



Saskatchewan
Apprenticeship and
Trade Certification
Commission

Apprenticeship

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**SEMIAUTOMATIC WELDING PRODUCTION OPERATOR
SUBTRADE OF WELDER**

PROVINCIAL OCCUPATIONAL ANALYSIS

2005



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Trade Description

Semiautomatic Welding Production Operator is a subtrade of the Welder trade and includes the preparation and joining of metals in a production assembly line setting primarily using the gas metal arc welding (GMAW) process.

Structure of Analysis

To facilitate the understanding of the nature of the occupation, the work performed is divided into the following divisions:

- A. **Block:** is the largest division within the analysis and reflects a distinct operation relevant to the occupation.

- B. **Task:** is the distinct activity that, when combined with others, makes up the logical and necessary steps the worker is required to perform to complete a specific assignment within a "Block".

- C. **Sub-task:** is the smallest division into which it is practical to subdivide any work activity and, combined with others, fully describes all duties constituting a "Task".

Supporting Knowledge & Abilities:

The element of skill and knowledge that an individual must acquire to adequately perform the task.

Purpose of the Provincial Occupational Analysis:

- To determine the average number of questions (items), derived from the collective decision made by workers within the occupation in Saskatchewan, which will be placed on a Provincial examination to assess the specific trade knowledge of each examination candidate.
- To provide guidelines for curriculum development that is to occur both during in-school technical training and during on-the-job mentored training.
- To provide the basis for trade time verification forms and record books of on-the-job training.

Semiautomatic Welding Production Operator

A Subtrade of the Welding Trade

Block A - Occupational Skills

Task 1 Interprets Blueprints and drawings

- 1.01 Determines required materials.
 - 1.01.01 knowledge of blueprints and drawings
 - 1.01.02 knowledge of lines
 - 1.01.03 knowledge of structural shapes and sizes
 - 1.01.04 knowledge of material specifications
 - 1.01.05 ability to read blueprints
 - 1.01.06 ability to interpret bill of materials

- 1.02 Identifies work processes.
 - 1.02.01 knowledge of welding processes
 - 1.02.02 knowledge of welding process terminology
 - 1.02.03 knowledge of welding symbols
 - 1.02.04 knowledge of company data sheets
 - 1.02.05 ability to read and interpret welding symbols
 - 1.02.06 ability to identify application of processes
(when to apply which process)

- 1.03 Identifies dimensions and details.
 - 1.03.01 knowledge of metric system
 - 1.03.02 knowledge of imperial system
 - 1.03.03 knowledge of decimals and fractions
 - 1.03.04 knowledge of the fundamentals of drafting
 - 1.03.05 ability to convert scale dimensions
 - 1.03.06 ability to convert from one system of
measurement to another (metric to imperial)
 - 1.03.07 ability to perform trade mathematical
computations

Task 2 Prepares Work Area

- 2.01 Cleans work area.
 - 2.01.01 knowledge of good housekeeping practices
 - 2.01.02 knowledge of types of cleaning materials and equipment
 - 2.01.03 knowledge of cleaning procedures
 - 2.01.04 knowledge of safety hazards
 - 2.01.05 knowledge of Worker's Compensation Board regulations and Occupational Health & Safety Act and Regulations
 - 2.01.06 ability to identify safety hazards

- 2.02 Plans sequence of operation.
 - 2.02.01 knowledge of assembly requirements
 - 2.02.02 knowledge of codes
 - 2.02.03 knowledge of weld procedure specifications (WPS)
 - 2.02.04 knowledge of final product
 - 2.02.05 knowledge of welding sequence
 - 2.02.06 knowledge of possible distortion
 - 2.02.07 ability to organize sequence of work
 - 2.02.08 ability to visualize final components

- 2.03 Gathers work materials and equipment.
 - 2.03.01 knowledge of work plan
 - 2.03.02 knowledge of finished component
 - 2.03.03 knowledge of assembly requirements

Task 3 Lays Out Materials

- 3.01 Transfers dimensions from drawings to materials.
 - 3.01.01 knowledge of measurements
 - 3.01.02 knowledge of layout tools
 - 3.01.03 knowledge of transfer methods
 - 3.01.04 ability to measure
 - 3.01.05 ability to use layout tools

