Plan of Training

SHEET METAL WORKER

Newfoundland Labrador

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

March 2013

PLAN OF TRAINING

Sheet Metal Worker

March 2013

Newfoundland Labrador

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

Approved by:

Chairperson, Provincial Apprenticeship and Certification Board

Date: March 26/13

Preface

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

This document describes the curriculum content for the Sheet Metal Worker 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.

Contact Information

Department of Advanced Education and Skills
Apprenticeship and Trades Certification Division
Tel: 709-729-2729 / 1-877-771-3737
Email: app@gov.nl.ca
Web: www.gov.nl.ca/app

Document Status	Date Distributed	Mandatory Implementation Date	Comments
Draft	March 2013	September 2013	

Table of Contents

A. Profile Chart

OCCUPATIONAL SKILLS			
SL1101 Safety	SL1111 Tools and Equipment	SL1440 Introduction to Gas Metal Arc Welding (GMAW)	SL1280 Plasma Arc Cutting
SL1770 Soldering	SL1121 Hoisting, Lifting and Rigging	SL1161 Blueprint Reading	SL2130 Advanced Gas Metal Arc Welding (GMAW)
SL1450 Introduction to Gas Tungsten Arc Welding (GTAW)	SL3150 Advanced Gas Tungsten Arc Welding (GTAW)	SL4200 HVAC Systems	SL1430 Shielded Metal Arc Welding (SMAW)
SL1350 Oxy-Acetylene Welding and Cutting	SL2100 Trade Related Documents	SL4100 Job Planning	
SHEET METAL FABRICATION			
SL1180 Sheet Metal Fundamentals	SL1151 Drafting, Pattern Development and Layout	SL1131 Fabrication Fundamentals	SL1241 Layout and Fabrication - Parallel Lines
SL1251 Layout and Fabrication - Radial Lines I (Basic)	SL1261 Layout and Fabrication - Triangulation I	SL1630 Layout and Fabrication - Triangulation II	SL2160 Layout and Fabrication - Triangulation III (Advanced)
SL3100 Layout and Fabrication - Radial Lines II (Advanced)	SL1141 Metallurgy	SL2200 Fabrication (Air and Material Handling Systems and Components)	SL-1720 Advanced Layout and Fabrication

AIR AND MATERIAL HANDLING SYSTEM INSTALLATION			
SL3130 Installation (Air and Material Handling Systems)	SL-1741 Air Quality Management	SL2230 Chimneys, Breeching and Venting	
ROOFING, ARCHITECTURAL METAL AND SPECIALTY PRODUCT INSTALLATION			
SL4240 Metal Roofing and Architectural Metal	SL4280 Specialty Products		
MAINTENANCE AND REPAIR			
SL4260 Maintenance and Repair (Air and Material Handling Systems)	SL4230 Adjusting and Balancing (Air and Material Handling Systems	SL2200 Fabrication (Air and Material Handling Systems and Components)	SL3130 Installation (Air and Material Handling Systems)

B. NOA Comparison Chart

NOA 2010 Tasks		2013 POT	
Task 1 - Uses tools and equipment.			
1.01	Uses personal protective equipment (PPE) and safety equipment.	SL1101	Safety
1.02	Maintains hand tools.	SL1111	Tools and Equipment
1.03	Maintains portable power tools.		
1.04	Maintains shop tools and equipment.		
1.05	Maintains welding/cutting equipment.	SL1111	Tools and Equipment
		SL1440	Introduction to Gas Metal Arc Welding (GMAW)
		SL1280	Plasma Arc Cutting
		SL2130	Advanced Gas Metal Arc Welding (GMAW)
		SL1450	Introduction to Gas Tungsten Arc Welding (GTAW)
		SL3150	Advanced Gas Tungsten Arc Welding (GTAW)
		SL1430	Shielded Metal Arc Welding (SMAW)
		SL1350	Oxy-Acetylene Welding and Cutting
1.06	Maintains soldering/brazing equipment.	SL1111	Tools and Equipment
		SL1770	Soldering
		SL1350	Oxy-Acetylene Welding and Cutting
1.07	Maintains measuring and layout equipment.	SL1111	Tools and Equipment
		SL1151	Drafting, Pattern Development and Layout
1.09	Uses ladders and platforms.	SL1111	Tools and Equipment
1.10	Uses hoisting and rigging equipment.	SL1121	Hoisting, Lifting and Rigging
Task 2 - Organizes work.			
2.01	Maintains safe work environment.	SL1101	Safety

NOA 2010 Tasks		2013 POT	
2.02	Interprets documentation.	SL2100	Trade Related Documents
2.03	Interprets drawings.	SL1151	Drafting, Pattern Development and Layout
		SL1161	Blueprint Reading
		SL4100	Job Planning
2.04	Completes documentation.	SL2100	Trade Related Documents
2.05	Communicates with others.	CM2160	Communication Essentials
2.06	Organizes materials.	SL2100	Trade Related Documents
2.07	Performs basic design and field modifications.	SL1151	Drafting, Pattern Development and Layout
		SL3130	Installation (Air and Material Handling Systems)
		SL4200	HVAC Systems
2.08	Performs inspection.	SL4260	Maintenance and Repair (Air and Material Handling Systems)
Task 3 - Performs pattern development.			
3.01	Develops pattern using triangulation method.	SL1261	Layout and Fabrication - Triangulation I
		SL1630	Layout and Fabrication - Triangulation II
		SL2160	Layout and Fabrication - Triangulation III (Advanced)
		SL1720	Advanced Layout and Fabrication
3.02	Develops pattern using radial line method.	SL1251	Layout and Fabrication - Radial Lines I (Basic)
		SL3100	Layout and Fabrication - Radial Lines II (Advanced)
		SL1720	Advanced Layout and Fabrication
3.03	Develops pattern using parallel line method.	SL1241	Layout and Fabrication - Parallel Lines

NOA 2010 Tasks		2013 POT	
3.04	Develops pattern using simple and straight line layout.	SL1151	Drafting, Pattern Development and Layout
3.05	Develops pattern using computer technology.		
3.06	Labels pieces.	SL1151	Drafting, Pattern Development and Layout
		SL1241	Layout and Fabrication - Parallel Lines
		SL1251	Layout and Fabrication - Radial Lines I (Basic)
		SL3100	Layout and Fabrication - Radial Lines II (Advanced)
		SL1261	Layout and Fabrication - Triangulation I
		SL1720	Advanced Layout and Fabrication
		SL2200	Fabrication (Air and Material Handling Systems and Components)
Task 4 - Fabricates sheet metal components for air and material handling systems.			
4.01	Cuts ductwork, fittings and components.	SL1131	Fabrication Fundamentals
		SL2200	Fabrication (Air and Material Handling Systems and Components)
4.02	Forms ductwork, fittings and components.	SL1131	Fabrication Fundamentals
		SL1180	Sheet Metal Fundamentals
		SL2200	Fabrication (Air and Material Handling Systems and Components)
4.03	Insulates ductwork, fittings and components.	SL1131	Fabrication Fundamentals
		SL1180	Sheet Metal Fundamentals
		SL2200	Fabrication (Air and Material Handling Systems and Components)
4.04	Assembles ductwork, fittings and components.	SL1131	Fabrication Fundamentals
		SL1180	Sheet Metal Fundamentals

NOA 2010 Tasks		2013 POT	
		SL2200	Fabrication (Air and Material Handling Systems and Components)
4.05	Fabricates dampers.	SL1180	Sheet Metal Fundamentals
		SL2200	Fabrication (Air and Material Handling Systems and Components)
4.06	Fabricates flexible connections.	SL1180	Sheet Metal Fundamentals
		SL2200	Fabrication (Air and Material Handling Systems and Components)
4.07	Fabricates hanger systems.	SL1180	Sheet Metal Fundamentals
		SL2200	Fabrication (Air and Material Handling Systems and Components)
4.08	Fabricates supports and bases.	SL1180	Sheet Metal Fundamentals
		SL2200	Fabrication (Air and Material Handling Systems and Components)
Task 5 - Fabricates roofing, sheeting and cladding.			
5.01	Determines seams.	SL4240	Metal Roofing and Architectural Metal
5.02	Cuts metal for flashing, roofing, sheeting and cladding.		
5.03	Forms flashing, roofing, sheeting and cladding.		
Task 6 - Fabricates specialty products.			
6.01	Cuts material for specialty products.	SL4280	Specialty Products
6.02	Forms specialty products.		
6.03	Assembles products.		
6.04	Finishes material.		
Task 7 - Prepares installation site.			
7.01	Performs onsite measurements.	SL3130	Installation (Air and Material Handling Systems)
7.02	Performs demolitions for renovations.	SL3130	Installation (Air and Material Handling Systems)
		SL2230	Chimneys, Breeching and Venting
7.03	Cuts penetrations.	SL3130	Installation (Air and Material Handling Systems)

NOA 2010 Tasks		2013 POT	
7.04	Installs supports and bases.	SL3130	Installation (Air and Material Handling Systems)
7.05	Installs hangers, braces and brackets.	SL2230	Chimneys, Breeching and Venting
		SL3130	Installation (Air and Material Handling Systems)
Task 8 - Installs chimneys, breeching and venting.			
8.01	Installs chimney, breeching and venting primary components.	SL2230	Chimneys, Breeching and Venting
8.02	Connects chimney, breeching and venting to appliance.		
Task 9 - Installs air handling system components.			
9.01	Installs air handlers.	SL3130	Installation (Air and Material Handling Systems)
9.02	Installs heat recovery ventilators (HRVs).	SL3130	Installation (Air and Material Handling Systems)
		SL1741	Air Quality Management
9.03	Installs sheet metal ducts and fittings.	SL3130	Installation (Air and Material Handling Systems)
9.04	Installs dampers.		
9.05	Installs fire dampers.		
9.06	Installs registers, grilles, diffusers and louvers.		
9.07	Installs terminal boxes.		
9.08	Installs coils.	SL3130	Installation (Air and Material Handling Systems)
		SL1741	Air Quality Management
9.09	Installs system component accessories.	SL3130	Installation (Air and Material Handling Systems)
		SL1741	Air Quality Management
Task 10 - Installs material handling system components.			
10.01	Installs pneumatic and gravity material handling system components.	SL3130	Installation (Air and Material Handling Systems)
10.02	Installs mechanical material handling system components.		
10.03	Installs collection and separating devices.		

