation.
- Demonstrate knowledge of standpipe systems and their installation.
- Demonstrate knowledge of residential sprinkler systems and their installation.

Duration: 18 Hours

Pre-requisite(s): Block I

Objectives and Content:

1. Identify and interpret applicable sections of the National Plumbing Code.
2. Describe the purpose, components and operation of residential sprinkler systems.
3. Identify and interpret applicable codes for fabrication and installation of standpipe systems.
4. Identify and interpret sources of information pertaining to installation of standpipe systems.
 - i. drawings
 - ii. specifications
 - iii. manufacturer's literature
5. Identify sources of information pertaining to residential sprinkler system installation, maintenance and testing and describe their use.
 - i. drawings
 - ii. specifications
 - iii. manufacturers' literature
6. Describe methods of supplying water to system.
 - i. siamese connection
 - ii. tanks
 - iii. pumps

Practical Requirements:

None

BLOCK III

PF2310 Cross Connection Control Devices

Learning Outcomes:

- Identify cross connections and determine how to correct them.

Duration: 45 Hours

Pre-requisite(s): Block II

Objectives and Content:

1. Identify and interpret applicable sections of the National Plumbing Code.
2. Identify and interpret sources of information pertaining to installation.
 - i. the National Plumbing Code
 - ii. manufacturers' literature
3. Describe the division of responsibilities for cross connection control.
 - i. installation
 - ii. troubleshooting
 - iii. repair
4. Describe the cross connection control program.
 - i. administration
 - ii. legal aspects
 - iii. health aspects
 - iv. minimum standards
 - v. inspection of devices
 - vi. licensing of testers
 - vii. testing of devices
5. Identify methods and devices used for cross connection control and describe their location and operation in various systems.

6. Describe the procedures used for maintenance and repair of devices.
 - i. troubleshooting
 - ii. repair procedures
7. Describe the causes of backflow and their role in cross connection.
8. Explain backflow control.
 - i. causes
 - ii. classification of hazards
 - iii. assessment of hazards
 - iv. types of devices
 - v. selection of proper devices
 - vi. methods of backflow control
 - vii. typical occurrences and recommended protection
9. Describe the purpose and operation of:
 - i. back siphonage devices
 - ii. back pressure devices
10. Identify testable devices.
 - i. non-testable devices
 - ii. testable devices
 - iii. testing procedures
11. Describe the procedures used to install devices.
 - i. location of devices
 - ii. National Plumbing Code applications
 - iii. manufacturer's recommendations
 - iv. warranty of devices

Practical Requirements:

1. Select, install, test and repair various cross connection control devices
 - i. atmospheric vacuum breaker
 - ii. pressure vacuum breaker
 - iii. double check valve assembly
 - iv. reduced pressure zone assembly

PF2320 Introduction to Gas Piping 2 (High Pressure)

Learning Outcomes:

- Demonstrate knowledge of the combustion process.
- Demonstrate knowledge of gas piping installation according to code.

Duration: 30 Hours

Pre-requisite(s): Block II

Objectives and Content:

1. Describe the purpose, parts and operation of a gas distribution system from the well head to the service regulator.
 - i. gas well
 - ii. compressor station
 - iii. city gate station
 - iv. district regulating station
 - v. regulators
 - vi. high pressure distribution service
 - vii. high pressure distribution lines
 - viii. line pressures
 - ix. meters

2. Identify types of gas pressure regulators and describe their purpose.
 - i. low capacity
 - ii. high capacity
 - iii. combination
 - iv. loading element
 - v. measuring element
 - vi. restricting element
 - vii. 1st stage
 - viii. 2nd stage
 - ix. service
 - x. system
 - xi. appliance

- xii. code
3. Describe the factors that determine the correct pipe sizing for gas systems over 2 PSI.
- i. installations.
 - ii. length of pipe
 - iii. allowable pressure loss
 - iv. system capacity
 - v. specific gravity of gas
 - vi. number and type of fittings
4. Describe the purpose and operation of gas venting.
- i. gravity or natural venting
 - ii. spillage
 - iii. combustion process
 - iv. carbon monoxide
 - v. power venting
 - vi. fan assisted

Practical Requirements:

None

PF2350 Renewable Energy Systems

Learning Outcomes:

- Demonstrate knowledge of geothermal systems and related components.
- Demonstrate knowledge of solar heating systems and related components.
- Demonstrate knowledge of heat recovery systems and related components.
- Demonstrate knowledge of emerging technologies in renewable energy.

