
Pre-Employment Plan of Training Steamfitter Pipefitter



Government of Newfoundland and Labrador
Department of Immigration, Population Growth and Skills
Apprenticeship and Trades Certification Division

March 2017

PLAN OF TRAINING

Pre-employment

Steamfitter Pipefitter

March 2017



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

Approved by:

A handwritten signature in blue ink, appearing to read "Dave Hill".

Chairperson, Provincial Apprenticeship and Certification Board

Date: March 30, 2017

Preface

This curriculum standard is aligned with the 2017 Level 1 Atlantic Apprenticeship Curriculum Standard (AACS) and the 2015 Red Seal Occupational Standard (RSOS) for the Steamfitter Pipefitter trade. It describes the curriculum content for the Plumber Pre-Employment training program.

Acknowledgements

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We offer you a sincere thank you.

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A. RSOS Comparison Chart

A Red Seal Occupational Standard (RSOS) comparison chart is located in the Atlantic Apprenticeship Curriculum Standard (AACCS).

B. 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 can be determined by the educational agency, as long as pre-requisite conditions are satisfied.

Upon completion of the Pre-Employment program, individuals may be required to complete other certifications (employer or job site specific) in order to gain employment.

Courses with an identified AACS number are equivalent to Level 1 units (courses) in the AACS.

A Pre-Employment student who becomes an apprentice will also be required to complete Levels 2, 3 & 4 in the AACS.

Pre-Employment				
NL Course No.	AACS No.	Course Name	Hours	Pre-Requisite
TS1510	STM-100	Occupational Health and Safety	6	None
TS1520	STM-100	WHMIS	6	None
TS1530	STM-100	Standard First Aid	14	None
--	STM-100	Safety	12	None
PF1340	STM-110	Tools and Equipment	75	None
PF1571	STM-120	Introduction to Electric Welding and Cutting	60	PF1340, PF1390
PF1380	STM-125	Introduction to Fuel Brazing and Cutting	45	PF1340
PF1370	STM-115	Rigging	39	None
	STM-130			
--	STM-135	Bracket, Support, Hanger, Guides and Anchor Fabrication (new)	12	PF1340
PF1365	STM-140	Blueprint Interpretation	60	None
PF1390	--	Pipe and Tubing Fundamentals	15	PF1340
PF2711	STM-150	Pipe and Tube Bending	21	PF1340
PF1410	STM-125	Copper Piping	45	PF1340

Pre-Employment				
NL Course No.	AACS No.	Course Name	Hours	Pre-Requisite
	STM-145			
PF1421	STM-155	Plastic Piping	43	PF1340
PF1400	STM-160	Steel Piping	90	PF1340
	STM-165			
PF1440	STM-170	Piping Valves	30	None
PF1450	--	Hydronic Heating 1	60	PF1340
PF1541	--	Low Pressure Steam	96	PF1365, PF1390, PF1400
PF1550	--	Pipe Template Development	75	PF1380, PF1390
PF1560	--	Pipe Layout & Fitting Fabrication	72	PF1380, PF1390
AM1000	--	Introduction to Essential Skills	9	None
AM1101	--	Math Essentials*	42	None
AM1390	--	Steamfitter Pipefitter Math Fundamentals	42	AM1101
CM2161	--	Communication Essentials	36	None
SD1761	--	Workplace Essentials	24	None
MC1062	--	Computer Essentials	15	None
AP1102	--	Introduction to Apprenticeship	12	None
Total Hours			1056	

Required Work Experience

*A student who can meet the mathematics requirement through an ACUPLACER® test may be exempted from AM1101 - Math Essentials. Please check with your training institution.

Pre-Employment

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. rationale and key elements
 - ii. history and development of WHMIS
 - 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
 - iii. worker responsibility
 - 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

Practical Requirements:

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

STM-100 Safety

Learning Outcomes:

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

Duration: 12 Hours

Pre-Requisite(s): None

Objectives and Content:

1. Identify hazards and describe safe work practices.
2. Identify and describe local and jurisdictional laws and requirements.
3. Identify safety regulations pertaining to locking out electrical equipment, piping equipment and piping.
4. Identify training required by jurisdictional codes and regulations, and site-specific regulations.
5. Identify situations that require lock-out.
6. Identify regulations and safety documentation pertaining to the use of PPE and safety equipment.
7. Identify and describe company or jurisdictional procedures for emergency response.
8. Identify types of PPE and safety equipment and describe their applications, limitations and procedures for use.
9. Describe procedures used to care for, maintain and store PPE and safety equipment.
10. Describe procedures for locking out equipment and piping.

Practical Requirements:

None

PF1340 Tools and Equipment

Learning Outcomes:

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

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 powder actuated tools and describe their applications.
14. Describe the procedures used to inspect, maintain and store powder 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.

