

Sheet Metal Worker Level 3

Sheet Metal Worker

Unit: A15 Blueprint Reading/Specifications

Level: Three

Duration: 35 hours

Theory: 28 hours

Practical: 7 hours

Overview:

Upon completion of this unit of instruction the apprentice will demonstrate knowledge of blueprint reading and interpretation, specifications, the procedures used to take field measurements and the procedures used to produce material take-off lists.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe the procedures used to interpret and extract information from blueprints and specifications.	25%
2. Identify the purpose of submittals and shop drawings and describe the procedures used to interpret them.	25%
3. Describe the procedures used to take field measurements.	10%
4. Identify the types of material take-off lists and describe their applications and the procedures used to produce them. a. Material estimation b. Material installation	20%
5. Demonstrate and extract information from blueprint drawings and specifications.	20%

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Unit: A18 Advanced Gas Tungsten Arc Welding (GTAW)

Level: Three

Duration: 35 hours

Theory: 14 hours

Practical: 21 hours

Overview:

Upon completion of this unit of instruction the apprentice will demonstrate knowledge of the procedures to weld aluminum and stainless steel using the GTAW process.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Identify and describe GTAW equipment, consumables and accessories used to weld aluminum and stainless steel.	10%
2. Describe the procedures to set-up, adjust and shut-down GTAW equipment for welding aluminum and stainless steel.	10%
3. Describe the procedures used to weld aluminum and stainless steel using the GTAW process. a. Plug b. Fillet (continuous) c. Stitch d. Tack e. Edge f. Corner	10%
4. Describe weld defects, their causes and the procedures to prevent and correct them.	10%
5. Demonstrate advanced welding techniques using the GTAW process.	60%

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Unit: A19 Duct System Design

Level: Three

Duration: 45 hours

Theory: 17 hours

Practical: 28 hours

Overview:

Upon completion of this unit of instruction the apprentice will demonstrate knowledge of duct systems and their associated design principles.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define and explain terminology associated with duct system design.	5%
2. Identify the types of basic duct systems and describe their associated design principles.	10%
3. Describe the procedures used to perform heat gain/loss calculations and their applications.	5%
4. Identify air patterns and describe their impact on the operation of air handling systems.	5%
5. Identify air pressure and its impact on the operation of air handling systems. a. Positive b. Negative	5%
6. Identify formulas used in duct system design and describe their applications. a. Fan laws b. Velocity c. Quantity d. Pressure	15%
7. Identify considerations and requirements used to determine duct system design. a. Equal friction • Air duct calculator b. Static regain c. Constant velocity	5%
8. Conduct a heating and cooling system design project that includes: a. Heat load calculation	50%

- b. Equipment selection
- c. Duct design
- d. Material list
- e. Labour estimate

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Unit: B3 Trade Mathematics III

Level: Three

Duration: 24 hours

Theory: 24 hours

Practical: 0 hours

Overview:

This unit is designed to provide the apprentice with the knowledge and ability to apply mathematics with precision, resourcefulness and confidence. This unit, which builds on the course Trade Mathematics II, is intended to provide the apprenticeship with ample opportunity to build on general mathematical concepts. Beginning with a review of trade-related calculations for occupational skills, the unit covers trade-related calculations.

Objectives and Content:

**Percent of
Unit Mark (%)**

1. **Review trigonometry functions.**
 - a. Introduction to trigonometry
 - b. Using the tangent formula
 - c. Using the sine formula
 - d. Using the cosine formula
 - e. Selection of formulas

100%

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Unit: B6 Science II

Level: Three

Duration: 24 hours

Theory: 24 hours

Practical: 0 hours

Overview:

This unit is designed to provide the apprentice with the knowledge and ability to use science with precision, resourcefulness and confidence. Beginning with an overview of the importance of science to the trade, the unit covers a review of general science concepts including an overview of trade-related science.

Objectives and Content:

Percent of Unit Mark (%)

1. Review science concepts of psychrometrics.

50%

- a. Properties of air
- b. Temperature
- c. Humidity
- d. Enthalpy
- e. Volume
- f. Relationships between properties
- g. Psychrometric chart
- h. Using the psychrometric chart

2. Review science concepts of basic electricity.

50%

- a. Ohm's Law
- b. Series circuits
- c. Parallel circuits
- d. Electricity fundamentals
- e. Electrical devices
- f. Digital multimeter usage

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Unit: C9 Parallel Line Development III

Level: Three

Duration: 30 hours

Theory: 15 hours

Practical: 15 hours

Overview:

Upon completion of this unit of instruction the apprentice will demonstrate knowledge of the procedures used to develop and fabricate complex fittings using parallel line development.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe the types of complex fittings and components that require parallel line development.	25%
2. Describe the procedures used to develop and fabricate complex fittings and components using parallel line development.	25%
3. Demonstrate parallel line development.	50%

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Unit: C12 Radial Line Development III

Level: Three

Duration: 31 hours

Theory: 15 hours

Practical: 16 hours

Overview:

Upon completion of this unit of instruction the apprentice will demonstrate knowledge of the procedures used to develop and fabricate complex fittings using radial line development.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe the types of complex fittings and components that require radial line development.	25%
2. Describe the procedures used to develop and fabricate complex fittings and components using radial line development.	25%
3. Demonstrate radial line development.	50%

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Unit: C15 Triangulation III

Level: Three

Duration: 31 hours

Theory: 15 hours

Practical: 16 hours

Overview:

Upon completion of this unit of instruction the apprentice will demonstrate knowledge of the procedures used to develop and fabricate complex fittings using triangulation.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe the types of complex fittings and components that require the triangulation method.	25%
2. Describe the procedures used to develop and fabricate complex fittings and components using the triangulation method.	25%
3. Demonstrate the triangulation method.	50%

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Unit: D4 Air Quality Management

Level: Three

Duration: 35 hours

Theory: 35 hours

Practical: 0 hours

Overview:

Upon completion of this unit of instruction the apprentice will demonstrate knowledge of air quality management.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe and explain terminology associated with air quality management.	10%
2. Describe considerations and requirements associated with air quality management.	25%
a. Safety	
b. Codes and regulations	
• LEEDS	
• ASHRAE	
• SMACNA	
• National building code	
c. Environmental conditions	
3. Describe the importance of indoor air quality.	10%
4. Identify methods of improving air quality.	20%
a. Heating	
b. Ventilation	
c. Conditioning	
• Filtration	
• Sterilization	
• Purification	
• Humidification/dehumidification	
5. Identify areas requiring special air quality ventilation.	20%
a. Clean/sterile rooms	
b. Industrial/commercial settings	
• Factory	
• Public	

- 6. Identify air quality problems and describe procedures used to prevent or correct them. 10%**
- a. Rigid fibrous ducts
 - b. Out/off-gasing
 - c. Humidification/dehumidification
 - d. Improper installation
- 7. Describe refrigeration principles and low-pressure compression systems. 5%**
- a. Refrigeration principles
 - b. Mechanical compression
 - c. Low-pressure side
 - d. Expansion devices
 - e. Evaporators
 - f. Refrigerant lines
 - g. Accessories
