Apprenticeship Manitoba

Manitoba

Welder
Level 2

Rev. December, 2016

Apprenticeship Manitoba

Welder

Unit: D2 Quality Assurance

Level: Two

Duration: 14 hours

Theory: 14 hours

Practical: 0 hours

Overview:

This unit is designed to introduce knowledge of quality control measures used to verify compliance with design and code specifications. It is also designed to introduce knowledge of inspection and testing methods and their applications.

Objectives and Content:	Percent of Unit Mark (%)
1. Define terminology associated with quality control.	**5%**
2. Interpret codes and standards pertaining to quality control.	**5%**
3. Interpret information pertaining to quality control found on drawings and specifications.	**5%**
4. Identify tools and equipment relating to quality control and describe their applications and procedures for use.	**5%**
5. Explain quality control, its purpose and applications.	**5%**
6. Explain the methods used to identify and verify materials. a. Codes, standards and specifications b. Mill certificates c. Colour coding of materials	**5%**
7. Identify methods of inspection and testing and describe their characteristics, limitations and applications. a. Destructive b. Non-destructive	**5%**
8. Describe the procedures used to verify compliance with design and code specifications. a. Perform visual inspections b. Verify measurements c. Perform post welding checks d. Mark materials and parts	**10%**

e. Verify layout

9.	**Describe the procedures used to document quality control measures.**	**5%**

D2.a Weld Faults

Objectives and Content:		**Percent of Unit Mark (%)**
1.	**Define terminology associated with weld faults.**	**5%**
2.	**Interpret standards and documentation relating to welds and weld faults.**	**5%**
3.	**Identify tools and equipment used to identify weld faults and describe their applications and procedures for use.**	**10%**
4.	**Identify the classifications of weld faults and describe their characteristics.** a. Dimensional defects b. Structural discontinuities c. Defective properties (weld metal and base metal)	**15%**
5.	**Identify the causes of weld faults and describe their effect on welds.**	**15%**

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Welder

Unit: D4 Shielded Metal Arc Welding I

Level: Two

Duration: 64 hours

Theory: 24 hours

Practical: 40 hours

Overview:

This unit is designed to demonstrate knowledge of the procedures used to prepare base metals and joints for shielded metal arc welding (SMAW) groove welds. It also introduces knowledge of the procedures used to perform groove welds on low carbon steel plate in all positions using the SMAW process.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with SMAW groove welds.	**5%**
2. Interpret information pertaining to SMAW groove welds found on drawings and specifications.	**5%**
3. Indentify the considerations when selecting consumables and determining equipment set-up for performing SMAW groove welds on low carbon steel plate. a. Specification requirements. b. Base metal • Composition • Thickness c. Power source d. Welding position e. Joint type and design	**6%**
4. Identify the requirements and describe the procedures to store consumables used for SMAW groove welds on low carbon steel plate.	**5%**
5. Describe the procedures used to prepare base metals and joints for SMAW groove welds.	**5%**
6. Describe the procedures used to perform groove welds on low carbon steel plate in all positions using SMAW process.	**5%**
7. Describe the procedures used to prevent and correct weld faults.	**5%**
8. Perform groove welds on low carbon steel plate in all positions.	**15%**

D4.b Shielded Metal Arc Welding

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with SMAW fillet and groove welds on medium carbon steel plate.	**5%**
2. Interpret information pertaining to SMAW fillet and groove welds on medium carbon steel plate found on drawings and specifications.	**5%**
3. Identify the considerations when selecting consumables and determining equipment set-up for performing SMAW fillet and groove welds on medium carbon steel plate. a. Specifications requirements b. Base metal. • Composition • Thickness c. Power source d. Welding position e. Joint type and design	**5%**
4. Identify the requirements and describe the procedures to store consumables used for SMAW fillet and groove welds on medium carbon steel plate.	**5%**
5. Describe the procedures used to prepare medium carbon steel plate and joints for SMAW fillet and groove welds.	**6%**
6. Describe the procedures used to perform fillet and groove welds on medium carbon steel plate using SMAW process. a. Temperature measuring device b. Pre-heating c. Interpass temperature d. Post-heating e. Stress relieving	**15%**
7. Describe the procedures used to prevent and correct weld faults.	**8%**