PF1571 Introduction to Electric Welding and Cutting

Learning Outcomes:

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

Duration: 60 Hours

Pre-requisite(s): PF1340, PF1390

Objectives and Content:

1. Explain the terminology associated with electric welding methods.
2. Describe the procedures used to inspect, maintain and store welding equipment.
3. Identify certification requirements for performing welding.
4. Identify and describe types of welding and their applications.
 - i. GMAW (MIG)
 - ii. GTAW (TIG)
 - iii. SMAW
 - iv. Fluxcore
 - v. SUB ARC
 - vi. Orbital welding
5. Explain the safe handling requirements used when handling shielding gas cylinders.
 - i. transportation
 - ii. storage
 - iii. bulkpacks
6. Describe electric welding equipment, its operating principles and components.
 - i. AC transformers
 - ii. AC/DC rectifiers
 - iii. DC generators
 - iv. engine drive (gasoline, diesel) sources
7. Describe the basic classifications and applications of electrodes.
8. Describe procedures used to prepare for electric welding operations.
 - i. electrode selection
 - ii. current
 - iii. polarity settings

- iv. special applications
- 9. Describe the five basic weld joint configurations.
- 10. Describe the safety procedures required in electric welding processes.
- 11. Explain stress relief of piping materials.
 - i. arc strikes and their effects
 - ii. grain structure of piping materials before and after welding
 - iii. methods used to normalize materials after welding
 - iv. preheat/postheat of materials.

Practical Requirements:

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

PF1380 Introduction to Fuel Brazing and Cutting

Learning Outcomes:

- Demonstrate knowledge of brazing equipment, applications and procedures.

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
19. Describe common cutting faults, their causes and remedies.

Practical Requirements:

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

PF1370 Rigging

Learning Outcomes:

- Demonstrate knowledge of safe operating procedures for slings, cables and cranes.
- Demonstrate knowledge of the procedures to select rigging and lifting equipment using rigging charts and manuals as well as rule of thumb methods.
- Demonstrate knowledge of hoisting, lifting, positioning and rigging equipment, their applications, limitations and procedures for use and storage.
- Demonstrate knowledge of calculations required when performing hoisting and lifting operations.
- Demonstrate knowledge of the procedures used to perform hoisting, lifting and positioning operations.
- Demonstrate knowledge of inspection for rigging, hoisting, lifting and positioning equipment.
- Demonstrate knowledge of ladders, scaffolding and motorized work platforms, their applications, limitations and procedures for use.

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.
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 types of ladders and describe their applications and safety factors to be considered.
13. Identify types of motorized work platforms/hydraulic lifts and describe their characteristics and applications.
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.

STM-135 Bracket, Support, Hanger, Guides and Anchor Fabrication

Learning Outcomes:

- Demonstrate knowledge of the procedures used to fabricate brackets, supports, hangers, guides and anchors.

Duration: 12 hours

Pre-requisite(s): PF1340

Objectives and Content:

1. Interpret information pertaining to brackets, supports, hangers, guides and anchors fabrication found on drawings and specifications.
2. Interpret codes and regulations pertaining to brackets, supports, hangers, guides and anchors fabrication.
3. Identify fabrication tools and equipment relating to brackets, supports, hangers, guides and anchors fabrication and describe their applications and procedures for use.
4. Identify types of joining methods and describe their applications.
5. Identify types of fabrication techniques and describe their applications.
6. Describe the procedures used to fabricate and assemble brackets, supports, hangers, guides and anchors.

Practical Requirements:

1. Fabricate a pipe supports.

PF1560 Pipe Layout and Fitting Fabrication

Learning Outcomes:

- Demonstrate knowledge of procedures used to layout elbows.
- Demonstrate knowledge of procedures used to layout tees, laterals and mitre turns using templates.
- Demonstrate knowledge of procedures used to fabricate tees, laterals and mitre turns.
- Demonstrate knowledge of procedures used to machine pipes.
- Demonstrate knowledge of procedures used to fasten pipe.

Duration: 72 Hours

Pre-requisite(s): PF1380, PF1390

Objectives and Content:

Pipe Layout

1. Explain pipe fitting terminology as it relates to fabrication.
 - i. angle of turn
 - ii. pipe spool
 - iii. angle of cut
 - iv. factor for angle of cut
 - v. cutback
 - vi. outside diameter pipe
 - vii. length and number of cut pieces

2. Identify and explain the use of specialty tools for layout and fabrication of pipe fittings.
 - i. wrap-around and contour markers and accessories
 - ii. squares
 - iii. flange aligner base
 - iv. pipe flange aligners
 - v. circle-ellipse projector
 - vi. center finder
 - vii. radius markers
 - viii. magnetic holder
 - ix. multi-trammel heads
 - x. universal level
 - xi. electronic level
 - xii. pro-mag level
 - xiii. dial-angle flange level
 - xiv. fitter protractor

- xv. pipe beveler
 - xvi. burning square (circle cutter)
 - xvii. magnetic burning guide
3. Describe layout procedures for pipe fitting fabrication.
 - i. using templates
 - ii. direct layout
 4. Describe the layout procedures for elbows using contour marker.
 5. Describe the layout procedure for tees, crosses, and wyes using contour marker.
 6. Describe the layout procedure for a 60 degree turn using a 90 degree stock elbow.

Pipe and Fitting Fabrication

7. Describe pipe fitting fabrication procedures.
 - i. cutting and preparing pipe
 - ii. alignment of joints
 - iii. tacking joints
 - iv. transition schedule 80 to sch 40
 - v. reducing lateral
8. Describe equipment required for machining of pipe ends for welding operations.
 - i. outside diameter mounted machining equipment types (clamshell)
 - ii. inside diameter mounted machining equipment types
 - iii. tool bits
 - iv. cutting equipment
9. Describe different types of power supplies used and their applications.
 - i. hydraulic pumps
 - ii. air
 - iii. electrical
10. Describe setup of equipment for square cuts and proper end finishes.
 - i. standard 37 ½ degree bevel
 - ii. compound 10 degree / 37 ½ degree bevel
 - iii. “J” bevel
11. Describe proper cleaning, maintenance and storage of equipment used for machining.