NOA 2010 Tasks		2013 POT	
Task 11 - Installs thermal insulation, lagging cladding and flashing.			
11.01	Applies thermal insulation to components.	SL3130	Installation (Air and Material Handling Systems)
11.02	Applies lagging and cladding to components.		
11.03	Applies flashing to components.		
Task 12 - Performs testing, adjusting and balancing.			
12.02	Performs air balancing.	SL-4230	Adjusting and Balancing (Air and Material Handling Systems)
Task 13 – Installs metal roofing and cladding systems.			
13.01	Lays out roof and walls.	SL4240	Metal Roofing and Architectural Metal
13.03	Installs roofing and cladding system components.		
13.04	Seals exposed joints.		
13.05	Installs decking.		
Task 14 - Installs exterior components.			
14.01	Prepares surface.	SL4240	Metal Roofing and Architectural Metal
14.02	Fastens exterior components.		
Task 15 - Installs specialty products.			
15.01	Installs stainless steel specialty products.	SL1180	Sheet Metal Fundamentals
		SL4280	Specialty Products
15.02	Installs non-stainless steel products.	SL4280	Specialty Products
Task 16 - Performs scheduled maintenance.			
16.01	Performs maintenance inspection.	SL4260	Maintenance and Repair (Air and Material Handling Systems)
16.02	Services components.		
Task 17 - Repairs faulty systems and components.			
17.01	Diagnoses system faults.	SL4260	Maintenance and Repair (Air and Material Handling Systems)
17.02	Repairs worn faulty or obsolete components.		

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.	**IPG No.**	**Course Name**	**Hours**	**Pre-Requisite(s)**
TS1510		OH&S	6	None
TS1520	-	WHMIS	6	None
TS1530	-	Standard First Aid	14	None
SL1101	SMW-100	Safety	6	None
SL1111	SMW-110 SMW-115 SMW-160 SMW-165	Tools and Equipment	60	TS1530, SL1101
SL1180	SMW-120	Sheet Metal Fundamentals	3	None
SL1121	SMW-205	Hoisting, Lifting and Rigging	18	SL1101
SL1131	SMW-155	Fabrication Fundamentals	30	SL1111
SL1141	SMW-120	Metallurgy	10	None

Block I				
Course No.	**IPG No.**	**Course Name**	**Hours**	**Pre-Requisite(s)**
SL1151	SMW-125 SMW-145	Drafting, Pattern Development and Layout	30	None
SL1161	SMW-210	Blueprint Reading	30	None
SL1241	SMW-215	Layout and Fabrication - Parallel Lines	90	SL1131, SL1151
SL1251	SMW-220 SMW-315	Layout and Fabrication - Radial Lines I (Basic)	90	SL1131, SL1151
SL1261	SMW-225	Layout and Fabrication - Triangulation I	60	SL1131, SL1151
SL1630	SMW-320	Layout and Fabrication - Triangulation II	60	SL1261
SL1350	SMW-430	Oxy-Acetylene Welding and Cutting	30	TS1530, SL1101
SL1280	SMW-135	Plasma Arc Cutting	12	TS1530, SL1101
SL1430	SMW-425	Shielded Metal Arc Welding (SMAW)	45	TS1530, SL1101
SL1440	SMW-130	Introduction to Gas Metal Arc Welding (GMAW)	30	SL1430
SL1450	SMW-235	Introduction to Gas Tungsten Arc Welding (GTAW)	60	SL1430
SL1741	SMW-330	Air Quality Management	60	None
SL1770	SMW-140	Soldering	30	SL1350
AP1101	-	Introduction to Apprenticeship	15	None
*AM1100	-	Math Essentials	30	None
AM1300	-	Sheet Metal Math Fundamentals	30	AM1100
CM2160	-	Communication Essentials	45	None

Block I				
Course No.	**IPG No.**	**Course Name**	**Hours**	**Pre-Requisite(s)**
SD1760	-	Workplace Essentials	45	None
MC1060	-	Computer Essentials	15	None
OT1191	-	Work Term	60	None
		Total Hours	**1020**	

***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**.

Required Work Experience

Block II				
Course No.	**IPG No.**	**Course Name**	**Hours**	**Pre-Requisite(s)**
SL2100	SMW-440	Trade Related Documents	15	SL1161
SL2130	SMW-230	Advanced Gas Metal Arc Welding (GMAW)	30	SL1440
SL2160	-	Layout and Fabrication - Triangulation III (Advanced)	120	SL1630
SL2200	SMW-240 SWM-400	Fabrication (Air and Material Handling Systems and Components)	60	SL1131, SL2100
SL2230	SMW-335	Chimneys, Breeching and Venting	15	SL1111, SL1161
		Total Hours	**240**	

Required Work Experience

Block III				
Course No.	**IPG No.**	**Course Name**	**Hours**	**Pre-Requisite(s)**
SL3100	SMW-220 SMW-315	Layout and Fabrication - Radial Lines II (Advanced)	90	SL1251
SL3130	SMW-245 SMW-405	Installation (Air and Material Handling Systems)	60	SL1111, SL1121, SL1161
SL3150	SMW-300	Advanced Gas Tungsten Arc Welding (GTAW)	90	SL1450
		Total Hours	**240**	

Required Work Experience

Block IV				
Course No.	**IPG No.**	**Course Name**	**Hours**	**Pre-Requisite(s)**
SL4100	SMW-445	Job Planning	15	SL1161
SL4200	SMW-325	HVAC Systems	60	SL1161, SL1741, SL3130
SL1720	-	Advanced Layout and Fabrication	90	SL1241, SL2160, SL3100
SL4230	SMW-415	Adjusting and Balancing (Air and Material Handling Systems)	15	SL2100, SL4200
SL4240	SMW-420	Metal Roofing and Architectural Metal	30	SL1111, SL1161
SL4260	SMW-410	Maintenance and Repair (Air and Handling Systems)	15	SL2100, SL4200
SL4280	SMW-435	Specialty Products	15	SL1111,SL1180, SL2100

Total Hours	**240**

Required Work Experience

Total Course Credit Hours	**1740**

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 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
      - 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

Practical Requirements:

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

SL1101 Safety

Learning Outcomes:

- Demonstrate knowledge of the procedures used to operate fire extinguishing equipment.
- Demonstrate knowledge of safe working practices.

Duration: 6 Hours

Pre-Requisite(s): None

Objectives and Content:

1. Define terminology associated with the Sheet Metal trade.

2. Describe applicable codes and regulations.

3 Describe the classes of fire and identify their associated fire extinguishing equipment.

4. Describe WHMIS regulations.

5. Describe Occupational Health & Safety regulations.

6. Describe inspection procedures of work area for electrical hazards.

7. Describe hazards when working in confined spaces.

8. Describe proper use and maintenance of personal protective safety equipment.
   i. breathing apparatus
   ii. clothing
   iii. foot wear
   iv. eye protection
   v. hearing protection

9. Describe the procedure for selecting, tagging, and locking out mechanical equipment that requires repair or maintenance.