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Welder

Unit: D7 Gas Metal Arc Welding (GMAW) II

Level: Two

Duration: 37 hours

Theory: 17 hours

Practical: 20 hours

Overview:

This unit of is designed to introduce knowledge of the procedures used to prepare base metals and joints for gas metal arc welding (GMAW) groove welds. It also introduces knowledge of the procedures used to perform groove welds on low carbon steel plate in all positions using the GMAW process.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with GMAW groove welds.	**2%**
2. Interpret information pertaining to GMAW groove welds found on drawings and specifications.	**4%**
3. Identify the considerations when selecting consumables and determining equipment set-up for performing GMAW groove welds on low carbon steel plate in all positions. a. Specification requirements b. Base metal. • Composition • Thickness c. Shielding gas selection d. Power source e. Welding position f. Joint type and design	**5%**
4. Identify the requirements and describe the procedures to store consumables used for GMAW groove welds on low carbon steel plate.	**2%**
5. Describe the procedures used to prepare base metal and joints for GMAW groove welds.	**5%**
6. Describe the procedures used to perform groove welds on low carbon steel plate in all positions using GMAW process.	**5%**
7. Describe the procedures used to prevent and correct weld faults.	**5%**
8. Perform groove welds on low carbon steel late in all positions.	**20%**

D7.a Gas Metal Arc Welding (GMAW) II

Objectives and Content:	Percent of Unit Mark (%)
1. Describe terminology associated with GMAW fillet and groove welds on medium carbon steel.	**2%**
2. Interpret information pertaining to GMAW fillet and groove welds on medium carbon steel found on drawings and specifications.	**5%**
3. Identify the considerations when selecting consumables and determining equipment set-up for performing GMAW fillet and groove welds on medium carbon steel. a. Specifications requirements b. Base metals • Composition • Thickness c. Shielding gas selection d. Power source e. Welding position f. Joint type and design	**5%**
4. Identify the requirements and describe the procedures to store consumables used for GMAW fillet and groove welds on medium carbon steel.	**5%**
5. Describe the procedures used to prepare medium carbon steel base metals and joints for GMAW fillet and groove welds.	**5%**
6. Describe the procedures used to perform GMAW fillet and groove welds on medium carbon steel. a. Temperature measuring devices b. Pre-heating c. Interpass temperature d. Post-heating e. Stress relieving	**25%**
7. Describe the procedures used to prevent and correct weld faults.	**5%**

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Apprenticeship Manitoba

Welder

Unit: D9 Gas Tungsten Arc Welding (GTAW) I

Level: Two

Duration: 66 hours

Theory: 21 hours

Practical: 45 hours

Overview:

This unit is designed to introduce knowledge of gas tungsten arc welding (GTAW) equipment, consumables and accessories. It also introduces knowledge of the procedures used to set up, adjust, operate, inspect and maintain GTAW welding equipment. In addition, it introduces knowledge of the procedures used to deposit a weld bead using GTAW equipment.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with GTAW welding.	**3%**
2. Identify hazards and describe safe work practices pertaining to GTAW welding. a. Personal b. Shop/facility c. Fire and explosion d. Equipment e. Ventilation/fumes f. Storage, handling and transportation	**3%**
3. Identify codes and standards pertaining to welding. a. Canadian Standards Association (CSA). b. American Society of Mechanical Engineers (ASME) c. American Welding Society (AWS)	**3%**
4. Identify GTAW welding equipment, consumables and accessories and describe their applications.	**3%**
5. Describe the procedures used to assemble and disassemble GTAW welding equipment.	**3%**
6. Describe the procedures used to establish and maintain an arc using GTAW welding equipment.	**3%**
7. Describe the procedures and techniques used to deposit a weld bead using GTAW welding equipment. a. With filler metal b. Without filler metal	**3%**