Practical Requirements:

1. Layout odd angle using stock 90 degree elbow.
2. Perform pipe layout and fabrication.
3. Fabricate fittings from carbon steel pipe.
4. Transition pipe.

PF1365 Blueprint Interpretation

Learning Outcomes:

- Demonstrate knowledge of drawings and their applications.
- Demonstrate knowledge of basic drawing and sketching techniques.
- Demonstrate knowledge of isometric piping drawings to orthographic drawings.
- Demonstrate knowledge of single line sketches.
- Demonstrate knowledge of orthographic piping drawings to isometric drawings.
- Demonstrate knowledge of compass and elevations.

Duration: 60 Hours

Pre-requisite(s): None

Objectives and Content:

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 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

3. Describe metric and imperial systems of measurement and the procedures used to perform conversions.

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. Explain the terms “scale” and “dimension” and their use and location on drawings.

6. 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
7. Identify basic piping system symbols.
8. Identify single line sketch symbols.
 - i. fittings
 - ii. facing viewer
 - iii. facing away
 - iv. horizontal
 - v. changes in direction
 - vi. valves, unions, reducers
9. Identify and interpret isometric drawings.
 - i. vertical lines
 - ii. angles relating to horizontal
 - iii. 45 degree angle
 - iv. floor penetrations
10. Describe plans, their content and use in job planning.
 - i. plot (site)
 - ii. foundation
 - iii. floor plans
 - iv. exterior elevations
 - v. sections, details
 - vi. reflected ceiling drawings
 - vii. room finish schedules
11. Identify features found on various piping drawings and describe their use.
12. 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
13. Describe the purpose and importance of specifications.
14. Identify piping system symbols and explain their importance and use.
- i. piping
 - ii. domestic hot and cold
 - iii. re-circulation lines
 - iv. compressed air
 - v. fittings
 - xiii. valves
 - xiv. hangers and supports
 - xv. heating equipment
 - xvi. heating valves
15. Identify basic welding symbols and explain their use.
16. Identify and interpret interference drawings.
17. Describe process flow diagrams.

Practical Requirements:

- 1. Interpret and sketch basic drawings and diagrams.
- 2. Read and interpret architectural and mechanical drawings.
- 3. Determine, sketch and apply dimensioning.
- 4. Read and interpret specifications.
- 5. Complete a bill of material (material take off).

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)
 - vi. 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

PF2711 Pipe and Tube Bending

Learning Outcomes:

- Demonstrate knowledge of procedures used to lay out and mark pipe and tube for bending.
- Demonstrate knowledge of procedures used to bend pipe and tubing.

Duration: 21 Hours

Pre-requisite(s): PF1340

Objectives and Content:

1. Describe the factors affecting the selection of materials for bending.
 - i. temper
 - ii. composition
 - iii. purpose
 - iv. applications
2. Describe methods of bending and their applications.
 - i. draw
 - ii. compression
 - iii. roll
 - iv. ram
 - v. stretch
 - vi. wrinkle
3. Describe the dangers and safety precautions associated with bending procedures.
 - i. supports and anchors
 - ii. protective clothing
 - iii. pinch points
4. Describe bending terminology.
 - i. developed length
 - ii. tangent
 - iii. gain
 - iv. bending zone
 - v. outside arc
 - vi. inside arc
 - vii. layout marks
 - viii. minimum radii
 - ix. spring back

5. Identify and perform calculations used in hot bending.
 - i. minimum radius of bend
 - ii. constant for developed length
 - iii. tangents
 - iv. layout marks on pipe

6. Describe procedures used to perform hot bending.
 - i. marking / layout
 - ii. use of fillers, plugs and mandrels
 - iii. securing pipe
 - iv. application of heat
 - v. desired angle/ radii
 - vi. cooling rate
 - vii. verification of bend to establish tolerance
 - viii. removal of plugs, fillers and mandrels
 - ix. annealing

7. Describe the procedures for use of benders.
 - i. manufacturer's instructions
 - ii. hydraulic bender and component parts
 - iii. set up
 - forming head
 - shoes
 - guides
 - pump
 - iv. desired angle
 - v. verification of bend angle
 - measurements
 - orientation

8. Describe procedures used for bending copper and stainless steel using hand benders.

Practical Requirements:

1. Bend steel pipe using hydraulic benders.
2. Bend copper tubing using tubing benders.

PF1410 Copper Piping

Learning Outcomes:

- Demonstrate knowledge of how to carry out work in compliance with codes, standards and manufacturer's literature in relation to copper tube and tubing.
- Demonstrate knowledge of copper tube and tubing, fittings and related components.
- Demonstrate knowledge of the procedures used to measure and size copper tube and tubing and related components.
- Demonstrate knowledge of the procedures used to cut, bend and join copper tube and tubing and related components.