- 3.02 Confirms material dimensions.
 - 3.02.01 knowledge of specifications
 - 3.02.02 knowledge measuring instruments
 - 3.02.03 ability to use measuring instruments

Task 4 Prepares Materials

- 4.01 Cuts material to specifications.
 - 4.01.01 knowledge of cutting processes
 - 4.01.02 knowledge of base metals
 - 4.01.03 knowledge of cutting sequence
 - 4.01.04 knowledge of specifications
 - 4.01.05 knowledge of tolerances
 - 4.01.06 knowledge of safe work practices specific to cutting (blocking, etc.)
 - 4.01.07 ability to identify material
 - 4.01.08 ability to use cutting equipment
 - 4.01.09 ability to select tool for cutting specific type of material

- 4.02 Grinds materials.
 - 4.02.01 knowledge of type of base metal
 - 4.02.02 knowledge of abrasives
 - 4.02.03 knowledge of safe work practices specific to grinding
 - 4.02.04 knowledge of fundamentals of grinding
 - 4.02.05 ability to set up grinding equipment
 - 4.02.06 ability to complete grinding process

- 4.03 Cleans weld area.
 - 4.03.01 knowledge of mechanical cleaning methods
 - 4.03.02 knowledge of safety hazards specific to cleaning
 - 4.03.03 ability to use cleaning tools
 - 4.03.04 ability to determine required cleaning method
 - 4.03.05 ability to clean to specifications and tolerances

Task 5 Fabricates Components

- 5.01 Preheats weld area (weldments).
 - 5.01.01 knowledge of weld procedure specifications (WPS)/Data Sheet preheat and interpass requirements
 - 5.01.02 knowledge of preheating effects on materials
 - 5.01.03 knowledge of preheating procedures
 - 5.01.04 knowledge of preheat equipment
 - 5.01.05 knowledge of preheat equipment setup

- 5.02 Tacks components.
 - 5.02.01 knowledge of welding processes
 - 5.02.02 knowledge of tacking techniques
 - 5.02.03 knowledge of potential distortion
 - 5.02.04 ability to tack weld
 - 5.02.05 ability to follow specifications

- 5.03 Finishes final product.
 - 5.03.01 knowledge of product specifications
 - 5.03.02 knowledge of weld procedure specifications (WPS)
 - 5.03.03 knowledge of post-heating practices
 - 5.03.04 knowledge of drawings
 - 5.03.05 ability to re-check dimensional and geometric tolerances
 - 5.03.06 ability to weld to specifications

Task 6 Maintains Equipment

- 6.01 Performs visual inspection of equipment.
 - 6.01.01 knowledge of manufacturer's specifications and recommendations
 - 6.01.02 knowledge of inspection methods
 - 6.01.03 knowledge of types of damage and wear
 - 6.01.04 knowledge of severity of damage and wear
 - 6.01.05 knowledge of lock-out procedures
 - 6.01.06 ability to detect defects in equipment
 - 6.01.07 ability to document and report defects
 - 6.01.08 ability to apply lock-out procedures

- 6.02 Checks equipment for leaks.
 - 6.02.01 knowledge of documentation
 - 6.02.02 knowledge of procedures for leak checks
 - 6.02.03 knowledge of leak testing methods
 - 6.02.04 ability to follow procedures for leak testing
 - 6.02.05 ability to perform leak test
 - 6.02.06 ability to repair leaks

- 6.03 Repairs leaks.
 - 6.03.01 knowledge of repair procedures
 - 6.03.02 knowledge of repair materials
 - 6.03.03 ability to repair within specifications and limits
 - 6.03.04 ability to determine severity of leak and limits of repair capabilities

- 6.04 Checks protective devices' operation and location.
 - 6.04.01 knowledge of types of protective devices
 - 6.04.02 knowledge of protective device operation
 - 6.04.03 knowledge of flashback arresters
 - 6.04.04 knowledge of check valves
 - 6.04.05 knowledge of dead-man (lock-out) switches
 - 6.04.06 knowledge of manufacturer's specifications
 - 6.04.07 ability to distinguish between protective devices
 - 6.04.08 ability to check for non-conformance
 - 6.04.09 ability to interpret regulations in order to follow approved procedures