Duration: 21 Hours

Pre-requisite(s): Block II

Objectives and Content:

Geothermal Systems

1. Describe geothermal systems, components and piping.
2. Describe joining methods for geothermal piping.
3. Describe the purpose, parts and operating principles of heat pumps.
4. Describe the procedures used to install heat pumps.
5. Identify tools and equipment associated with geothermal piping.
6. Solar Heating Systems
7. Describe solar heating systems, components and piping.
8. Describe the operation of the various types of solar heating systems.
9. Describe the applications of solar heating systems.

Heat Recovery Systems

10. Describe heat recovery systems, components and piping.
11. Describe the operation of the various types of heat recovering systems.
12. Describe the purpose, parts and operating principles of heat recovery systems.
13. Identify tools and equipment associated with heat recovery piping.

Practical Requirements:

None

PF2510 Compressed Air and Vacuum Systems

Learning Outcomes:

- Demonstrate knowledge of compressed air and vacuum systems and their installation.

Duration: 21 Hours

Pre-requisite(s): Block II

Objectives and Content:

1. Explain air theory.
 - i. effects of water within a system
 - ii. humidity
 - iii. air treatment and storage
 - iv. safety
2. Identify component parts of vacuum systems and describe their purpose.
3. Identify and interpret sources of information applicable to the installation of compressed air systems.
 - i. drawings
 - ii. specifications
 - iii. manufacturers' literature
 - iv. codes and regulations
4. Describe types of compressors, their operating principles and applications.
 - i. rotary
 - ii. piston
5. Describe the procedures used to install compressors.
 - i. cold climate
 - ii. damp climate or high humidity
 - iii. bases and foundations

6. Describe the procedures used to install compressor piping.
 - i. inlet piping
 - ii. discharge piping
 - iii. safety valves
 - iv. shut-off valves
 - v. controls
 - vi. condensate drain valve/trap

7. Describe the procedures used to install distribution piping to draw-off point.
 - i. systems
 - ii. laboratories
 - iii. instrumentation
 - iv. workshops
 - v. supports
 - vi. materials
 - vii. branch connections off main
 - viii. drop lines
 - ix. drains
 - x. shut-off valves
 - xi. quick-connects

8. Identify component parts of pneumatic transfer systems and describe their purpose.

Practical Requirements:

1. Install and test a basic compressed air system.

PF2520 Chilled Water Systems

Learning Outcomes:

- Demonstrate knowledge of chilled water systems and their installation.

Duration: 12 Hours

Pre-requisite(s): Block II

Objectives and Content:

1. Describe the purpose, component parts and operation of a chilled water system.
2. Identify and interpret sources of information pertaining to the installation of chilled water systems.
 - i. drawings
 - ii. specifications
 - iii. manufacturers' literature
3. Describe the procedures used to install a chilled water system.

Practical Requirements:

None

PF2541 Rural Water Supply

Learning Outcomes:

- Demonstrate understanding of the operation of rural water supply systems.
- Demonstrate understanding of the operation, installation and repair of water pumps.

Duration: 39 Hours

Pre-requisite(s): Block II

Objectives and Content:

1. Identify and interpret applicable sections of the National Plumbing Code.
2. Describe the surface sources of water supply.
 - i. rivers
 - ii. lakes
 - iii. ponds
 - iv. streams
 - v. cisterns
3. List and describe the most common contamination sources of water supply.
4. Describe the types of wells, their characteristics, advantages and disadvantages.
 - i. shallow
 - ii. deep
 - iii. dug
 - iv. bored
 - v. driven
 - vi. drilled
5. Explain well terminology.
 - i. static water level
 - ii. draw down
 - iii. recovery rate

- iv. well casing
 - v. submergence
 - vi. well cap
 - vii. pumping water level
 - viii. water seams
 - ix. well capacity
6. Describe the various purposes of a well driller's report and the information contained in it.
- i. well owner
 - ii. well contractor
 - iii. well log
 - iv. well information
 - v. method of drilling
 - vi. water usage
 - vii. pumping rate
7. Identify provisions of Well Drilling Regulations in respect to:
- i. definitions
 - ii. location of well
 - iii. protection of aquifers
 - iv. pump installation

Positive Displacement Pumps and Accessories

8. List and describe the components of a hydro-pneumatic system.
- i. foot valve
 - ii. piping
 - iii. clamps
 - iv. pumps
 - v. pressure tanks
 - vi. controls
 - vii. shut-off valves
 - viii. drainage
 - ix. relief valve
 - x. air volume control