10. Describe the procedures used for maintaining a clean and safe work environment.

Practical Requirements:

1. Prepare a list of the extinguishers available in the sheet metal shop.

2. Demonstrate fire alarm procedures.

3. Practice the use of the various types of extinguishers available in the shop.

4. Select and use ventilation and breathing apparatus.

SL1111 Tools and Equipment

Learning Outcomes:

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

Duration: 60 Hours

Pre-Requisite(s): TS1530, SL1101

Objectives and Content:

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

2. Identify types of hand tools and describe their applications and procedures for use.

3. Identify types of portable power tools and describe their applications and procedures for use.

4. Identify types of powder actuated tools and describe their applications.

5. Identify types of shop tools and equipment and describe their applications and procedures for use.

6. Identify types of Computer Numerical Control (CNC) equipment and describe their applications.
   i. plasma cutting
   ii. punches
   iii. brakes

7. Identify types of measuring and layout tools and equipment and describe their applications and procedures for use.

8. Identify types of soldering/brazing equipment and describe their applications.

9. Describe the procedures used to inspect, maintain and store tools and equipment.

10. Define terminology associated with ladders and work platforms.

11. Identify hazards and describe safe work practices pertaining to ladders and work platforms.
    i. fall protection and arrest
    ii. power lines
    iii. excess loads

12. Interpret codes and regulations pertaining to ladders and work platforms.

13. Identify types of ladders and work platforms, and describe their characteristics and applications.
    i. ladders
    ii. work platforms
        - stationary
        - portable

14. Describe the procedures used to erect and remove ladders and stationary work platforms.

15. Describe the procedures used to inspect, maintain, transport and store ladders and stationary work platforms.

Practical Requirements:

1. Produce work pieces to print specifications using the various types of power cutting equipment.

2. Use combination snips to cut to size a metal blank and circular disk.

3. Cut a circular opening in a metal blank using aviation snips.

4. Cut a piece of angle iron to size using a hack saw.

5. Cut a rectangular opening in a metal blank using a chisel.

6. Perform bending operations of ferrous and non-ferrous materials, using press brake, to specified tolerances/drawing specifications.

7. Use power shears to cut a sample piece to a given measurement and deburr.

8. Produce samples of seams and edges and check for accuracy.

9. Adjust and change punches and dies to create burr free holes.

10. Roll a work piece to a given specification.

11. Perform general maintenance according to manufacturer's specifications on hand and power tools.

12. Perform general maintenance according to manufacturer' specifications on equipment.

13. Prepare lap seams using various methods
    i. sheet metal screws
    ii. pop rivets
    iii. spot welds

SL1180 Sheet Metal Fundamentals

Learning Outcomes:

- Demonstrate knowledge of metals and their characteristics and applications.

Duration: 3 Hours

Pre-Requisite(s): None

Objectives and Content:

1. Define terminology associated with sheet metals.

2. Describe identification systems for metals.
   i. numbering
   ii. colour coding
   iii. gauging

3. Identify types of metals and describe their applications.
   i. steel
   ii. copper
   iii. brass
   iv. aluminum
   v. cast iron
   vi. stainless steel

4. Identify types of basic surface finishes and describe their applications.
   i. mill
   ii. brushed
   iii. mirrored
   iv. dull

5. Identify methods used to work with metals.
   i. forming
   ii. cutting/shearing

iii. punching
iv. drilling
v. joining

6. Describe the procedures used to prevent or correct problems that occur when working metals.

Practical Requirements:

None.

SL1121 Hoisting, Lifting and Rigging

Learning Outcomes:

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

Duration: 18 Hours

Pre-Requisite(s): SL1101

Objectives and Content:

1. Define terminology associated with hoisting, lifting and rigging.

2. Identify hazards and describe safe work practices pertaining to hoisting, lifting and rigging.

3. Interpret codes and regulations pertaining to rigging, hoisting and lifting.
   i. training and certification requirements

4. Identify types of rigging equipment and accessories and describe their applications, limitations and procedures for use.
   i. ropes
   ii. slings
   iii. chains
   iv. hooks
   v. spreader bars
   vi. shackles

5. Identify the factors to consider when selecting rigging equipment.
   i. load characteristics
   ii. environment

iii. safety factor

6. Describe the considerations when rigging material/equipment for lifting.
   i. load characteristics
   ii. equipment and accessories
   iii. environmental factors
   iv. anchor points
   v. sling angles

7. Identify types of knots, hitches, splices and bends, and describe the procedures used to tie them.
   i. bowline
   ii. running bowline
   iii. square/reef
   iv. half-hitch

8. Identify types of hoisting and lifting equipment and accessories, and describe their applications and procedures for use.
   i. duct lift
   ii. electric overhead travelling cranes
   iii. come-alongs
   iv. tirfors
   v. chainfalls

9. Describe the procedures used to inspect, maintain and store hoisting, lifting and rigging equipment.

10. Explain sling angle when preparing for hoisting and lifting operations.

11. Describe the procedures used for attaching rigging equipment to the load.

12. Identify and interpret basic hand signals used for hoisting and lifting.

13. Identify and describe procedures used to communicate during hoisting, lifting and rigging operations.
   i. hand signals
   ii. electronic communications
   iii. audible/visual

14. Describe the procedures used to ensure the work area is safe for lifting.
    i. supervision of lift
    ii. securing work area
    iii. communication

15. Describe the procedures used to perform a lift.
    i. load determination
    ii. communication methods
    iii. pre-lift checks
    iv. placement of load
    v. post-lift inspection

16. Describe various types of scaffolding.

Practical Requirements:

1. Tie the following using fibre rope:
    i. reef knot
    ii. bowline
    iii. round turn and hitch
    iv. scaffold hitch

2. Demonstrate hand signals for crane operation.

SL1131 Fabrication Fundamentals

Learning Outcomes:

- Demonstrate knowledge of the procedures used to fabricate basic ductwork and fittings.

Duration: 30 Hours

Pre-Requisite(s): SL1111

Objectives and Content:

1. Define terminology associated with fabrication.

2. Interpret codes and regulations pertaining to the fabrication of sheet metal components.

3. Interpret information, pertaining to the fabrication of sheet metal components, found on drawings and specifications.

4. Identify tools and equipment used to fabricate basic sheet metal components, and describe their applications and procedures for use.

5. Identify types of fastening methods used to fabricate ductwork and fittings and describe their associated procedures.
   i. mechanical
   ii. adhesives
   iii. welding

6. Identify types of seams for fabrication of ductwork and fittings and describe the procedures and connectors used to produce them.
   i. longitudinal
      - Pittsburgh Lock
      - groove seam
      - acme lock
      - snap/button lock

ii. transverse
- slip & drive
- duct mate
- TDC/TDF
- companion flanges

7. Identify types of edges for fabrication of ductwork and fittings and describe the procedures used to produce them.

8. Identify types of duct reinforcement.

Practical Requirements:

1. Layout and fabricate a basic duct system.
   i. metallic or non-metallic
   ii. gauge
   iii. joining apparatus
   iv. sealing

2. Fabricate various seams and edges.

3. Fabricate and insulate basic duct run with basic fittings and various types of cleats.

SL1141 Metallurgy

Learning Outcomes:

- Demonstrate knowledge of metals and their properties.
- Demonstrate knowledge of metallurgic principles.

Duration: 10 Hours

Pre-Requisite(s): None

Objectives and Content:

1. Define terminology associated with metallurgy.

2. Describe the properties of metals.
   i. composition
   ii. physical

3. Describe the effects metal working has on metallurgic properties.
   i. stress
   ii. contraction
   iii. expansion
   iv. distortion
   v. work hardening
   vi. annealing
   vii. galvanic action

4. Describe the passivation process.

Practical Requirements:

None.

SL1151 Drafting Pattern Development and Layout

Learning Outcomes:

- Demonstrate knowledge of basic drafting.
- Demonstrate knowledge of basic drafting tools and equipment and their procedures for use.
- Demonstrate basic knowledge of Computer Aided Drafting (CAD) and its use.
- Demonstrate knowledge of basic geometric shapes.

Duration: 30 Hours

Pre-Requisite(s): None

Objectives and Content:

1. Define terminology associated with drafting, pattern development and layout.

2. Identify basic drafting tools and equipment, and describe their applications and procedures for use.

3. Identify layout tools and describe their applications and procedures for use.

4. Identify basic geometric shapes and describe their characteristics.

5. Identify different views used when drafting and describe their applications.
   i. elevation
   ii. plan
   iii. section
   iv. auxiliary

6. Describe the procedures used to develop basic drawings and sketches.
   i. pictorial
   ii. orthographic

7. Identify types of computer technology used for pattern development and describe their applications.

8. Identify types of sheet metal patterns and describe the characteristics and applications.
   i. square-to-round on centre
   ii. right cone
   iii. pipe tee

Practical Requirements:

1. Perform various geometric operations.
   i. bisect a straight line or circle
   ii. construct a perpendicular
   iii. divide a line into a given number of equal parts
   iv. construct parallel lines
   v. construct tangents
   vi. construct an ellipse
   vii. construct a pentagon, octagon and hexagon

2. Layout and fabricate simple fittings.
   i. elbows
   ii. offsets
   iii. duct sections

SL1161 Blueprint Reading

Learning Outcomes:

- Demonstrate knowledge of the procedures used to interpret and extract information from drawings.
- Demonstrate knowledge of drawings and specifications and their applications.