Task 7 Performs Basic Rigging Operations

- 7.01 Selects rigging equipment.
 - 7.01.01 knowledge of slings
 - 7.01.02 knowledge of shackles
 - 7.01.03 knowledge of lifting devices
 - 7.01.04 knowledge of rigging hardware
 - 7.01.05 knowledge of wire ropes
 - 7.01.06 knowledge of identification markings
 - 7.01.07 knowledge of manufacturer's specifications
 - 7.01.08 ability to determine safe condition of equipment
 - 7.01.09 ability to determine safe capacities
 - 7.01.10 ability to verify inspection status of equipment

- 7.02 Operates basic lifting devices.
 - 7.02.01 knowledge of occupational health and safety laws and regulations related to lifting devices
 - 7.02.02 knowledge of provincial acts and regulations governing the performance of lifts
 - 7.02.03 knowledge of lifting devices
 - 7.02.04 knowledge of manufacturer's specifications
 - 7.02.05 knowledge of lifting procedures
 - 7.02.06 ability to estimate weight of load
 - 7.02.07 ability to select proper rigging hardware
 - 7.02.08 ability to attach proper rigging hardware
 - 7.02.09 ability to apply safe operating practices

Block B - Quality Control

Task 8 Performs Inspections

- 8.01 Examines components (fit-up and preparation) prior to assembly.
 - 8.01.01 knowledge of blueprints and drawings
 - 8.01.02 knowledge of measuring tools
 - 8.01.03 knowledge of measuring instruments
 - 8.01.04 knowledge of applicable specifications
 - 8.01.05 knowledge of applicable codes
 - 8.01.06 knowledge of applicable standards
 - 8.01.07 ability to read blueprints and drawings
 - 8.01.08 ability to operate measuring tools
 - 8.01.09 ability to operate measuring instruments

- 8.02 Examines completed welds.
 - 8.02.01 knowledge of visual defects
 - 8.02.02 knowledge of relevant/non-relevant indications
 - 8.02.03 knowledge of non-destructive testing methods
 - 8.02.04 knowledge of destructive testing methods
 - 8.02.05 knowledge of required inspection tools
 - 8.02.06 knowledge of required inspection materials
 - 8.02.07 ability to identify visual defects
 - 8.02.08 ability to identify relevant/non-relevant indications
 - 8.02.09 ability to use inspection tools
 - 8.02.10 ability to document inspection findings

- 8.03 Measures completed welds.
 - 8.03.01 knowledge of blueprints and drawings
 - 8.03.02 knowledge of completed weld specifications
 - 8.03.03 knowledge of weld gauges
 - 8.03.04 knowledge of applicable codes
 - 8.03.05 knowledge of applicable standards
 - 8.03.06 knowledge of measuring equipment and tools
 - 8.03.07 ability to read blueprints and drawings to determine required dimensions
 - 8.03.08 ability to use measuring equipment and tools

- 8.04 Measures final product for compliance to blueprints and drawings.
 - 8.04.01 knowledge of blueprints and drawings
 - 8.04.02 knowledge of potential distortion
 - 8.04.03 knowledge of specifications
 - 8.04.04 ability to read blueprints and drawings
 - 8.04.05 ability to identify and detect distortion

Block C - Cutting Processes

Task 9 Cuts with Mechanical and Power Cutting Equipment

- 9.01 Selects mechanical and power cutting equipment.
 - 9.01.01 knowledge of hand tools
 - 9.01.02 knowledge of power tools
 - 9.01.03 knowledge of mechanical tools
 - 9.01.04 knowledge of pneumatic tools
 - 9.01.05 knowledge of consumables
 - 9.01.06 ability to match consumables to tool and job

- 9.02 Selects operating parameters.
 - 9.02.01 knowledge of tool functions
 - 9.02.02 knowledge of tool capabilities
 - 9.02.03 knowledge of manufacturer's recommendations
 - 9.02.04 knowledge of base metal to be cut
 - 9.02.05 knowledge of metal preparation requirements
 - 9.02.06 knowledge of power tool input requirements
 - 9.02.07 ability to match tool to work requirements