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. Interpret codes and regulations pertaining to copper tube and tubing.
4. Interpret information pertaining to copper tubing found on drawings and specifications.
5. 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
6. 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
7. Describe the tools and procedures used for soldering, bending and annealing copper pipe and fittings.
8. Identify fittings used for joining copper pipe and describe their characteristics and applications.
 - i. terminology
 - ii. types
 - iii. parts
 - iv. acronyms and abbreviations
9. 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
10. Describe the procedures used to calculate fitting allowances.
 - i. tees
 - ii. elbows
 - iii. 45 degrees
11. Identify brass pipe and fittings and describe their properties and applications.

12. 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.

PF1421 Plastic Piping

Learning Outcomes:

- Demonstrate knowledge of how to carry out work in compliance with codes, standards and manufacturer's literature in relation to plastic piping.
- Demonstrate knowledge of plastic piping and tubing, fittings and related components.
- Demonstrate knowledge of the procedures used to measure and size plastic piping, tubing and related components.
- Demonstrate knowledge of the procedures used to cut, bend and join plastic piping, tubing and related components.

Duration: 43 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)
 - with/without oxygen barrier
 - vii. PTFE (Teflon)
 - viii. PEX/Aluminum/PEX
3. Describe the labelling system used to identify plastic pipe and fittings.
4. Interpret information pertaining to plastic piping and tubing found on drawings and specifications.
5. 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
6. 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
7. 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
8. 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
9. 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. compression
 - iii. insert
 - iv. crimp
 - v. fusion weld

PF1400 Steel Piping

Learning Outcomes:

- Demonstrate knowledge of selecting materials for steel piping.
- Demonstrate knowledge of steel pipe and fittings and their assembly.
- Demonstrate knowledge of carrying out work in compliance with codes, standards and manufacturer's literature.
- Demonstrate knowledge of the procedures used to measure steel piping.
- Demonstrate knowledge of the procedures used to cut and join steel piping.

Duration: 90 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. carbon steel
 - ii. galvanized
 - iii. stainless
 - iv. cast iron
4. List the information required to select and order steel pipe.
 - i. material (carbon 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 carbon 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 carbon steel, galvanized and stainless steel pipe and describe their associated procedures.
- i. threading and grooving
 - ii. welding
 - pre/post-weld activities.
 - iii. flanging
 - iv. press-fit
7. Describe the procedures and methods to prevent cross contamination.
8. Identify the tools used to prepare and assemble carbon 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
9. Identify fittings used to assemble carbon steel, galvanized and stainless steel pipe and describe their characteristics and applications.
- i. terminology
 - ii. types
 - iii. parts
 - iv. abbreviations
10. 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
11. Describe an angle and its parts.
- i. vertex
 - ii. degrees

- iii. letters
12. Describe a circle and its parts.
- i. centre
 - ii. circumference
 - iii. diameter
 - iv. radius
 - v. cord
 - vi. arc
 - vii. concentric and eccentric circle
13. 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
14. Calculate perimeter and areas.
- i. squares
 - ii. rectangles
 - iii. triangles
 - iv. circles
15. Calculate volume.
- i. cubes
 - ii. rectangular prisms and cylinders
16. 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
17. Calculate piping measurements.
- i. run and branch
 - ii. fitting allowance
 - iii. center
 - iv. face
 - v. back
 - vi. throat

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

19. Perform piping calculations.
 - i. grade
 - ii. drop
 - iii. rise and run

20. 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.

PF1440 Piping Valves

Learning Outcomes:

- Demonstrate knowledge of piping valves, their installation, applications and operation.

Duration: 30 Hours

Pre-requisite(s): None

Objectives and Content:

1. Describe the materials and service ratings for valves.
2. Explain valve terminology.
3. Interpret codes, regulations and standards pertaining to piping valves.
4. Interpret information found on drawings and specifications pertaining to valves.
5. 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
6. Describe procedures used to install valves.
 - i. position
 - ii. location
 - iii. accessibility
 - iv. joining methods
7. Describe the types, construction and operation of control valves.
 - i. two-way
 - ii. three-way
 - iii. actuated

8. Describe procedures used to repair and test valves.
9. Describe the procedures used to maintain 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

PF1541 Low Pressure Steam

Learning Outcomes:

- Demonstrate knowledge of how to sketch and label low pressure steam heating systems.
- Demonstrate knowledge of safety controls and equipment.
- Select steam traps for specific steam applications.
- Demonstrate knowledge of the piping system operation for steam to hot water converters.
- Demonstrate knowledge of how to interpret drawings for steam tracing lines and installation requirements.
- Demonstrate knowledge of installation procedures for oil burner piping and components.

Duration: 96 Hours

Pre-requisite(s): PF1365, PF1390, PF1400

Objectives and Content:

1. Describe the characteristics and applications of steam heating systems.
 - i. heat energy
 - ii. sensible heat
 - iii. latent heat

2. Identify low pressure steam heating systems and describe their components and operating principles.
 - i. one-pipe gravity
 - components
 - boiler connections
 - main steam supply line
 - hartford loop
 - equalizer connection
 - convector connection
 - boiler piping
 - system piping
 - ii. vapour steam heating
 - theory of operation
 - boiler connections
 - boiler return trap
 - air eliminator
 - boiler piping
 - system piping
 - thermostatic trap