Duration: 30 Hours

Pre-Requisite(s): None

Objectives and Content:

1. Define terminology associated with drawings.

2. Identify the types of drawings and describe their applications.
   i. civil/site
   ii. architectural
   iii. mechanical
   iv. structural
   v. electrical
   vi. shop drawings
   vii. sketches
   viii. as-built

3. Identify the views used on drawings.
   i. elevation
   ii. plan
   iii. section
   iv. detail
   v. auxiliary

4. Identify the parts of a drawing and describe their purpose and applications.
   lines
   i. lines
   ii. legend

iii. symbols and abbreviations
- duct
- welding
- electrical
- plumbing
- architectural

iv. title block
v. notes
vi. specifications

5. Identify and interpret common symbols and abbreviations found on drawings.

6. Identify the types of scales and describe their applications and procedures for use.

7. Describe metric and imperial systems of measurement.

8. Interpret and extract information from drawings.

Practical Requirements:

1. Interpret blueprints.

SL1241 Layout and Fabrication-Parallel Lines

Learning Outcomes:

- Demonstrate knowledge of the procedures used to develop, wye-branches, two piece elbows and basic branches using the parallel line method of layout.
- Demonstrate knowledge of the procedures used to layout and fabricate flat on top and flat on bottom patterns.
- Demonstrate knowledge of the procedures used to layout and fabricate round tees.
- Demonstrate knowledge of the procedures used to layout and fabricate basic gutter mitres.
- Demonstrate knowledge of the procedures used to layout and fabricate round elbows.
- Demonstrate knowledge of the procedures used to layout and fabricate flashings.
- Demonstrate knowledge of the procedures used to layout and fabricate roof jacks.

Duration: 90 Hours

Pre-Requisite(s): SL1131, SL1151

Objectives and Content:

1. Define terminology associated with parallel line development.
    i. flat-on-top
    ii. flat-on-bottom
    iii. pipe
    iv. tee
    v. mitre line
    vi. centerline radius
    vii. gore
    viii. seam lines
    ix. end gore
    x. symmetry of lines
    xi. true length of lines

2. Describe procedures to layout and fabricate round tees.
   i. 90^{o} tee with equal diameters
      - patterns for the tee
      - patterns for the hole
   ii. 90^{o} tee with unequal diameters
      - patterns for the tee
      - patterns for the hole
   iii. centered tees at an angle
   iv. off-center tees
   v. off-center tees at an angle

3. Describe procedures used to layout and fabricate flat-on-top and flat-on-bottom patterns.
   i. determine views
   ii. locate views
      - symmetry of lines
   iii. label lines and points
   iv. prepare drawing
   v. determine true length of lines
   vi. determine types of seams, joints and edges
   vii. calculate allowances
   viii. determine stretch outs
   ix. cut pattern
   x. check pattern accuracy

4. Describe procedures used to layout and fabricate basic gutter mitres.

5. Describe the rule of elbow division.

6. Describe procedures used to layout and fabricate round and multi-piece elbows.

7. Describe procedures used to layout and fabricate roof jacks.

8. Describe procedures used to layout and fabricate wye branches.

Practical Requirements:

1. Layout and fabricate a basic roof jack as per specifications.

2. Layout and fabricate a basic two-piece elbow as per specifications.

3. Layout and fabricate a basic branch pattern as per specifications.

4. Layout and fabricate patterns as per specifications.
   i. flat-on-top
   ii. flat-on-bottom
   iii. round tee
   iv. basic gutter mitre
   v. multi-piece elbow

SL1251 Layout and Fabrication-Radial Lines I (Basic)

Learning Outcomes:

- Demonstrate knowledge of the procedures used to layout and fabricate tapers on a pitch.
- Demonstrate knowledge of the procedures used to layout and fabricate scalene and oblique cones (eccentrics).

Duration: 90 Hours

Pre-Requisite(s): SL1131, SL1151

Objectives and Content:

1. Define terminology associated with radial line pattern development.
   i. apex
   ii. frustum of a cone
   iii. truncated cones
   iv. right cones
   v. true length lines
   vi. eccentrics

2. Identify and describe the types of fittings that require the radial line method of layout.
   i. funnel
   ii. tapers
   iii. branches

3. Describe procedures to layout patterns and fabricate tapered fittings.
   i. determine views
   ii. locate views
      - symmetry of lines
   iii. label lines and points
   iv. prepare drawing
   v. determine true length of lines
   vi. determine types of seams, joints and edges
   vii. calculate allowances

viii. determine stretch outs
ix. check pattern accuracy
x. cut pattern

Practical Requirements:

1. Layout basic patterns and fabricate tapered fittings as per specifications.
   i. basic frustum
   ii. basic truncated cone

2. Layout pattern and fabricate fittings as per specifications.
   i. tapers on a pitch
   ii. scalene or oblique cones (eccentrics)

SL1261 Layout and Fabrication-Triangulation I

Learning Outcomes:

- Demonstrate knowledge of the procedures used to layout and fabricate basic square-to-rounds. using the triangulation method.
- Demonstrate knowledge of the procedures used to develop basic transitions using the triangulation method.

Duration: 60 Hours

Pre-Requisite(s): SL1131, SL1151

Objectives and Content:

1. Define terminology associated with triangulation.
   i. true length of lines
   ii. lines of symmetry
   iii. square-to-rounds (e.g., change in shape)
   iv. transitions (e.g., change in size)

2. Identify and describe the types of patterns and fittings that require the triangulation method.
   i. square-to-rounds
   ii. transitions

3. Describe two methods of finding true length of lines.
   i. separate
   ii. superimposed

4. Describe procedures to layout and fabricate patterns for basic transitions and square-to-rounds.
   i. determine views
   ii. locate views
      - symmetry of lines
   iii. label lines and points
   iv. prepare drawing

v. determine true length of lines
vi. determine types of seams, joints, and edges
vii. calculate allowances
viii. determine stretch outs
ix. check pattern accuracy
x. cut pattern

Practical Requirements:

1. Layout and fabricate basic transitions.

2. Layout and fabricate basic square-to-rounds.

SL1630 Layout and Fabrication-Triangulation II

Learning Outcomes:

- Demonstrate knowledge of the procedures used to layout and fabricate basic drop cheek elbows and rolling offsets.
- Demonstrate knowledge of the procedures used to layout and fabricate basic wye-branches.
- Demonstrate knowledge of the procedures used to layout and fabricate basic tapered elbows.

Duration: 60 Hours

Pre-Requisite(s): SL1261

Objectives and Content:

1 Describe procedures used to layout patterns and fabricate basic cylindrical rolling offsets.
- i. determine views
- ii. locate views
  - symmetry of lines
- iii. label lines and points
- iv. prepare drawing
- v. determine true length of lines
- vi. determine types of seams, joints, and edges
- vii. calculate allowances
- viii. determine stretch outs
- ix. check pattern accuracy
- x. cut pattern

2. Describe procedures used to layout patterns and fabricate square or rectangular basic drop cheek elbows and offsets.
- i. determine views
- ii. locate views

- symmetry of lines

iii. label lines and points
iv. prepare drawing
v. determine true length of lines
vi. determine types of seams, joints, and edges
vii. calculate allowances
viii. determine stretch outs
ix. check pattern accuracy
x. cut pattern

3. Describe procedures used to layout patterns and fabricate basic wye-branches and tapered elbows.
   i. determine views
   ii. locate views
      - symmetry of lines
   iii. label lines and points
   iv. prepare drawing
   v. determine true length of lines
   vi. determine types of seams, joints, and edges
   vii. calculate allowances
   viii. determine stretch outs
   ix. check pattern accuracy
   x. cut pattern

Practical Requirements:

1. Layout and fabricate basic cylindrical rolling offsets as per specifications.

2. Layout and fabricate rectangular or square basic drop cheek elbows and offsets as per specifications.

3. Layout and fabricate basic wye-branches and tapered elbows as per specifications.

SL1350 Oxy-Acetylene Welding and Cutting

Learning Outcomes:

- Demonstrate knowledge of the procedures to use oxy-fuel equipment to perform basic welding, cutting and brazing.

Duration: 30 Hours

Pre-Requisite(s): TS1530, SL1101

Objectives and Content:

1. Identify and describe oxy-fuel equipment, its characteristics and applications.

2. Describe the safe operation of oxy-fuel equipment.
   - i. cleaning
   - ii. threads
   - iii. pressure
   - iv. fuel gas
   - v. oxygen
   - vi. set up procedures
   - vii. lighting procedures
   - viii. flame adjustment
   - ix. shut down procedures

3. Identify the metals that can be cut by oxy-fuel equipment.

4. Describe the types of flames, pressure and tip sizes and the application of each.

5. Describe the various types of torches and their applications.

6. Describe the principles of the oxy-fuel welding process.
   - i. flame adjustment
   - ii. filler metals
     - brazing rod
     - sil foss

Practical Requirements:

1. Set up and use cutting equipment.

2. Set up and use welding equipment.

3. Fusion weld in the flat position.

4. Braze weld in the horizontal position.

5. Shut down oxy-fuel equipment.

SL1280 Plasma Arc Cutting

Learning Outcomes:

- Demonstrate knowledge of plasma arc equipment and accessories.
- Demonstrate knowledge of the procedures used to cut with plasma arc equipment.

Duration: 12 Hours

Pre-Requisite(s): TS1530, SL1101

Objectives and Content:

1, Define terminology associated with plasma arc cutting.