- 9.03 Sets up mechanical and power cutting equipment.
 - 9.03.01 knowledge of manufacturer's recommendations
 - 9.03.02 knowledge of set-up procedures for selected mechanical and power cutting equipment
 - 9.03.03 knowledge of intended use
 - 9.03.04 knowledge of base metal to be cut
 - 9.03.05 ability to detect faulty equipment
 - 9.03.06 ability to follow manufacturer's specifications

- 9.04 Operates mechanical and power cutting equipment.
 - 9.04.01 knowledge of mechanical and power cutting equipment operation
 - 9.04.02 knowledge of operating techniques
 - 9.04.03 knowledge of required personal protective equipment
 - 9.04.04 ability to secure workplace
 - 9.04.05 ability to determine quality of cut
 - 9.04.06 ability to detect equipment malfunctions
 - 9.04.07 ability to follow manufacturer's recommendations
 - 9.04.08 ability to apply mechanical and power cutting techniques

Task 10 Cuts Using Oxy-fuel Gas Cutting Process (OFC)

- 10.01 Selects oxy-fuel cutting equipment.
 - 10.01.01 knowledge of fundamentals of oxy-fuel gas cutting process (OFC)
 - 10.01.02 knowledge of types of regulators
 - 10.01.03 knowledge of operation of regulators
 - 10.01.04 knowledge of flashback arrestors
 - 10.01.05 knowledge of types of hoses
 - 10.01.06 knowledge of types of torch bodies
 - 10.01.07 knowledge of torch attachments
 - 10.01.08 knowledge of manual oxy-fuel cutting equipment
 - 10.01.09 knowledge of automated oxy-fuel cutting equipment
 - 10.01.10 knowledge of mechanized oxy-fuel cutting equipment

10.02 Selects fuel gas.

- 10.02.01 knowledge of characteristics of fuel gases
- 10.02.02 knowledge of fuel gas delivery systems
- 10.02.03 knowledge of cylinder and gases handling procedures
- 10.02.04 knowledge of cylinder and gases storage requirements
- 10.02.05 knowledge of hazards associated with different fuel gases
- 10.02.06 ability to match fuel gas to type of cutting equipment
- 10.02.07 ability to identify type of fuel gas from information on label

10.03 Selects tips.

- 10.03.01 knowledge of type of base metal
- 10.03.02 knowledge of base metal thickness
- 10.03.03 knowledge of tip functions
- 10.03.04 knowledge of required cut
- 10.03.05 knowledge of types of tips
- 10.03.06 ability to match tip to base metal and required cut
- 10.03.07 ability to differentiate between tips

10.04 Selects operating parameters.

- 10.04.01 knowledge of base metal thickness
- 10.04.02 knowledge of tip sizes
- 10.04.03 knowledge of type of fuel gas used
- 10.04.04 knowledge of regulations
- 10.04.05 knowledge of manufacturer's recommendations
- 10.04.06 knowledge of trade related and process related guidelines
- 10.04.07 ability to match fuel gas and oxygen pressures to cut specifications
- 10.04.08 ability to reference information

- 10.05 Sets up oxy-fuel cutting equipment.
 - 10.05.01 knowledge of types of oxy-fuel cutting equipment and their operation
 - 10.05.02 knowledge of set-up procedures for selected oxy-fuel cutting equipment
 - 10.05.03 knowledge of test procedures for selected oxy-fuel cutting equipment
 - 10.05.04 knowledge of oxy-fuel gas safe cutting practices
 - 10.05.05 ability to follow safe set-up procedures for selected type of oxy-fuel cutting equipment
 - 10.05.06 ability to reference manufacturer's instructions
 - 10.05.07 ability to perform set-up tests

- 10.06 Operates oxy-fuel cutting equipment.
 - 10.06.01 knowledge of required task-specific personal protective clothing and equipment for oxy-fuel gas cutting
 - 10.06.02 knowledge of safe operating practices
 - 10.06.03 knowledge of metallurgy
 - 10.06.04 knowledge of types of flames
 - 10.06.05 knowledge of flashback conditions
 - 10.06.06 knowledge of backfire burnback conditions
 - 10.06.07 knowledge of cutting techniques
 - 10.06.08 ability to recognize flashback
 - 10.06.09 ability to recognize backfire burnback conditions
 - 10.06.10 ability to prevent flashback
 - 10.06.11 ability to prevent backfire burnback
 - 10.06.12 ability to correct flashback conditions
 - 10.06.13 ability to correct backfire burnback conditions
 - 10.06.14 ability to light and adjust torch
 - 10.06.15 ability to initiate cut
 - 10.06.16 ability to detect defects in cut
 - 10.06.17 ability to apply oxy-fuel cutting techniques