9. Identify types of positive displacement pumps and describe their operating principles.
 - i. gear
 - ii. helical rotary
 - iii. piston

10. Identify types of shallow well piston pumps and describe their theory of operation.
 - i. types
 - ii. single acting
 - iii. double acting
 - iv. dual double acting
 - v. lift
 - vi. gallons per minute
 - vii. relief valve
 - viii. priming
 - ix. pump chart
 - x. pressure switch

11. Describe procedures used to install a shallow well piston pump.
 - i. location
 - ii. pump tapping size
 - iii. suction line
 - iv. grade
 - v. depth
 - vi. foot or check valve
 - vii. venting well
 - viii. noise control

Jet Pumps

12. Identify types of shallow well jet pumps and describe their characteristics, parts and operation.
 - i. lift
 - ii. types
 - iii. single stage
 - iv. multi-stage
 - v. parts
 - vi. impeller

- vii. diffuser
 - viii. ejector
 - ix. pressure switch
 - x. motor size
13. Identify types of deep well jet pumps and describe their characteristics, parts and operation.
- i. lift
 - ii. types
 - iii. single stage
 - iv. multi-stage
 - v. parts
 - vi. suction line
 - vii. drive line
 - viii. deep well ejector
 - ix. tail pipe
 - x. pitless adapter
 - xi. air vent
 - xii. control valve or regulating valve
 - xiii. pressure switch
 - xiv. foot valve
14. Describe the installation and start up procedures for shallow and deep well jet pumps.
- i. depth
 - ii. frost protection
 - iii. priming
 - iv. control valve
15. Describe how to read a shallow and deep well jet pump chart.
- i. types of ejectors
 - ii. motor HP
 - iii. ejector location
 - iv. pipe size
 - v. litres per second
 - vi. gallons per minute

Submersible Pumps

16. Describe the components and operation of a submersible pump.
 - i. pump size
 - ii. check valve
 - iii. discharge head
 - iv. impellers
 - v. diffusers
 - vi. suction screen
 - vii. cable lead - splicing
 - viii. motor size
 - ix. voltage
 - x. torque arrestor
 - xi. wire guard
 - xii. relief valve
 - xiii. tank tee
 - xiv. pitless adaptor

17. Describe the procedure used to wire a two- or three-wire submersible pump.
 - i. wire size
 - ii. distance
 - iii. voltage
 - iv. phase
 - v. control box
 - vi. start capacitor
 - vii. relay
 - viii. pressure switch

18. Describe the installation procedure for a submersible pump.
 - i. inspect pump
 - ii. electrical preparation
 - iii. torque arrester
 - iv. taping wires
 - v. aligning pump
 - vi. checking flow

19. Describe how to read a submersible pump chart.
 - i. pumping depth
 - ii. pressure

- iii. litres per second
- iv. gallons per minute
- v. head loss

Pressure Tanks and Controls

20. Identify types of tanks and explain the reasons for a pressure tank in a pump system.
- i. types
 - ii. water compatibility – galvanized
 - iii. glass lined
 - iv. fiberglass
 - v. bladder tank
 - vi. diaphragm
 - vii. purpose
 - viii. prevent rapid cycling
 - ix. shut down period
 - x. storage
21. Explain pressure tank terminology.
- i. capacity
 - ii. cycle rate
 - iii. demand
 - iv. draw-down
 - v. usable water
 - vi. minimum operating pressure
 - vii. peak demand period
 - viii. supercharge
 - ix. recharge
 - x. water logging
 - xi. pressure
 - xii. pump start pressure
 - xiii. supplemental supply
22. Describe the operating principles of pressure tanks.
- i. standard galvanized tank with an air volume control
 - ii. standard galvanized tank with a floating diaphragm
 - iii. diaphragm tank
 - iv. bladder tank

- v. floated tank
 - vi. in-line tank
 - vii. vertical and horizontal tanks
23. Describe the procedures used to size a pressure tank.
- i. tank dimensions
 - ii. peak demand
 - iii. tank selection tables
 - iv. manufacturers' specifications
 - v. pump run time
24. Describe the operation of an add air type and an air release type air volume control.
- i. snifter valve
 - ii. diaphragm type
 - iii. float operated type
 - iv. vacuum booster
25. Describe the operation of a pressure switch, float switch and liquid level controllers.
- i. switch settings
 - ii. differential nut
 - iii. range nut
 - iv. low water cut off switch
 - v. depth of floats
 - vi. electrical hook up
26. Describe the procedures used to measure flow from a pump.