2. Identify hazards and describe safe work practices pertaining to the use of plasma arc cutting equipment.
   - i. personal
   - ii. shop/facility
   - iii. equipment
   - iv. ventilation

3. Describe the plasma arc process.
   - i. general precautions
   - ii. equipment and accessories
     - types of torches
     - electrodes and tips
   - iii. types of arcs
   - iv. gases
   - v. power source
   - vi. procedures to set-up equipment and check its operation

4. Describe the procedures used to set-up, adjust and shut down plasma arc equipment.

5. Describe the procedures used to inspect and maintain plasma arc equipment.

6. Describe the procedures used to cut using plasma arc equipment.

Practical Requirements:

1. Perform plasma arc cutting operations.

SL1430 SMAW (Shielded Metal Arc Welding)

Learning Outcomes:

- Demonstrate knowledge of shielded metal arc welding (SMAW) welding equipment, consumables and accessories.
- Demonstrate knowledge of the procedures used to set - up, adjust, operate, inspect and maintain SMAW welding equipment.
- Demonstrate knowledge of the procedures used to deposit a weld bead using SMAW welding equipment.

Duration: 45 Hours

Pre-Requisite(s): TS1530, SL1101

Objectives and Content:

1. Describe the purpose, applications and advantages of SMAW.

2. Define terminology associated with SMAW welding.
   - i. mild steel and low alloy steel electrodes
   - ii. AC (Alternating Current)
   - iii. DC (Direct Current) (polarity)
   - iv. arc blow
   - v. duty cycle
   - vi. rated amperage
   - vii. general precautions
   - viii. electrodes
   - ix. equipment and accessories
     - personal protective equipment
     - ground clamps
     - terminal lugs
     - electrode holders

3. Identify hazards and describe safe work practices pertaining to SMAW welding.
   i. personal
   ii. shop/facility
   iii. fire and explosion
   iv. equipment
   v. ventilation/fumes
   vi. storage/handling

4. Identify codes and standards and symbols pertaining to SMAW welding.
   i. Canadian Standards Association (CSA)
   ii. American Society of Mechanical Engineers (ASME)
   iii. American Welding Society (AWS)

5. Identify SMAW welding equipment, consumables and accessories and describe their applications.

6. Describe the procedures used to set- up and adjust SMAW welding equipment.

7. Describe the procedures used to strike and maintain an arc using SMAW welding equipment.

8. Describe the procedures and techniques used to deposit a weld bead using SMAW welding equipment.
   i. arc length
   ii. travel speed
   iii. work and travel angles
   iv. visual inspection

9. Describe the procedures used to inspect and maintain SMAW welding equipment.

Practical Requirements.

1. Set-up welding equipment check the various external components.

2. Tack weld with (6011) 4311 and (7018) 4918 electrodes.

3. Deposit stringer and weave beads with (6011) 4311 and (7018) 4918 electrodes.

4. Perform padding with 4311 and 4918 electrodes.

5. Perform fillet welds.
    i. T-joint
    ii. butt Joint

SL1440 Introduction to Gas Metal Arc Welding (GMAW)

Learning Outcomes:

- Demonstrate knowledge of gas metal arc welding (GMAW) welding equipment, consumables and accessories.
- Demonstrate knowledge of the procedures used to set-up, adjust, operate, inspect and maintain GMAW welding equipment.
- Demonstrate knowledge of the procedures used to deposit a weld bead using GMAW welding equipment.

Duration: 30 Hours

Pre-Requisite(s): SL1430

Objectives and Content:

1. Describe the purpose, applications and advantages of GMAW.

2. Identify hazards and describe safe work practices pertaining to the use of GMAW equipment.
   i. personal
   ii. shop/facility
   iii. equipment
   iv. ventilation

3. Define terminology associated with GMAW welding.
   i. general precautions
   ii. equipment and accessories
      - shielding gas and regulators
      - electrode wire
      - gun
      - feeder
      - power source
      - nozzle
      - cable connections

- cables
- pulsed arc machines

iii. metal transfers
iv. polarity
v. arc voltage
vi. slope and adjustment
vii. inductance
viii. travel speed
ix. wire feed speed
x. penetration
xi. travel and work angles
xii. manipulation
xiii. guide tubes
xiv. contact tips
xv. liners

4. Identify codes, standards and symbols pertaining to GMAW welding.
   i. Canadian Standards Association (CSA)
   ii. American Society of Mechanical Engineers (ASME)
   iii. American Welding Society (AWS)

5. Identify GMAW welding equipment, consumables and accessories and describe their applications.

6. Describe the procedures used to assemble and disassemble GMAW welding equipment.

7 Describe the procedures used to establish and maintain an arc using GMAW welding equipment.
   i. starting and stopping the weld
      - finishing end of the joint
   ii. filler metal
   iii. adjustment
   iv. shielding gases (pre and post weld)
   v. drive rolls
   vi. gun
   vii. stick-out
   viii. speed

8. Identify the modes of transfer relating to GMAW welding and describe their characteristics and applications.
   i. short circuiting
   ii. globular
   iii. spray
   iv. pulse

9. Describe the procedures and techniques used to deposit a weld bead using GMAW welding equipment.
   i. electrode extension
   ii. travel speed
   iii. work and travel angles
   iv. flow rates
   v. stringer
   vi. weave
   vii. stick-out
   viii. travel speed
   ix. work and travel angles
   x. visual inspection

10. Describe the procedures used to inspect, maintain and troubleshoot GMAW welding equipment

Practical Requirements:

1. Set-up GMAW equipment.

2. Change electrode wire guide.

3. Adjust and check flow meter.

4. Deposit fillet welds on mild steel, various thickness.

SL1450 Introduction to Gas Tungsten Arc Welding (GTAW)

Learning Outcomes:

- Demonstrate knowledge of gas tungsten arc welding (GTAW) equipment, consumables and accessories.
- Demonstrate knowledge of the procedures used to set-up, adjust, operate, inspect and maintain GTAW welding equipment.
- Demonstrate knowledge of the procedures used to deposit a weld bead using GTAW equipment.

Duration: 60 Hours

Pre-Requisite(s): SL1430

Objectives and Content:

1. Describe the purpose, applications and advantages of GTAW.

2. Define terminology associated with GTAW welding.
   - i. equipment and accessories
     - power sources
     - air-cooled torches
     - water-cooled torches
     - flow meters
   - ii. tungsten electrodes
   - iii. current requirement
   - iv. shielding gases
   - v. travel and work angles
   - vi. filler rods
   - vii. collet
   - viii. collet body
   - ix. cup
   - x. high frequency

3. Identify hazards and describe safe work practices pertaining to the use of GTAW equipment.
   i. personal
   ii. shop/facility
   iii. equipment
   iv. ventilation

4. Interpret codes and regulations pertaining to the use of GTAW equipment for welding mild steel.

5. Identify GTAW welding equipment, consumables and accessories and describe their applications.

6. Describe the procedures used to assemble and disassemble GTAW welding equipment.

7. Describe the procedures used to establish and maintain an arc using GTAW welding equipment.

8. Describe the procedures and techniques used to deposit a weld bead using GTAW welding equipment.
   i. with filler metal
   ii. without filler metal

9. Describe the procedures used to inspect, maintain and troubleshoot GTAW welding equipment.

Practical Requirements:

1. Set-up GTAW equipment.

2. Run beads on mild steel plate.

3. Shut-down equipment.

SL1741 Air Quality Management

Learning Outcomes:

- Demonstrate knowledge of air quality management.

Duration: 60 Hours

Pre-Requisite(s): None

Objectives and Content:

1. Define terminology associated with air quality management.

2. Identify hazards and describe safe work practices pertaining to air quality management.

3. Interpret codes and regulations pertaining to air quality management.

4. Describe considerations and requirements associated with air quality management.
   i. environmental conditions
   ii. intake locations
   iii. exhaust locations

5. Describe the importance of indoor air quality.

6. Identify methods of improving or correcting problems with air quality.
   i. heating/cooling
   ii. ventilation
   iii. conditioning
      - filtration
      - sterilization
      - purification
      - humidification/dehumidification

7. Identify areas requiring special air quality ventilation.
   i. clean/sterile rooms
   ii. industrial/commercial settings

8. Identify the methods used to determine air quality relating to humidity and temperature.

9. Identify air quality problems and describe the procedures used to prevent or correct them.
   i. contamination
   ii. humidity
   iii. temperature (hot/cold zones)
   iv. air motion

10. Describe the impact improper system or component installation can have on air quality.

Practical Requirements:

None.

SL1770 Soldering

Learning Outcomes:

- Demonstrate knowledge of equipment used for soldering.
- Demonstrate knowledge of the procedures used to solder various materials.

Duration: 30 Hours

Pre-Requisite(s): SL1350

Objectives and Content:

1. Identify and describe the various types of soldering equipment, its characteristics and applications.
   i. types of soldering irons (copper)
   ii. types of soldering furnaces

2. Describe the safe operation of gas fired furnaces.
   i. leaks
   ii. ventilation
   iii. cleaning
   iv. lighting procedure
   v. shut down procedure

3. Describe the proper method of forging and tinning an iron.

4. Describe the various fluxes used in soldering and their preparation.
   i. corrosive and non-corrosive
   ii. safe handling of acids
   iii. ventilation

5. Describe the various types of solder and their advantages and disadvantages.
   i. Composition
   ii. grading (50/50, 60/40)
   iii. bar solder
   iv. wire solder

v. flux core
vi. beads

6. Describe various soldering methods.
   i. flame color
   ii. sweating a joint
   iii. skimming
   iv. pointing up
   v. capillary action
   vi. seam preparation
   vii. flux removal
   viii. test for leakage

Practical Requirements:

1. Forge and tin a soldering iron.

2. Light and shut down a propane furnace.

3. Solder container having both vertical and horizontal seams.

4. Test for leaks.

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.