- condensate pump piping
 - iii. vacuum steam heating
 - theory of operation
 - system piping
 - lift fitting
 - vacuum pump
 - boiler piping
 - equalizer
 - hartford loop
 - thermostatic trap
 - iv. sub-atmospheric steam heating
 - theory of operation
 - system piping
 - differential pump
 - control valve
 - heat balancer
 - control panel
 - traps
 - boiler piping
- 3. Identify and explain the operating principles and applications of controls and equipment for steam boiler safety.
 - i. safety valves
 - characteristics
 - operating features
 - code regulations
 - testing procedures
 - ii. pressure reducing valves
 - applications
 - characteristics
 - operating principles
 - iii. steam pressure gauges
 - siphon operation
 - bourdon tube
 - code regulations
 - gauge fittings
 - iv. glass water column
 - tubular water gauges
 - gauge cocks
 - testing and maintenance
 - v. fusible plugs
 - characteristics
 - design
 - applications
 - vi. manifold relief valves
 - characteristics

- applications
 - installation considerations
 - vii. boiler stop valves
 - characteristics
 - applications
 - installation considerations
 - viii. blow-off valves
 - characteristics
 - applications
 - ix. low water cut-offs
 - types
 - characteristics
 - operating principles
 - applications
 - x. pressure control
 - types
 - characteristics
 - operating principles
 - applications
 - code requirements
- 4. Identify the types of traps used in low pressure steam heating systems, and describe their characteristics and applications.
 - i. mechanical
 - ii. thermostatic
 - iii. thermodynamic
- 5. Identify types of steam traps and describe their characteristics, applications and maintenance.
 - i. inverted bucket
 - ii. ball float
 - iii. tilting bucket
 - iv. float and thermostatic
 - v. fixed orifice
 - vi. adjustable orifice
 - vii. thermodynamic
 - viii. thermostatic
 - ix. liquid expansion thermostatic
- 6. Describe the equipment and piping requirements for supplying steam to heat transfer equipment to supply hot water convectors.
 - i. shell and shell-tube heat exchanger
 - fluid flow arrangement
 - applications
 - piping installation
 - ii. indirect water heater

- applications
 - piping installation
 - iii. heat exchanger
 - applications
 - piping installation
 - maintenance procedures
- 7. Troubleshoot potential problems with low pressure steam systems and identify solutions.

Practical Requirements:

1. Install trim and related equipment on a low pressure steam boiler.
2. Install a low pressure steam piping system.

PF1550 Pipe Template Development

Learning Outcomes:

- Demonstrate knowledge of drawing procedures and tools to divide lines and circles.
- Demonstrate knowledge of template development.
- Demonstrate knowledge of procedures used to perform layout for the fabrication of pipe fittings to acceptable tolerances.

Duration: 75 Hours

Pre-requisite(s): PF1380, PF1390

Objectives and Content:

1. Explain the procedures for the development of pipe templates.
2. Lay out templates for 2, 3 and 4 piece mitre turns.
3. Lay out and develop a template for reducing tee-branch
4. Lay out and develop a template for full size laterals.
5. Lay out and develop a template for reducing tee.
6. Explain the procedures for parallel line development of pipe templates.
 - i. dividing a line into equal parts
 - ii. constructing angles
 - 20 degrees
 - 22.5 degrees
 - 45 degrees
 - 60 degrees
 - 90 degrees
 - iii. dividing an arc into equal parts

Practical Requirements:

1. Lay out templates for 2, 3 and 4 piece mitre turns.
2. Lay out and develop a template for full size laterals.
3. Lay out and develop a template for reducing tee.

AM1000 Introduction to Essential Skills

Learning Outcomes:

- Demonstrate knowledge of the nine nationally recognized essential skills.
- Demonstrate knowledge of the essential skills levels of complexity.
- Demonstrate knowledge of the essential skills required for the learners chosen trade.
- Demonstrate an awareness of essential skills assessments.

Duration: 9 Hours

Pre-Requisite(s): None

Objectives and Content:

1. Identify and describe the essential skills recognized by the Government of Canada through the Office of Literacy and Essential Skills (OLES).
 - i. reading
 - ii. document use
 - iii. numeracy
 - iv. writing
 - v. oral communication
 - vi. working with others
 - vii. thinking
 - viii. computer use
 - ix. continuous learning
2. Describe the Levels of Complexity measurement assigned to essential skills.
3. Identify the essential skills, along with their complexity level, identified as necessary for the learner's trade.
 - i. RSOS / NOA content¹
 - ii. OLES Essential Skills Profiles²
 - iii. OLES tools and support for apprentices and tradespersons³
4. Describe the nature and purpose of essential skills assessment.
 - i. self-assessment & formal assessment tools
 - ii. indicators of deficiencies
 - iii. suggestions for improvement
5. Describe the benefits of essential skills improvement.
 - i. confidence at work

- ii. employability
- iii. success in apprenticeship
- iv. wage & job advancement

Practical Requirements:

1. Complete an essential skills self-assessment addressing numeracy, document use and reading. The online Government of Canada Essential Skills Indicator⁴ and Essential Skills Self-Assessment for the Trades⁵ are to be used unless the instructor provides a similar assessment tool or tools.
2. Participate in a group discussion about the impact of gaps in essential skills that may be revealed by the self-assessments completed, and the value of improving essential skills.

Students are graded complete or incomplete on this practical work, no grade is permitted for self-assessment performance. However, completion of the practical requirements is mandatory for completion of this unit.

Resources:

All footnotes are in the companion document, Resources for Introduction to Essential Skills, which is available online from Apprenticeship and Trades Certification.