Pump Service and Maintenance

27. Describe the use of gauges to diagnose pump problems.
- i. pressure gauge
 - ii. compound gauge
 - iii. vacuum gauge
 - iv. in feet
 - v. in inches

28. Describe the use of pump charts to diagnose causes and correct problems in a jet pump.
 - i. failure to start or run
 - ii. overheating or tripping out
 - iii. frequent starting or stopping
 - iv. failure to shut off
 - v. little or no water delivery

29. Describe the use of pump charts to diagnose causes and correct problems in a submersible pump.
 - i. failure to start or run
 - ii. overheating or tripping out
 - iii. frequent starting or stopping
 - iv. failure to shut off
 - v. little or no water delivery

30. Describe the use of pump charts to diagnose and correct problems in a reciprocating pump.
 - i. failure to start or run
 - ii. little or no water delivery
 - iii. low capacity
 - iv. pump loses its prime
 - v. frequent starting or stopping
 - vi. failure to shut off
 - vii. excessive operating noise

31. Describe the procedure for taking meter readings.
 - i. ammeter
 - ii. ohmmeter
 - iii. volt meter

Practical Requirements:

1. Disassemble, inspect and reassemble a domestic water pump.
2. Install a water pump including related components and controls for a rural water pumping system.

PF2571 Commercial Drainage, Waste and Venting III

Learning Outcomes:

- Size building sewers and sanitary drainage systems for commercial/industrial applications according to code.
- Demonstrate knowledge of the procedures to install venting systems for commercial/industrial applications according to code.

Duration: 30 Hours

Pre-requisite(s): Block II

Objectives and Content:

1. Identify and interpret applicable sections of the National Plumbing Code.
2. Identify and interpret applicable sections of the National Plumbing Code applicable to mobile home services.
3. Describe the purpose, components and sizing of relief vents for stacks over 11 storeys.
4. Describe the purpose and components of a municipal sewage system.
 - i. types of sewer
 - ii. construction and design
 - iii. grades and elevation
 - iv. methods of connection
5. Describe the purpose and design of wastewater treatment plants.
 - i. methods of disposal
 - ii. methods of treatment
 - iii. lift stations
 - iv. piping materials and components

6. Describe the terminology, factors and procedures involved in sizing sewage pumps or receiving tanks.
 - i. capacity
 - ii. purpose
 - iii. application
 - iv. interpret plumbing code requirements

7. Describe the components and operation of sewage pumps or receiving tanks.
 - i. materials/covers
 - ii. types of pumps and components
 - iii. control/alarm

8. Describe the methods of installing and servicing sewage pumps and their components.
 - i. excavation/bedding/backfill
 - ii. pumps and their controllers
 - iii. floats and alarm
 - iv. troubleshooting
 - v. interpret codes and manufacturers' literature

9. Describe the procedures for connecting sewage sump drains.
 - i. to building drains
 - ii. arrangement of fittings
 - iii. sizing
 - iv. termination

10. Describe the terminology, purpose and applications associated with indirect wastes.

11. Describe the criteria used to size and install indirect piping connections and air breaks.
 - i. types of fixtures/equipment
 - ii. fixture outlet sizes
 - iii. material
 - iv. methods of support
 - v. venting of traps
 - vi. interpret plumbing code requirements

12. Describe the terminology, purpose and common types of interceptors.
 - i. oil/gas
 - ii. sediment/sand

13. Describe the methods of sizing, installing and servicing interceptors.
 - i. capacity
 - ii. purpose
 - iii. application

14. Describe the procedures used to connect drains and vents of interceptors to build drains, stacks, and branches.
 - i. arrangement of fittings
 - ii. sizing
 - iii. termination

15. Describe the methods of protecting plumbing systems from extreme conditions.
 - i. high temperature
 - ii. corrosive waste

16. Identify types of acid resistant piping systems and describe associated safety precautions and installation procedures.
 - i. acid resistant plastics
 - ii. glass
 - iii. duriron and teflon
 - iv. stainless steel

17. Describe the methods of treating corrosive waste before entering the plumbing system and explain the requirements for installation, sizing and venting.
 - i. acid-dilution tanks
 - ii. neutralizing tanks

Practical Requirements:

None

PF2580 Industrial/Commercial Appliances, Fixtures and Trim

Learning Outcomes:

- Demonstrate knowledge of the procedures to select and install plumbing fixtures, appliances and trim for a variety of commercial/Industrial applications.