AM1300 Sheet Metal 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
   ii. copy files and folders
   iii. move files and folders
   iv. rename files and folders
   v. 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.

OT1191 Work Term

Learning Outcomes:

- Demonstrate knowledge of theory and practical applications of trade skills, safe work practices, appropriate workplace behaviour, and time management through exposure to the trade in an authentic work environment.

NOTE: The pre-apprentice must be supervised at the workplace. Supervision staff must be appropriately qualified to undertake that role – preferably a certified Journeyperson for the trade.

Duration: 60 Hours

Pre-Requisite(s): None

BLOCK II

SL2100 Trade Related Documents

Learning Outcomes:

- Demonstrate knowledge of trade related documents and their use.
- Demonstrate knowledge of procedures used to prepare documentation.

Duration: 15 Hours

Pre-Requisite(s): SL1161

Objectives and Content:

1. Identify types of trade related documents and describe their applications.
   - i. manufacturers' specifications
   - ii. drawings and specifications
   - iii. codes and standards
     - SMACNA
     - ASHRAE
     - National Building Code (NBC)
   - iv. work orders
     - change
     - job
     - material

2. Identify types of documentation and describe the procedures used to prepare them.
   - i. work orders
   - ii. reports
     - hazard assessment
     - safety
     - Worker's Compensation
   - iii. maintenance/service records
   - iv. stock/inventory records
     - shop
     - job site

- vehicle

Practical Requirements:

None.

SL2130 Advanced Gas Metal Arc Welding (GMAW)

Learning Outcomes:

- Demonstrate knowledge of the procedures used to weld aluminum and stainless steel using the GMAW process.
- Demonstrate knowledge of the procedures used to weld mild steel using the FCAW process.

Duration: 30 Hours

Pre-Requisite(s): SL1440

Objectives and Content:

1. Interpret codes and regulations pertaining to the use of GMAW equipment for welding aluminum and stainless steel.

2. Identify GMAW equipment, consumables and accessories used to weld aluminum and stainless steel, and describe their characteristics and applications.

3. Identify the modes of transfer relating to GMAW welding and describe their characteristics and applications.
   i. short circuiting
   ii. globular
   iii. spray
   iv. pulse

4. Describe the procedures used to set-up, adjust and shut-down GMAW equipment for welding aluminum and stainless steel.

5. Describe the procedures used to weld aluminum and stainless steel using the GMAW process.
   i. plug
   ii. fillet (continuous)
   iii. stitch

iv. tack
v. edge
vi. corner

6. Describe weld defects, their causes and the procedures to prevent and correct them.
   i. porosity
   ii. cracks
   iii. warping
   iv. undercut

7. Identify FCAW equipment, consumables and accessories used to weld mild steel, and describe their characteristics and applications.

8. Describe the procedures used to set-up, adjust and shut-down FCAW equipment for welding mild steel.

9. Describe the procedures used to weld mild steel using the FCAW process.
   i. plug
   ii. fillet (continuous)
   iii. stitch
   iv. tack
   v. edge
   vi. corner

Practical Requirements:

1. Set up GMAW equipment.

2. Change the electrode wire guide.

3. Adjust and check the flow metre.

4. Deposit fillet welds on aluminum and stainless steel plates of various thicknesses using the GMAW process in four positions.

5. Deposit fillet welds on mild and stainless steel using GMAW process in the flat and horizontal positions (conventional and pulse).

SL2160 Layout and Fabrication-Triangulation III (Advanced)

Learning Outcomes:

- Demonstrate knowledge of the procedures used to layout and fabricate complex transitions.
- Demonstrate knowledge of the procedures used to layout and fabricate complex drop cheek elbows and rolling offsets.
- Demonstrate knowledge of the procedures used to layout and fabricate complex wye-branches and tapered elbows.
- Demonstrate knowledge of the procedures used to layout and fabricate complex square-to-rounds.

Duration: 120 Hours

Pre-Requisite(s): SL1630

Objectives and Content:

1 Describe procedures used to layout patterns and fabricate complex square-to-rounds.
   i. determine views
   ii. locate views
      - symmetry of lines
   iii. label lines and points
   iv. prepare drawing
   v. determine true length of lines
   vi. determine types of seams, joints, and edges
   vii. calculate allowances
   viii. determine stretch outs
   ix. check pattern accuracy
   x. cut pattern

2. Describe procedures used to layout patterns and fabricate complex square or rectangular drop cheek elbows and offsets.
   i. determine views

ii. locate views
- symmetry of lines

iii. label lines and points
iv. prepare drawing
v. determine true length of lines
vi. determine types of seams, joints, and edges
vii. calculate allowances
viii. determine stretch outs
ix. check pattern accuracy
x. cut pattern

3. Describe procedures used to layout patterns and fabricate complex wye-branches and tapered elbows.
   i. determine views
   ii. locate views
   - symmetry of lines

   iii. label lines and points
   iv. prepare drawing
   v. determine true length of lines
   vi. determine types of seams, joints, and edges
   vii. calculate allowances
   viii. determine stretch outs
   ix. check pattern accuracy
   x. cut pattern

4. Describe procedures used to layout patterns and fabricate complex transitions and transition elbows.
   i. determine views
   ii. locate views
   - symmetry of lines

   iii. label lines and points
   iv. prepare drawing
   v. determine true length of lines
   vi. determine types of seams, joints, and edges
   vii. calculate allowances
   viii. determine stretch outs
   ix. check pattern accuracy
   x. cut pattern

Practical Requirements:

1. Layout and fabricate complex square-to-rounds as per specifications.

2. Layout and fabricate rectangular or square complex drop cheek elbows and offsets as per specifications.

3. Layout and fabricate complex wye-branches and tapered elbows as per specifications.

4. Layout and fabricate complex transitions and transition elbows as per specifications.

SL2200 Fabrication (Air and Material Handling Systems and Components)

Learning Outcomes:

- Demonstrate knowledge of sheet metal components for air handling systems and the procedures used to fabricate them.
- Demonstrate knowledge of sheet metal components for material handling systems and the procedures used to fabricate them.

Duration: 60 Hours

Pre-Requisite(s): SL1131, SL2100

Objectives and Content:

1. Define terminology associated with air and material handling systems.

2. Identify hazards and describe safe work practices when fabricating sheet metal components for air and material handling systems.

3. Interpret codes and regulations pertaining to the fabrication of sheet metal components for air and material handling systems.
   i. SMACNA
   ii. ASHRAE
   iii. NBC

4. Interpret information, pertaining to the fabrication of sheet metal components for air and material handling systems, found on drawings and specifications.

5. Identify tools and equipment used to fabricate sheet metal components for air and material handling systems, and describe their applications, limitations and procedures for use.

6. Identify types of materials used to fabricate sheet metal components for air and material handling systems, and describe their characteristics and applications.

7. Identify and describe sheet metal components associated with air and material handling systems.
   i. ductwork
   ii. fittings
   iii. dampers
   iv. fire dampers
      - breakaway join
   v. flexible connections
   vi. hangers
   vii. equipment supports/bases
   viii. louvers
   ix. attenuators (silencer)

8. Identify considerations and requirements when fabricating sheet metal components for air handling systems.
   i. load bearing capacities
   ii. system specifications
   iii. environmental conditions

9. Identify considerations and requirements when fabricating sheet metal components for material handling systems.
   i. load bearing capacities
   ii. system specifications
   iii. environmental conditions
   iv. architectural conditions

10. Describe the procedures used to fabricate sheet metal components for air and material handling systems.
   i. cut
   ii. label
   iii. form
   iv. insulate
   v. assemble

Practical Requirements:

1. Fabricate and assemble a flexible connection.

2. Fabricate and install a single blade balancing damper.

3. Fabricate sleeve to accommodate installation of a fire damper in duct work.

SL2230 Chimneys, Breeching and Venting

Learning Outcomes:

- Demonstrate knowledge of installation procedures for chimneys, breeching and venting.

Duration: 15 Hours

Pre-Requisite(s): SL1111, SL1161

Objectives and Content:

1. Define terminology associated with chimneys, breeching and venting.

2. Identify hazards and describe safe work practices associated with chimneys, breeching and venting.

3. Interpret codes, standards and regulations pertaining to the installation of chimneys, breeching and venting.
   i. jurisdictional requirements

4. Interpret information pertaining to the installation of chimneys, breeching and venting, found on drawings and specifications.

5. Identify tools and equipment relating to the installation of chimneys, breeching and venting, and describe their applications and procedures for use.