AM1101 Math Essentials

Note: It is recommended that AM1100 be delivered in the first semester of the Pre-Employment program.

Learning Outcomes:

- Demonstrate knowledge of essential numeracy skills.
- 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: 42 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. Describe whole number operations.
 - i. read, write, count, round off, add, subtract, multiply and divide whole numbers
2. Describe the application of the order of operations in math problems.
3. Describe fraction and mixed number operations.
 - i. read, write, add, subtract, multiply and divide fractions
4. Describe decimal operations.
 - i. read, write, round off, add, subtract, multiply and divide decimals
5. Describe percent/decimal/fraction conversion and comparison.
 - i. convert between fractions, decimals and percents
6. Identify percentage operations.
 - i. read and write percentages
 - ii. calculate base, rates and percentages
7. Identify ratio and proportion operations.
 - i. use a ratio comparing two quantities with the same units
 - ii. use a proportion comparing two ratios

8. Describe the use of the imperial measurement system in math problems.
 - i. identify units of measurement
 - length
 - mass
 - area
 - volume
 - capacity

9. Describe the use of the metric measurement system in math problems.
 - i. identify units of measurement
 - length
 - mass
 - area
 - volume
 - capacity

10. Identify angles, lines and geometric shapes.
 - i. use a protractor to measure angles
 - ii. determine whether an angle is right, acute or obtuse
 - iii. identify parallel, perpendicular, horizontal and vertical lines
 - iv. identify types of triangles, quadrilaterals, and 3-dimensional shapes

11. Describe estimation strategies.
 - i. estimate a linear measure using a referent
 - ii. estimate length, area and volume of objects in metric and imperial systems

12. Describe problem solving that involves linear measurement using instruments such as rulers or tape measures, in the metric and imperial systems.

Practical Requirements:

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

AM1390 Steamfitter Pipefitter 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.
- Solve 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: 42 Hours

Pre-Requisite(s): AM1101

Objectives and Content:

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

1. Describe percent/decimal/fraction conversions and comparisons in trade specific situations.
2. Describe ratios and proportions as they relate to trade specific problems.
3. Describe the use of the Imperial and Metric measurement systems in trade specific applications.
4. Describe Imperial and Metric conversions in trade specific situations.
 - i. convert between imperial and metric measurements
 - ii. convert to another unit within the same measurement system
5. Describe how to manipulate formulas using cross multiplication, dividing throughout, elimination, and substitution to solve trade specific problems.
 - i. right angle triangles
 - ii. area
 - iii. volume
 - iv. perimeter
 - v. density
6. Identify calculations involving geometry that are relevant to the trade.
 - i. angle calculations

- ii. circle calculations
7. Identify math processes used 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 is 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. Apprentice transfers under Provincial / Territorial Mobility agreements may be exempt from this requirement.

CM2161 Communication Essentials

Learning Outcomes:

- Demonstrate knowledge of the importance of well-developed writing and oral communication skills in the workplace.
- Demonstrate knowledge of the principles of effective workplace writing.
- Demonstrate knowledge of the purpose of various types of workplace documentation and workplace meetings.
- Demonstrate knowledge of the importance of effective interpersonal skills in the workplace.
- Demonstrate knowledge of effective job search techniques.

Duration: 36 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. Define communications terminology used in the trade.
2. Identify the principles of effective workplace writing.
 - i. grammar, punctuation, mechanics
 - ii. sentence and paragraph construction
 - iii. tone, language, and word choice
 - iv. the writing process
 - planning
 - writing
 - editing/revising
3. Identify sources of information used to communicate in the workplace.
 - i. regulations
 - ii. codes
 - iii. OH&S requirements
 - iv. prints, drawings and specifications
 - v. company and client documentation

4. Identify types and purposes of informal workplace documents.
 - i. reports
 - incident
 - process
 - progress
 - ii. common trade specific forms
 - iii. primary and secondary methods of information gathering
 - iv. accuracy and completeness in reports and forms

5. Demonstrate an understanding of interpersonal communications in the workplace.
 - i. recognize group dynamics
 - ii. contribute information and expertise
 - iii. individual learning styles
 - audible
 - visual
 - experiential
 - theoretical
 - iv. recognize respectful and open communication
 - v. accept and provide feedback
 - vi. interpret non-verbal communication cues
 - body language
 - signals

6. Demonstrate an understanding of effective oral communication skills.
 - i. listening
 - receiving, understanding, remembering, reflecting, evaluating, paraphrasing, and responding
 - ii. speaking
 - using clear and proper words
 - tone, style, and vocabulary
 - brevity
 - iii. common workplace oral communication situations
 - introducing self and others
 - telephone conversations
 - tool box/safety talks
 - face-to-face conversations
 - communicating with co-workers, supervisors, clients, and other trades people

7. Identify common practices related to workplace meetings.
 - i. meeting formats
 - ii. meeting preparation
 - iii. agendas and minutes
 - iv. roles, responsibilities, and etiquette of meeting participants

8. Identify acceptable workplace use of communication technologies.
 - i. cell / smart phone etiquette
 - ii. voice mail
 - iii. e-mail
 - iv. texting / messaging through social media
 - v. teleconferencing / videoconferencing for meetings and interviews
 - vi. social networking
 - vii. other emerging technologies

9. Demonstrate an understanding of effective job search techniques.
 - i. employment trends, opportunities, and sources of employment
 - ii. job ads and the importance of fitting qualifications to job requirements
 - iii. resumes
 - characteristics of effective resumes
 - types of resumes
 - principles of resume formatting
 - iv. effective cover letters
 - v. job interview process
 - pre-interview preparation
 - interview conduct
 - post-interview follow up

Practical Requirements:

1. Write a well-developed, coherent, unified paragraph.
2. Complete a trade-related form.
3. Prepare an agenda for a toolbox safety talk.
4. Participate in a simulated oral workplace communication situation.
5. Prepare a resume.