Duration: 18 Hours

Pre-requisite(s): Block II

Objectives and Content:

Commercial Appliances

1. Identify and interpret applicable sections of the National Plumbing Code.
2. Identify and interpret sources of information for installation of appliances.
 - i. drawings
 - ii. specifications
 - iii. manufacturer's literature
3. Identify types of dishwashers and describe their operation and procedures used for installation.
4. Identify types of automatic clothes washers and describe their operation and procedures used for installation.
5. Identify types of garbage disposal units and describe their operation and procedures used for installation.
6. Identify types of water stations and describe their operation and procedures used for installation.
7. Describe potential cross connections and effective preventative measures.

8. Identify and interpret the National Plumbing Code sections that apply to the
 - i. installation and testing of commercial appliances.

Institutional and Industrial Fixtures and Trim

9. Identify and interpret the National Building Code and National Plumbing Code sections that apply to the installation and testing of institutional and industrial fixtures and trim.
10. Identify and interpret sources of information for installations.
 - i. drawings
 - ii. specifications
 - iii. manufacturers' literature
11. Describe institutional and industrial fixtures and their characteristics.
 - i. water closet (patients)
 - ii. water closet (specimen)
 - iii. lavatory (patients)
 - iv. lavatory (exam/treatment)
 - v. lavatory (general)
 - vi. bathtub
 - vii. sitz bath
 - viii. clinic service sink
 - ix. surgeon's scrub sink
 - x. eye wash
 - xi. emergency shower
 - xii. plaster sink
 - xiii. vacuum breaker
 - xiv. bedpan cleanser
 - xv. thermostatic mixing valve
 - xvi. pedal valve or stop
 - xvii. knee action mixing valve
 - xviii. shower head
 - xix. bradley wash fountain
 - xx. mop sinks
 - xxi. vandal proof fixtures and fittings
 - xxii. whirlpool bath
12. Describe procedures used to install institutional and industrial fixtures and trim.

Practical Requirements:

None

PF2590 Lawn Sprinkler Systems

Learning Outcomes:

- Demonstrate knowledge of the installation of lawn sprinkler systems and equipment.

Duration: 6 Hours

Pre-requisite(s): Block II

Objectives and Content:

1. Identify and interpret applicable sections of the National Plumbing Code.
2. Describe the component parts of a lawn sprinkler system, their purpose and operation.
 - i. spray heads
 - ii. draining points
 - iii. valves
 - iv. chemical fertilizer injectors
 - v. water supply connections
3. Identify and interpret sources of information pertaining to lawn sprinkler systems.
 - i. drawings
 - ii. specifications
 - iii. manufacturers' literature
4. Describe the types of pipes and fittings used in lawn sprinkler systems.
5. Describe potential dangers from cross connection and methods used to eliminate them.
6. Describe the procedures required to install lawn sprinkler systems.

Practical Requirements:

None

PF2601 Swimming Pool Systems

Learning Outcomes:

- Demonstrate knowledge of installation of swimming pool systems and equipment.

Duration: 6 Hours

Pre-requisite(s): Block II

Objectives and Content:

1. Identify and interpret applicable sections of the National Plumbing Code.
2. Identify and interpret sources of information pertaining to installation.
 - i. drawings
 - ii. specifications
 - iii. manufacturers' literature
3. Describe a typical swimming pool installation, the component parts and operation.
 - i. piping
 - ii. skimmer
 - iii. hair and lint strainer
 - iv. filter pump
 - v. circulating pump
 - vi. filter
 - vii. chlorinator
 - viii. pool heater
 - ix. controls
4. Describe skimmers, their location and operation.
 - i. residential installation
 - ii. normal skimming operation
 - iii. safety by-pass operation
 - iv. skimmers and accessories

5. Describe hair and lint strainers, their location and operation.
 - i. typical types of hair and lint strainers
 - ii. layout of plumbing

6. Identify types of filter systems and describe their location and operation.
 - i. operating principle
 - ii. types of installations
 - iii. cleaning the filter
 - iv. two tank battery system
 - v. single tank systems
 - vi. multiple-battery system

7. Identify types of filter pumps and describe their parts and operation.

8. Describe vacuum systems, their parts and operation.

9. Describe methods of heating swimming pools.
 - i. gas
 - ii. electric
 - iii. solar
 - iv. heat exchangers
 - v. heat pumps

10. Describe chlorinators, their purpose and operation.

11. Describe flowmeters, their purpose and operation.

12. Describe the procedures used to install swimming pool piping and accessories.

Practical Requirements:

None

PF3130 Commissioning

Learning Outcomes:

- Demonstrate knowledge of commissioning and its associated procedures.