8.	**Describe the procedures techniques used to inspect, maintain and troubleshoot GTAW welding equipment.**	**3%**
9.	**Describe an arc.**	**5%**

D9.a Gas Tungsten Arc Welding (GTAW) I

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with GTAW fillet welds.	**2%**
2. Interpret information pertaining to GTAW fillet welds found on drawings and specifications.	**2%**
3. Identify the considerations when selecting consumables and determining equipment set-up for performing GTAW fillet welds in all positions. a. Specification requirements. b. Base metals • Composition • Thickness c. Shielding gas selection d. Power source e. Welding position f. Joint type and design	**3%**
4. Identify requirements and describe the procedures to store consumables used for GTAW fillet welds on low carbon steel sheet and plate.	**3%**
5. Describe the procedures used to prepare base metals and joints for GTAW fillet welds.	**2%**
6. Describe the procedures used to set up and adjust GTAW welding equipment.	**3%**
7. Describe the procedures used to perform fillet welds on low carbon steel sheet and plate in all positions using the GTAW process.	**3%**
8. Perform fillet welds on low carbon steel sheet and plate.	**18%**

D9.b Gas Tungsten Arc Welding (GTAW) I

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with GTAW fillet welds.	**3%**
2. Interpret information pertaining to GTAW fillet welds found on drawings and specifications.	**3%**
3. Identify the considerations when selecting consumables and determining equipment set-up for performing GTAW fillet welds in all positions. a. Specific requirements b. Base metal • Composition • Thickness	**3%**

c. Shielding gas selection
d. Power source
e. Welding position
f. Joint type and design

4.	**Identify the requirements and describe the procedures to store consumables used for GTAW fillet welds on low carbon steel sheet and plate.**	**3%**
5.	**Describe the procedures used to prepare base metals and joints for GTAW groove welds.**	**3%**
6.	**Perform the procedures used to perform groove welds on low carbon steel sheet and plate in all positions using the GTAW process.**	**15%**
7.	**Describe the procedures used to prevent and correct weld faults.**	**5%**

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Apprenticeship Manitoba

Welder

Unit: C1 Cutting

Level: Two

Duration: 17 hours

Theory: 5 hours

Practical: 12 hours

Overview:

This unit is designed to introduce knowledge of electric arc cutting equipment and accessories. It also introduces knowledge of the procedures used to cut with electric arc cutting equipment. In addition, it introduces knowledge of the procedures used to gouge with electric arc gouging equipment.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with electric arc cutting and gouging.	**5%**
2. Identify hazards and describe safe work practices pertaining to electric arc cutting and gouging. a. Personal b. Shop facility c. Fire and explosion d. Equipment e. Ventilation/fumes f. Storage, handling and transportation g. Noise	**5%**
3. Describe the electric arc cutting and gouging processes and their applications. a. Air-carbon arc b. Metal arc c. Oxy-arc	**5%**
4. Identify electric arc cutting and gouging equipment and accessories and describe their applications.	**5%**
5. Perform the procedures used to set up, adjust and shut down electric arc cutting and gouging equipment.	**12%**
6. Describe the procedures used to prevent and correct weld faults.	**3%**
7. Describe the procedures used to cut using electric arc cutting equipment.	**3%**
8. Describe the procedures used to gouge using electric arc gouging equipment.	**5%**