SD1761 Workplace Essentials

Note: It is recommended that SD1760 be delivered in the second half of Pre-Employment training.

Learning Outcomes:

- Demonstrate knowledge of workplace requirements in the areas of personal responsibility, unions, workers compensation, workers' rights, and human rights.
- Demonstrate knowledge of quality customer service.

Duration: 24 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 personal responsibilities and attitudes that contribute to on-the-job success.
 - i. asking questions
 - ii. working safely
 - iii. accepting constructive feedback
 - iv. time management & punctuality
 - v. respect for authority
 - vi. stewardship of materials, tools and properties
2. Define unions and identify their role in the workplace.
 - i. purpose of unions
 - ii. common union structure
 - iii. unions in this trade
3. Demonstrate an understanding of the Worker's Compensation process.
 - i. aims, objectives, and benefits of the Workplace Health, Safety and Compensation Commission
 - ii. role of the workers advisor
 - iii. internal review process

4. Demonstrate an understanding of worker's rights.
 - i. labour standards
 - ii. 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. awareness of the Human Rights Code and the role of the Human Rights Commission
 - ii. categories of discrimination and strategies for prevention
 - direct
 - systemic
 - adverse effect
 - iii. types of discrimination
 - race
 - ethnic origin
 - colour
 - religion
 - age
 - gender identify
 - sexual orientation
 - marital status
 - family status
 - disability
 - criminal conviction that has been pardoned
 - iv. conduct that constitutes harassment and discrimination
 - objectionable conduct
 - comments or displays made either on a one-time or continuous basis that demeans, belittles, or causes personal humiliation or embarrassment to the recipient
 - v. the value of diversity in the workplace
 - culture
 - gender identify
 - sexual orientation

6. Demonstrate an understanding of quality customer service.
 - i. importance of quality service
 - ii. barriers to quality service
 - physical and physiological
 - cultural
 - technological

- iii. customer needs & common methods for meeting them
- iv. characteristics & importance of a positive attitude
- v. interactions with challenging customers
- vi. addressing complaints and resolve conflict

Practical Requirements:

None

MC1062 Computer Essentials

Learning Outcomes:

- Demonstrate knowledge of desktop/laptop and mobile computers and their operation.
- Demonstrate knowledge of word processing and spreadsheet software, internet browsers and their applications.
- Demonstrate knowledge of e-mail applications and procedures.
- Demonstrate an awareness of security issues related to computers.
- Demonstrate an awareness of online learning using computers.

Duration: 15 Hours

Pre-Requisite(s): None

Objectives and Content:

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

1. Identify computer types used in the workplace, and the characteristics of each.
 - i. desktop/laptop computers
 - ii. tablets
 - iii. smartphones
2. Identify common desktop and mobile operating systems.
 - i. Windows
 - ii. Mac OS
 - iii. iOS
 - iv. Android
3. Describe the use of Windows operating system software.
 - i. start and end a program
 - ii. use the help function
 - iii. use the find function
 - iv. maximize and minimize a window
 - v. open and scroll through multiple windows
 - vi. use the task bar
 - vii. adjust desktop settings such as screen savers, screen resolution, and backgrounds
 - viii. shut down a computer

4. Identify the skills necessary to perform file management commands.
 - i. create folders
 - ii. copy files and folders
 - iii. move files and folders
 - iv. rename files and folders
 - v. delete files and folders

5. Describe the use of word processing software to create documents.
 - i. enter & edit text
 - ii. indent and tab text
 - iii. change text attributes
 - bold
 - underline
 - font
 - iv. change layout format
 - margins
 - alignment
 - line spacing
 - v. spell check and proofread
 - vi. save, close & reopen a document
 - vii. print document

6. Describe the use of spreadsheet software to create documents.
 - i. enter data in cells
 - ii. format data in cells
 - iii. create formulas to add, subtract, multiply and divide
 - iv. save, close & reopen a spreadsheet
 - v. print spreadsheet

7. Describe the use of the internet in the workplace.
 - i. web browsers
 - ii. search engines
 - iii. security issues
 - iv. personal responsibility for internet use at work

8. Describe the role of e-mail.
 - i. e-mail etiquette
 - grammar and punctuation
 - privacy issues when sharing and forwarding e-mail
 - work appropriate content
 - awareness of employer policies
 - ii. managing e-mail
 - using folders
 - deleting, forwarding, replying
 - iii. adding attachments to e-mail
 - iv. view e-mail attachments

- v. printing e-mail
9. Describe computer use for online learning.
- i. online training
 - ii. level exams
 - iii. study guides
 - iv. practice exams

Practical requirements:

- 1. Create, save and print a document using word processing software.
- 2. Create, save and print a document using spreadsheet software.
- 3. Send and receive an e-mail with an attachment.