Duration: 12 Hours

Pre-requisite(s): Block II

Objectives and Content:

1. Define terminology associated with commissioning.
2. Identify hazards and describe safe work practices pertaining to commissioning.
3. Identify sources of information pertaining to commissioning.
 - i. specifications
 - ii. codes and regulations
 - iii. operation and maintenance manuals
 - iv. quality assurance/quality control documentation
 - v. as-built drawings
4. Identify tools and equipment relating to commissioning and describe their
 - i. applications and procedures for use.
5. Identify systems and equipment that require commissioning.
6. Describe the procedures used to commission systems.
 - i. mark and label system
 - valve tags
 - equipment labeling
 - pipe identification
 - ii. operator training
 - iii. coordinate system start-up

Practical Requirements:

None

D. Conditions Governing Apprenticeship Training

1.0 General

The following general conditions apply to all apprenticeship training programs approved by the Provincial Apprenticeship and Certification Board (PACB) in accordance with the *Apprenticeship Training and Certification Act (1999)*. If an occupation requires additional conditions, these will be noted in the specific Plan of Training for the occupation. In no case should there be a conflict between these conditions and the additional requirements specified in a certain Plan of Training. All references to Memorandum of Understanding will also apply to Letter of Understanding (LOU) agreements.

2.0 Entrance Requirements

2.1 Entry into the occupation as an apprentice requires:

Indenturing into the occupation by an employer who agrees to provide the appropriate training and work experiences as outlined in the Plan of Training.

2.2 Notwithstanding the above, each candidate must have successfully completed a high school program or equivalent, and in addition may be required to have completed certain academic subjects as specified in a particular Plan of Training. Mature students, at the discretion of the Director of Apprenticeship and Trades Certification, may be registered. A mature student is defined as one who has reached the age of 19 and who can demonstrate the ability and the interest to complete the requirements for certification.

2.3 At the discretion of the Director of Apprenticeship and Trades Certification, credit toward the apprenticeship program may be awarded to an apprentice for previous work experience and/or training as validated through prior learning assessment.

2.4 An Application for Apprenticeship form must be duly completed along with a Memorandum of Understanding as applicable to be indentured into an Apprenticeship. The Memorandum of Understanding must contain signatures of an authorized employer representative, the apprentice and an official representing the Provincial Apprenticeship and Certification Board to be valid.

- 2.5 A new Memorandum of Understanding must be completed for each change in an employer during the apprenticeship term.

3.0 Probationary Period

The probationary period for each Memorandum of Understanding will be six months or 900 employment credit hours. Within that period the memorandum may be terminated by either party upon giving the other party and the PACB one week notice in writing.

4.0 Termination of a Memorandum of Understanding

After the probationary period referred to in Section 3.0, the Memorandum of Understanding may be terminated by the PACB by mutual consent of the parties involved, or cancelled by the PACB for proper and sufficient cause in the opinion of the PACB, such as that stated in Section 14.

5.0 Apprenticeship Progression Schedule, Wage Rates and Advanced Training Criteria

Progression Schedule, Wage Rate and Advanced Training Criteria are stated in the specific occupational Plan of Training for each designated apprenticeship occupation.