6. Identify types of chimneys, breeching and venting systems and their components and describe their applications.
   i. chimney classifications
   ii. vent classifications/combustion air

7. Describe the procedures used to remove and install chimneys, breeching and venting.

8. Describe the procedures used to connect chimneys, breeching and venting to the appliance.

9. Identify cladding and lagging materials used for chimneys, breeching and venting and describe their characteristics and applications.

10. Identify flashing requirements pertaining to chimneys, breeching and venting.

11. Describe the procedures used to install cladding and lagging on chimneys, breeching and venting.

Practical Requirements:

None.

BLOCK III

SL3100 Layout and Fabrication-Radial Lines II (Advanced)

Learning Outcomes:

- Demonstrate knowledge of the procedures used to layout and fabricate tapered elbows.
- Demonstrate knowledge of the procedures used to layout and fabricate wye-branch using scalene cones.
- Demonstrate knowledge of the procedures used to layout and fabricate intersections.

Duration: 90 Hours

Pre-Requisite(s): SL1251

Objectives and Content:

1. Define terminology associated with tapered fittings.
   - i. tapered elbows
   - ii. wye-branch
   - iii. intersections

2. Describe procedures used to layout and fabricate tapered elbows, wye-branch and intersections.
   - i. determine views
   - ii. locate views
     - symmetry of lines
   - iii. label lines and points
   - iv. prepare drawing
   - v. determine true length of lines
   - vi. determine types of seams, joints and edges
   - vii. calculate allowances
   - viii. determine stretch outs
   - ix. check pattern accuracy
   - x. cut pattern

Practical Requirements:

1. Layout and fabricate the following, as per specifications.
    i. tapered elbows
    ii. wye-branch using scalene cones
    iii. intersections
    iv. oblique fittings

SL3130 Installation (Air and Material Handling Systems)

Learning Outcomes:

- Demonstrate knowledge of installation procedures for air handling systems and their components.
- Demonstrate knowledge of installation procedures for material handling systems and their components.
- Demonstrate knowledge of basic design and field modifications.

Duration: 60 Hours

Pre-Requisite(s): SL1111, SL1121, SL1161

Objectives and Content:

1. Define terminology associated with the installation of air and material handling systems and components.

2. Identify hazards and describe safe work practices pertaining to the installation of air and material handling systems and components.

3. Interpret information, pertaining to the installation of air and material handling systems, found on drawings and specifications.

4. Identify tools and equipment used for the installation of air handling systems, and describe their application, limitations and procedures for use.

5. Identify tools and equipment used for the installation of material handling systems, and describe their application, limitations and procedures for use.

6. Identify types of air handling systems, and describe their applications, principles and operation.
   i. exhaust
   ii. make-up air
   iii. supply/return air (central)

7. Identify types of material handling systems and describe their applications, principles and operation.
   i. conveyors
   ii. chutes
   iii. blow pipe/dust collection

8. Identify air handling system components and describe their applications.
   i. sheet metal components
      - ductwork
      - fittings
      - hangers
      - braces
      - brackets
      - cladding/lagging
      - flashing
   ii. system components
      - units
      - dampers
      - fire dampers
      - registers/diffusers
      - grilles
      - louvers
      - coils
      - heat and energy recovery ventilators
      - automatic controls and instruments
      - insulation
        - thermal
        - acoustical
   iii. accessories
      - humidifiers
      - filters
      - mixing boxes

9. Identify material handling system components and describe their applications.
   i. sheet metal components
      - ductwork
      - fittings
      - hangers
      - braces

- brackets
- cladding/lagging
- flashing

ii. system components
- fans
- collection devices
- cyclone
- separating devices
- automatic controls and instruments
- thermal insulation

iii. accessories
- access doors
- blast gates

10. Identify the types of fasteners and describe their applications.
    i. concrete
    ii. metal
    iii. wood

11. Describe the procedures used to prepare for installation of residential and commercial/industrial air handling systems and components.
    i. determine equipment requirements
    ii. determine penetration locations
    iii. perform site measurements
    iv. demolition and removal of existing systems and components
    v. on-site co-ordination
        - staging (storing material)
        - planning
        - distributing (material to installation area)
        - sectioning (pre-assembling on site)
        - erecting
    vi. final inspection (completing)

12. Describe the procedures used to prepare for installation of material handling system components.
    i. determine equipment requirements
    ii. verify duct sizing
    iii. determine penetration locations
    iv. perform site measurements

v. demolition and removal of existing systems and components
vi. on-site co-ordination
- staging (storing material)
- planning
- distributing (material to installation area)
- sectioning (pre-assembling on site)
- erecting

vii. final inspection (completing)

13. Identify considerations and requirements for installing air handling system components.
i. manufacturers' specifications
ii. isolators
iii. building materials
iv. environmental conditions
v. field design modifications

14. Identify considerations for installing material handling system components.
i. manufacturers' specifications
ii. isolators
iii. building materials
iv. environmental conditions
v. field design modifications

15. Describe the procedures used to install air handling system components.

16. Describe the procedures used to install material handling system components.

Practical Requirements:

1. Install duct run and various components to plan and specifications.

SL3150 Advanced Gas Tungsten Arc Welding

Learning Outcomes:

- Demonstrate knowledge of the procedures used to weld aluminum and stainless steel using the GTAW process.

Duration: 90 Hours

Pre-Requisite(s): SL1450

Objectives and Content:

1. Interpret codes and regulations pertaining to the use of GTAW equipment for welding aluminum and stainless steel

2. Identify types of GTAW equipment, consumables and accessories used to weld aluminum and stainless steel and describe their characteristics and applications.

3. Describe the procedures used to set-up, adjust and shut-down GTAW equipment for welding aluminum, and stainless steel.

4. Describe the procedures used to weld aluminum and stainless steel using the GTAW process.
   i. plug
   ii. fillet (continuous)
   iii. stitch
   iv. tack
   v. edge
   vi. corner

5. Describe weld defects, their causes and the procedures to prevent and correct them.
   i. porosity
   ii. cracks
   iii. warping
   iv. undercut

Practical Requirements:

1. Set-up and adjust GTAW welding equipment.

2. Weld corner, lap, tee and butt joints on aluminum and stainless steel.

3. Fillet weld aluminum and stainless steel in flat and horizontal positions.

4. Apply finishing methods to welds.

BLOCK IV

SL4100 Job Planning

Learning Outcomes:

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

Duration: 15 Hours

Pre-Requisite(s): SL1161

Objectives and Content:

1. Identify sources of information relevant to job planning.
   i. documentation
   ii. drawings
   iii. specifications
   iv. related professionals
   v. clients

2. Describe the considerations for determining job requirements.
   i. personnel
   ii. tools and equipment
   iii. materials
   iv. permits

3. Describe the procedures used to plan job tasks.
   i. scheduling
   ii. estimating

4. Describe the procedures used to organize and maintain inventory.

5. Describe the procedures used to interpret and extract information from blueprints.

6. Identify the purpose of submittals and shop drawings and describe the procedures used to interpret them.

7. Describe the procedures used to take field measurements.

8. Identify the types of material take-off lists and describe their applications and the procedures used to produce them.
   i. material estimation
   ii. material installation

Practical Requirements:

None.

SL4200 HVAC Systems

Learning Outcomes:

- Demonstrate knowledge of HVAC systems and their associated design principles.

Duration: 60 Hours

Pre-Requisite(s): SL1161, 1741 SL3130

Objectives and Content:

1. Describe the purpose and operation of an HVAC system.

2. Describe the basic properties of air.
   i. psychometric chart

3. Describe air patterns and their impact on the operation of a typical HVAC system.
   i. air velocity (FPM)
   ii. air volume (CFM)
   iii. duct pressure
      - static pressure (SP)
      - velocity pressure (VP)
      - total pressure (TP)
   iv. resistance
      - friction loss
      - dynamic loss

4. Describe ventilation.
   i. purpose
   ii. positive and negative building pressure
   iii. sources of infiltration and exfiltration
   iv. methods of measuring

5. Describe the basic principles of heating and cooling air.

6. Identify the types of fans.
   i. axial
      - propeller
      - tube axial
      - vane axial
   ii. centrifugal
      - straight blade
      - forward curved blade (squirrel cage)
      - backward inclined

7. Describe the four basic duct systems and their design principles.
   i. single zone
   ii. variable air volume (VAV)
   iii. multi-zone
   iv. double-duct (dual)

8. Describe the installation of HVAC equipment.
   i. regulations (SMACNA)
   ii. procedures
   iii. practices
   iv. principles

9. Describe the types of package units.
   i. gas-electric
   ii. gas-gas
   iii. electric-electric
   iv. heat pump

10. Describe procedures used to install package units.
   i. roof top systems
   ii. split systems
      - indoor
      - outdoor

Practical Requirements:

None.

SL1720 Advanced Layout and Fabrication

Learning Outcomes:

- Demonstrate knowledge of the procedures used to layout and fabricate composite components using a combination of methods.