9.	**Identify air-carbon arc gouging.**	**2%**

C1.a Cutting

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with plasma arc cutting and gouging.	**2%**
2. Identify hazards and describe safe work practices pertaining to plasma arc cutting and gouging. a. Personal b. Shop/facility c. Fire and explosion d. Equipment e. Equipment f. Ventilation/fumes e. Joint type and design	**5%**
3. Describe the plasma arc cutting and gouging process and its applications.	**5%**
4. Identify plasma arc equipment and accessories and describe their applications. a. Cutting b. Gouging	**7%**
5. Describe the procedures used to set up, adjust and shut down plasma arc equipment.	**7%**
6. Describe the procedures used to inspect and maintain plasma arc equipment.	**5%**
7. Describe the procedures used to cut using plasma arc equipment.	**5%**
8. Describe the procedures used to gouge using plasma arc equipment.	**5%**
9. Perform plasma arc cutting and gouging operations.	**10%**

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Apprenticeship Manitoba

Welder

Unit: B1 Fabrication Fundamentals

Level: Two

Duration: 42 hours

Theory: 36 hours

Practical: 6 hours

Overview:

This unit is designed to introduce knowledge of structural components, their characteristics and applications. It also introduces knowledge of joints, their applications and the procedures used to prepare them for welding operations.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with structural components.	**2%**
2. Identify hazards and describe safe work practices pertaining to structural components.	**3%**
3. Interpret codes, regulations and standards pertaining to structural components. a. Industry standards b. Codes of practice c. Government regulations	**3%**
4. Interpret information pertaining to structural components found on drawings and specifications.	**3%**
5. Identify types of structures and describe their characteristics.	**3%**
6. Identify structural steel shapes and describe their designations, characteristic and applications. a. Sheet b. Plate c. Pipe d. Flat e. Bar f. Angle g. Channel h. Beams i. Hollow structural sections	**3%**
7. Identify types of joints and describe their characteristics and applications. a. Corner	**3%**

b. Tee
c. Lap
d. Edge
e. Butt

8. Describe the procedures used to prepare joints on structural steel shapes. 3%

9. Perform the procedures used to fabricate using various structural steel shapes. 8%

B1.a Fabrication Fundamentals

Objectives and Content: **Percent of Unit Mark (%)**

1. Define terminology associated with drawings and sketches. 2%

2. Describe metric and imperial systems of measurement and the procedures used to perform conversions. 2%

3. Identify the types of drawings and describe their applications. 2%
a. Architectural
b. Engineering
c. Erection
d. Assembly
e. Shop (detail)

4. Identify drawing projections and views and describe their applications. 3%
a. Projections
- Orthographic (1st and 3rd angle)
- Oblique
- Isometric

b. Views
- Plan
- Section
- Detail.
- Elevation

5. Describe the use of scales. 3%

6. Interpret information on drawings. 7%
a. Welding symbols
b. Lines
c. Legend
d. Other symbols and abbreviations
e. Notes and specifications
f. Schedules
g. Scales

7. Describe basic sketching techniques. 3%

8. Describe the dimensioning systems, their purpose and applications. 3%
a. Datum/baseline

b. Elevation
c. Conventional
d. Running
e. Aligned
f. Unidirectional
g. Group

9. Describe the procedures used for the care, handling and storage of drawings. 3%

10. Interpret basic shop drawings. 9%

B1.b Fabrication Fundamentals

Objectives and Content:	**Percent of Unit Mark (%)**

1. Identify sources of information relevant to work task planning. 13%

a. Supervisor
b. Documentation
c. Drawings
d. Related professionals
e. Suppliers
f. Clients

2. Identify the considerations when planning work tasks. 13%

a. Scheduling
b. Sequence
c. Material selection and handling
d. Equipment selection

3. Describe the procedures used to organize, move and store tools, equipment, materials and supplies. 7%

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Apprenticeship Manitoba

Welder

Unit: **C4 Practicum I**

Level: Two

Duration: 40 hours

Theory:	0	hours
Practical:	40	hours

Overview:

This unit is designed to provide practical experience with a variety of welding procedures.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Perform assigned project tasks as determined in consultation with instructor.	**100%**

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