Progression Schedule

Plumber - 7200 Hours			
APPRENTICESHIP LEVEL AND WAGES			
Year	Wage Rate At This Level	Requirements for progression to next level of apprenticeship	When requirements are met, the apprentice will progress to...
1 st	60 %	<ul style="list-style-type: none"> ▪ Completion of Block 1 training ▪ Pass Block 1 exam ▪ Minimum 1800 hours of combined relevant work experience and training 	2 nd Year
2 nd	70%	<ul style="list-style-type: none"> ▪ Completion of Block 1 training ▪ Pass Block 1 exam ▪ Minimum 3600 hours of combined relevant work experience and training 	3 rd Year
3 rd	80%	<ul style="list-style-type: none"> ▪ Completion of Block 2 training ▪ Pass Block 2 exam ▪ Minimum 5400 hours of combined relevant work experience and training 	4 th Year
4 th	90%	<ul style="list-style-type: none"> ▪ Completion of Block 3 training ▪ Minimum 7200 hours of combined relevant work experience and training ▪ Sign-off of all workplace skills in apprentice logbook ▪ Pass certification exam 	Journey person Certification
<p>Wage Rates</p> <ul style="list-style-type: none"> ▪ Rates are percentages of the prevailing journey person's wage rate in the place of employment of the apprentice. ▪ Rates must not be less than the wage rate established by the Labour Standards Act (1990), as now in force or as hereafter amended, or by other order, as amended from time to time replacing the first mentioned order. ▪ Rates must not be less than the wage rate established by any collective agreement which may be in force at the apprentice's workplace. ▪ Employers are free to pay wage rates above the minimums specified. <p>Block Exams</p> <ul style="list-style-type: none"> ▪ This program may not currently contain Block Exams, in which case this requirement will be waived until such time as Block Exams are available. 			

Plumber - 7200 Hours		
CLASS CALLS		
Call Level	Requirements for Class Call	Hours awarded for In-School Training
Direct Entry Apprentice: PLA & / or Block 1	<ul style="list-style-type: none"> ▪ Minimum of 1000 hours of relevant work experience ▪ Prior Learning Assessment (PLA) at designated college (if applicable) 	To be determined by the number of courses completed after each class call
Block 2	<ul style="list-style-type: none"> ▪ Minimum of 5000 hours of relevant work experience and training 	240
Block 3	<ul style="list-style-type: none"> ▪ Minimum of 7000 hours of relevant work experience and training 	240
<p>Direct Entry Apprentice</p> <ul style="list-style-type: none"> ▪ Must complete Block 1 courses through PLA and / or in-school training. ▪ Block 1 training is to be completed via class calls; up to 16 weeks of training per calendar year. ▪ Must attend in-school training until Block 1 is complete before attending Blocks 2 or higher <p>Class Calls at Minimum Hours</p> <ul style="list-style-type: none"> ▪ Class calls may not always occur at the minimum hours indicated. Some variation is permitted to allow for the availability of training resources and apprentices. 		

6.0 Tools

Apprentices shall be required to obtain their own hand tools applicable for the designated occupation of registration or tools as specified by the PACB.

7.0 Periodic Examinations and Evaluation

7.1 Every apprentice shall submit to such occupational tests and examinations as the PACB shall direct. If after such occupational tests and examinations the apprentice is found to be making unsatisfactory progress, his/her apprenticeship level and rate of wage shall not be advanced as provided in Section 5 until his/her progress is satisfactory to the Director of Apprenticeship and Trades Certification and his/her date of completion shall be deferred accordingly. Persistent failure to pass required tests shall be a cause for revocation of his/her Memorandum of Understanding.

7.2 Upon receipt of reports of accelerated progress of the apprentice, the PACB may shorten the term of apprenticeship and advance the date of completion accordingly.

7.3 For each and every course, a formal assessment is required for which 70% is the pass mark. A mark of 70% must be attained in both the theory examination and the practical project assignment, where applicable as documented on an official transcript.

7.4 Course credits may be granted through the use of a PACB approved matrix which identifies course equivalencies between designated trades and between current and historical Plans of Training for the same trade.

8.0 Granting of Certificates of Apprenticeship

Upon the successful completion of apprenticeship, the PACB shall issue a Certificate of Apprenticeship.

9.0 Hours of Work

Any hours employed in the performance of duties related to the designated occupation will be credited towards the completion of the term of apprenticeship. Appropriate documentation of these hours must be provided.

10.0 Copies of the Registration for Apprenticeship

The Director of Apprenticeship and Trades Certification shall provide copies of the Registration for Apprenticeship form to all signatories to the document.

11.0 Ratio of Apprentices to Journeypersons

Under normal practice, the ratio of apprentices to journeypersons shall not exceed two apprentices to every one journeyperson employed. Other ratio arrangements would be determined and approved by the PACB.

12.0 Relationship to a Collective Bargaining Agreement

Where applicable in Section 5 of these conditions, Collective Agreements take precedence.

13.0 Amendments to a Plan of Apprenticeship Training

A Plan of Training may be amended at any time by the PACB.