Duration: 90 Hours

Pre-Requisite(s): SL1241, SL2160, SL3100

Objectives and Content:

1. Describe procedures used to layout and fabricate composite components using a combination of methods.
   - i. identify shapes
   - ii. determine layout methods
   - iii. determine views
   - iv. locate views
     - symmetry of lines
   - v. label lines and points
   - vi. prepare drawing
   - vii. determine true length of lines
   - viii. determine types of seams, joints and edges
   - ix. calculate allowances
   - x. determine stretch outs
   - xi. check pattern accuracy
   - xii. cut pattern

Practical Requirements:

1. Layout and fabricate composite components using a combination of layout methods as per specifications.

SL4230 Adjusting and Balancing (Air and Material Handling Systems)

Learning Outcomes:

- Demonstrate knowledge of adjusting and balancing procedures for air handling systems.
- Demonstrate knowledge of adjusting and balancing procedures for material handling systems.

Duration: 15 Hours

Pre-Requisite(s): SL2100, SL4200

Objectives and Content:

1. Define terminology associated with adjusting and balancing air and material handling systems.

2. Identify hazards and describe safe work practices pertaining to adjusting and balancing air and material handling systems.

3. Interpret codes and regulations pertaining to adjusting and balancing air and material handling systems.

4. Interpret information, pertaining to adjusting and balancing air and material handling systems, found on drawings and specifications.

5. Identify requirements and limitations pertaining to adjusting and balancing air handling systems.

6. Identify tools and instruments used in adjusting and balancing systems, and describe their applications and procedures for use.
   i. electrical devices
   ii. air balancing devices
   iii. charts
      - psychometric
      - fan

7. Describe the importance of balancing and adjusting to ensure optimal system performance.

8. Describe the procedures and techniques used to perform air balancing on air handling systems.

9. Describe the procedures and techniques used to perform balancing on material handling systems.

10. Describe the procedures used to adjust air handling system components to optimize performance.

11. Describe the procedures used to adjust material handling system components to optimize performance.

12. Identify problems pertaining to air handling systems and describe the procedures used to prevent and correct them.
    i. positive pressure
    ii. negative pressure
    iii. improper installation
        - duct sizing
        - noise

13. Identify problems pertaining to material handling systems and describe the procedures used to prevent and correct them.

Practical Requirements:

None.

SL4240 Metal Roofing and Architectural Metal

Learning Outcomes:

- Demonstrate knowledge of fabrication procedures for metal roofing, cladding and architectural metals.
- Demonstrate knowledge of installation procedures for metal roofing, cladding and architectural metals.

Duration: 30 Hours

Pre-Requisite(s): SL1111, SL1161

Objectives and Content:

1. Define terminology associated with metal roofing, cladding and architectural metals.

2. Identify hazards and describe safe work practices pertaining to the fabrication and installation of metal roofing, cladding and architectural metals.

3. Interpret codes and regulations pertaining to the installation of metal roofing, cladding and architectural metals.

4. Interpret information, pertaining to metal roofing and architectural metal, found on drawings and specifications.

5. Identify tools and equipment used to fabricate and install metal roofing, cladding and architectural metals, and describe their applications and procedures for use.

6. Identify types of materials used in fabricating metal roofing, cladding and architectural metals.

7. Identify types of components associated with metal roofing and cladding and architectural metals and describe their applications.
   i. roof drainage
   ii. flashing
   iii. soffit and fascia

iv. roof vents

8. Describe the procedures used to fabricate metal roofing, cladding and architectural metals and their associated components.
   i. layout
   ii. determine seam
      - standing seam
      - batten seam
      - flat seam
      - commercial
   iii. cut
   iv. form

9. Identify considerations and requirements relating to installing metal roofing, cladding and architectural metals.
   i. building materials
   ii. roof slope
   iii. expansion and contraction

10. Identify types of fasteners for installing metal roofing, cladding and architectural metals and describe their applications.

11. Identify types of roof structures and construction features and describe their applications.
   i. hip
   ii. gable
   iii. pitched
   iv. flat
   v. saw tooth
   vi. shed
   vii. mansard

12. Describe the procedures used to layout metal roofing, cladding and architectural metals.
   i. check for square
   ii. determine starting point
   iii. establish reference lines

13. Identify materials to be installed to prepare surfaces for installation of metal roofing, cladding and architectural metals insulation.
    i. waterproof membrane
    ii. isolation material
    iii. building envelope

14. Describe the procedures used to install materials to roofs or walls in preparation for installation of metal roofing, cladding and architectural metals.

15. Describe the procedures used to install metal roofing, cladding and architectural metals.
    i. cut
    ii. fit
    iii. secure
    iv. seal

16. Identify types of metal decking and describe their applications.
    i. metal pan
    ii. Q decking

17. Describe the procedures used to install decking.

18. Identify types of exterior components and describe their applications.
    i. awnings
    ii. signage
    iii. cornice work

Practical Requirements:

None.

SL4260 Maintenance and Repair (Air and Material Handling Systems)

Learning Outcomes:

- Demonstrate knowledge of maintenance and repair procedures for air handling systems.
- Demonstrate knowledge of maintenance and repair procedures for material handling systems.
- Demonstrate knowledge of testing devices and their applications.

Duration: 15 Hours

Pre-Requisite(s): SL2100, SL4200

Objectives and Content:

1. Define terminology associated with the maintenance and repair of air and material handling systems.

2. Identify hazards and describe safe work practices pertaining to the maintenance and repair of air and material handling systems.

3. Interpret codes and regulations pertaining to the maintenance and repair of air and material handling systems.
   i. SMACNA
   ii. ASHRAE
   iii. NBC

4. Identify tools and equipment used to maintain and repair air and material handling system components, and describe their applications, limitations and procedures for use.
   i. testing devices

5. Identify considerations for the maintenance and repair of air and material handling system components.
   i. sounds
   ii. vibration

iii. odours
iv. heat build-up
v. visual

6. Describe the procedures used to diagnose system faults in air and material handling system components.

7. Describe the procedures used to service air and material handling system components.
   i. scheduled
      - filters
      - lubrication
      - adjustments
   ii. emergency
   iii. lock out

8. Describe the procedures used to repair or replace worn, faulty or defective components of air or material handling systems.

Practical Requirements:

None.

SL4280 Specialty Products

Learning Outcomes:

- Demonstrate knowledge of specialty products and their applications.
- Demonstrate knowledge of fabrication procedures for specialty products.
- Demonstrate knowledge of installation procedures for specialty products and their related components.

Duration: 15 Hours

Pre-Requisite(s): SL1111, SL1180, SL2100

Objectives and Content:

1. Define terminology associated with the fabrication of specialty products.
   i. metal
   ii. non-metal

2. Identify hazards and safe work practices pertaining to the fabrication and installation of specialty products.

3. Interpret codes and regulations pertaining to the fabrication and installation of specialty products.
   i. codes and regulations
   ii. manufacturers' specifications
   iii. environmental conditions
   iv. sanitation

4. Interpret information, pertaining to the fabrication and installation of specialty products, found on drawings and specifications.

5. Identify tools and equipment used to fabricate and install specialty products, and describe their applications, limitations and procedures for use.

6. Identify types of specialty products and accessories and describe their applications.

i. kitchen
ii. medical
iii. food processing
iv. pharmaceutical laboratory
v. decorative

7. Identify types of materials used in fabricating specialty products and components and describe their applications.
   i. ferrous
   ii. non-ferrous
   iii. plastics/PVC
   iv. composites (i.e., awnings)

8. Describe the procedures used to fabricate specialty products and their associated components.
   i. handling
   ii. design
   iii. cut
   iv. form
   v. assemble
   vi. join
   vii. finish

9. Identify types of fasteners and fastening methods used to install specialty products and describe their applications.

10. Describe the procedures used to install specialty products.

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 inSection14.

5.0 Apprenticeship Progression Schedule, Wage Rates and Advanced Training Criteria

Progression Schedule

Sheet Metal Worker - 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…
1st	60 %	▪ Completion of Block 1 training ▪ Pass Block 1 exam ▪ Minimum 1800 hours of combined relevant work experience and training	2nd Year
2nd	70%	▪ Completion of Block 2 training ▪ Pass Block 2 exam ▪ Minimum 3600 hours of combined relevant work experience and training	3rd Year
3rd	80%	▪ Completion of Block 3 training ▪ Pass Block 3 exam ▪ Minimum 5400 hours of combined relevant work experience and training	4th Year
4th	90%	▪ Completion of Block 4 training ▪ Minimum 7200 hours of combined relevant work experience and training ▪ Sign-off of all workplace skills in apprentice logbook ▪ Pass certification exam	Journeyperson Certification

Wage Rates

- Rates are percentages of the prevailing journeyperson'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.

Block Exams

- This program may **not** currently contain Block Exams, in which case this requirement will be waived until such time as Block Exams are available.

Sheet Metal Worker – 7200 Hours		
CLASS CALLS		
Call Level	Requirements for Class Call	Hours awarded for In-School Training
Direct Entry Apprentice: PLA & / or Block 1	▪ 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	▪ Minimum of 3000 hours of relevant work experience and training	240
Block 3	▪ Minimum of 5000 hours of relevant work experience and training	240
Block 4	▪ Minimum of 7000 hours of relevant work experience and training	240

Direct Entry Apprentice

- 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

Class Calls at Minimum Hours

- 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 journeyperson.
- 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.