AP1102 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: 12 Hours

Pre-Requisite(s): None

Objectives and Content:

1. Define terminology associated with apprenticeship.
 - i. apprentice
 - ii. registered apprentice
 - iii. trade qualifier
 - iv. journeyperson
 - v. certified journeyperson
 - vi. Certificate of Apprenticeship
 - vii. Certificate of Qualification
 - viii. dual certification
 - ix. compulsory trades
2. Explain the roles and responsibilities of those involved in the apprenticeship system in Newfoundland and Labrador.
 - i. registered apprentice
 - ii. training institution
 - iii. employer
 - iv. journeyperson
 - v. mentor
 - vi. Department of Immigration, Population Growth and Skills
 - Industrial Training section
 - Standards and Curriculum section
 - vii. Provincial Trade Advisory Committees (PTAC)
 - viii. Provincial Apprenticeship and Certification Board (PACB)
3. Describe the training components of an apprenticeship.
 - i. in-school
 - Pre-Employment / Level 1
 - advanced levels
 - ii. workplace experience

4. Explain the steps in the registered apprenticeship process.
 - i. meet entrance requirements
 - education
 - employment
 - Recognition of Prior Learning (RPL) - if applicable
 - ii. complete the registration process
 - application
 - required documents
 - iii. complete the Memorandum of Understanding (MOU)
 - contract responsibilities
 - probation period
 - cancellation
 - iv. maintain Record of Occupational Progress (Logbook)
 - sign off skills
 - record hours
 - update Apprenticeship Program Officer (APO) on progress
 - v. class calls
 - hour requirements
 - EI eligibility
 - training schedule
 - vi. level examinations - if applicable
 - vii. progression schedule
 - apprenticeship level
 - wage rates
 - viii. certification examinations
 - Provincial
 - Interprovincial
 - written
 - practical - if applicable
 - ix. certification
 - Certificate of Apprenticeship
 - Certificate of Qualification
 - Provincial journeyman - Blue Seal
 - Interprovincial journeyman - Red Seal endorsement (RSE)
5. Identify the Conditions Governing Apprenticeship.
6. Discuss cancellation of apprenticeship.
 - i. failure to notify of address change
 - ii. extended periods of unemployment
 - iii. lack of contact with an APO for an extended period
 - iv. failure to respond to class calls
 - v. declining of multiple class calls

7. Explain the Interprovincial Standards Red Seal program.
 - i. designated Red Seal trades
 - ii. the Red Seal Occupational Standard (RSOS)
 - iii. relationship of RSOS to IP examination
 - iv. national qualification recognition and mobility
8. Identify the current financial incentives available to apprentices.
 - i. Federal
 - ii. Provincial
9. Explain the Provincial / Territorial Apprentice Mobility Guidelines.
 - i. temporary mobility
 - ii. permanent mobility
10. Describe Atlantic and National Harmonization initiatives.

Practical Requirements:

1. Use the Provincial Apprenticeship and Trades Certification website at www.gov.nl.ca/atcd
 - i. locate, download, and complete the Application for Apprenticeship and Memorandum of Understanding (MOU)
 - ii. locate the address of the Industrial Training office closest to this campus
 - iii. locate the training schedule and identify the start date of the next class call for this trade
 - iv. locate and review the learning resources applicable to this trade
 - Study Guide
 - Exam Preparation Guide
 - Plan of Training
2. Use the Plan of Training applicable to this trade.
 - i. locate the hours for the trade
 - total in-school
 - total required for certification
 - ii. locate the number of levels
 - iii. locate the courses in each level
 - iv. locate the hours required for progression to a Level 2 apprentice and the wage percentage of that level

C. 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

Steamfitter Pipefitter - 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 Pre-Employment training ▪ Registration as an apprentice ▪ Minimum 1800 hours of combined relevant work experience and training 	2 nd Year
2 nd	70%	<ul style="list-style-type: none"> ▪ Completion of AACS Level 2 training ▪ Pass Level 2 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 AACS Level 3 training ▪ Pass Level 3 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 AACS Level 4 training ▪ Pass Level 4 exam ▪ Minimum 7200 hours of combined relevant work experience and training ▪ Sign-off of all workplace skills in apprentice logbook ▪ Pass certification exam 	Journeyman Certification
<p>Wage Rates</p> <ul style="list-style-type: none"> ▪ Rates are percentages of the prevailing journeyman'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>Level Exams</p> <ul style="list-style-type: none"> ▪ This program may not currently contain Level Exams, in which case this requirement will be waived until such time as Level Exams are available. 			

Steamfitter Pipefitter - 7200 Hours		
Class Calls (After Apprenticeship Registration)		
Call Level	Requirements for Class Call	Hours awarded for In-School Training
Level 2	<ul style="list-style-type: none"> ▪ Minimum of 3000 hours of relevant work experience and training 	180
Level 3	<ul style="list-style-type: none"> ▪ Minimum of 5000 hours of relevant work experience and training 	240
Level 4	<ul style="list-style-type: none"> ▪ Minimum of 7000 hours of relevant work experience and training 	240
<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 Immigration, Population Growth and Skills within 30 days of the decision.

D. 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 10 800 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.

E. 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 journeyman.
- 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 Immigration, Population Growth 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 level, 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.