14.0 Employment, Re-Employment and Training Requirements

- 14.1 The Plan of Training requires apprentices to regularly attend their place of employment.
- 14.2 The Plan of Training requires apprentices to attend training for that occupation as prescribed by the PACB.
- 14.3 Failure to comply with Sections 14.1 and/or 14.2 will result in cancellation of the Memorandum of Understanding. Apprentices may have their MOUs reinstated by the PACB but would be subject to a commitment to complete the entire program as outlined in the General Conditions of Apprenticeship. Permanent cancellation in the said occupation is the result of non-compliance.
- 14.4 Cancellation of the Memorandum of Understanding to challenge journeyperson examinations, if unsuccessful, would require an apprentice to serve a time penalty of two (2) years before reinstatement as an apprentice or qualifying to receive a class call to training as a registered Trade Qualifier. Cancellation must be mutually agreed upon by the employer and the apprentice.

- 14.5 An employer shall ensure that each apprentice is under the direct supervision of an approved journeyperson supervisor who is located at the same worksite as the apprentice, and that the apprentice is able to communicate with the journeyperson with respect to the task, activity or function that is being supervised.
- 14.6 Under the Plan of Training the employer is required to keep each apprentice employed as long as work is available, and if the apprentice is laid off due to lack of work, to give first opportunity to be hired before another is hired.
- 14.7 The employer will permit each apprentice to attend training programs as prescribed by the PACB.
- 14.8 Apprentices who cannot acquire all the workplace skills at their place of employment will have to be evaluated in a simulated work environment at a PACB authorized training institution and have sign-off done by instructors to meet the requirements for certification.

15.0 Appeals to Decisions Based on Conditions Governing Apprenticeship Training

Persons wishing to appeal any decisions based on the above conditions must do so in writing to the Minister of Advanced Education and Skills within 30 days of the decision.

E Requirements for Red Seal Endorsement

1. Evidence the required work experiences outlined in this Plan of Training have been obtained. This evidence must be in a format clearly outlining the experiences and must be signed by an appropriate person or persons attesting that these experiences have been obtained to the level required.
2. Successful completion of all required courses in the program.
3. A combination of training from an approved training program and suitable work experience totaling 7200 hours.

Or

A total of 9000 hours of suitable work experience.

4. Completion of a National Red Seal examination, to be set at a place and time determined by the Apprenticeship and Trades Certification Division.

F Roles and Responsibilities of Stakeholders in the Apprenticeship Process

The apprenticeship process involves a number of stakeholders playing significant roles in the training of apprentices. This section outlines these roles and the responsibilities resulting from them.

The Apprentice:

- completes all required technical training courses as approved by the PACB.
- finds appropriate employment.
- completes all required work experiences in combination with the required hours.
- ensures work experiences are well documented.
- approaches apprenticeship training with an attitude and commitment that fosters the qualities necessary for a successful career as a qualified journey person.
- obtains the required hand tools as specified by the PACB for each period of training of the apprenticeship program.

The Employer:

- provides high quality work experiences in an environment conducive to learning.
- remunerates apprentices as set out in the Plan of Training or Collective Agreements.
- provides feedback to training institutions, Apprenticeship and Trades Certification Division and apprentices in an effort to establish a process of continuous quality improvement.
- where appropriate, releases apprentices for the purpose of returning to a training institution to complete the necessary technical courses.
- ensures work experiences of the apprentice are documented.
- ensures a certified journeyperson is currently on staff in the same trade area as the apprentice and whose certification is recognized by the NL Department of Advanced Education and Skills.

The Training Institution:

- provides a high quality learning environment.
- provides the necessary student support services that will enhance an apprentice's ability to be successful.
- participates with other stakeholders in the continual updating of programs.

The Apprenticeship and Trades Certification Division:

- establishes and maintains program advisory committees under the direction of the PACB.
- promotes apprenticeship training as a viable career option to prospective apprentices and other appropriate persons involved, such as career guidance counsellors, teachers, parents, etc.
- establishes and maintains a protocol with training institutions, employers and other appropriate stakeholders to ensure the quality of apprenticeship training programs.
- ensures all apprentices are appropriately registered and records are maintained as required.
- schedules all necessary technical training periods for apprentices to complete requirements for certification.
- administers block, provincial and interprovincial examinations.

The Provincial Apprenticeship and Certification Board:

- sets policies to ensure the provisions of the *Apprenticeship and Certification Act (1999)* are implemented.
- ensures advisory and examination committees are established and maintained.
- accredits institutions to deliver apprenticeship training programs.
- designates occupations for apprenticeship training and/or certification.