- 10.07 Shuts down oxy-fuel cutting equipment.
 - 10.07.01 knowledge of shutdown sequence of selected oxy-fuel cutting equipment
 - 10.07.02 ability to check regulators
 - 10.07.03 ability to perform a complete shutdown

Task 11 Cuts Using Plasma Arc Cutting Process (PAC)

- 11.01 Selects plasma arc cutting equipment.
 - 11.01.01 knowledge of fundamentals of plasma arc cutting process (PAC)
 - 11.01.02 knowledge of power sources
 - 11.01.03 knowledge of manual plasma arc cutting equipment
 - 11.01.04 knowledge of automated plasma arc cutting equipment
 - 11.01.05 knowledge of mechanized plasma arc cutting equipment
 - 11.01.06 knowledge of regulators
 - 11.01.07 knowledge of torches
 - 11.01.08 knowledge of quality of finished product
 - 11.01.09 ability to match equipment to requirements

- 11.02 Selects gases.
 - 11.02.01 knowledge of type and thickness of base metal
 - 11.02.02 knowledge of types of gases
 - 11.02.03 knowledge of gas characteristics
 - 11.02.04 knowledge of compressed air source
 - 11.02.05 knowledge of compressed air characteristics
 - 11.02.06 knowledge of filters
 - 11.02.07 knowledge of dryers
 - 11.02.08 ability to match gases to application

- 11.03 Selects consumables.
 - 11.03.01 knowledge of electrodes
 - 11.03.02 knowledge of cups/shields
 - 11.03.03 knowledge of tips
 - 11.03.04 knowledge of tip/orifice sizes
 - 11.03.05 ability to visually inspect tips
 - 11.03.06 ability to visually inspect cups
 - 11.03.07 ability to visually check orifice sizes
 - 11.03.08 ability to determine suitability of tips and electrodes
 - 11.03.09 ability to determine suitability of cups/shields
 - 11.03.10 ability to determine suitability of orifices

- 11.04 Selects operating parameters.
 - 11.04.01 knowledge of manufacturer's specifications and recommendations
 - 11.04.02 knowledge of required base metal
 - 11.04.03 knowledge of base metal thickness
 - 11.04.04 knowledge of operating pressure
 - 11.04.05 ability to interpret information

- 11.05 Sets up plasma arc cutting equipment.
 - 11.05.01 knowledge of manufacturer's recommendations
 - 11.05.02 knowledge of procedures for assembly of plasma components
 - 11.05.03 knowledge of types of plasma arc cutting equipment and their components
 - 11.05.04 knowledge of set-up procedures for selected plasma arc cutting equipment
 - 11.05.05 knowledge of required ventilation
 - 11.05.06 ability to verify plasma arc cutting equipment operation
 - 11.05.07 ability to follow set-up procedures for selected plasma arc cutting equipment
 - 11.05.08 ability to verify operation of ventilation equipment

- 11.06 Operates plasma arc cutting equipment.
 - 11.06.01 knowledge of metallurgy as it applies to plasma arc cutting
 - 11.06.02 knowledge of plasma arc cutting techniques
 - 11.06.03 knowledge of cutting sequence
 - 11.06.04 knowledge of required task-specific personal protective equipment for plasma arc cutting
 - 11.06.05 knowledge of shutdown procedures for selected plasma arc cutting equipment
 - 11.06.06 ability to verify selected plasma arc cutting equipment operation
 - 11.06.07 ability to detect equipment malfunction
 - 11.06.08 ability to identify defects in cuts
 - 11.06.09 ability to apply plasma arc cutting techniques

Block D - Gouging Processes

Task 12 Gouges Using Air Carbon Arc Process (ACA)

- 12.01 Selects air carbon arc cutting equipment for gouging.
 - 12.01.01 knowledge of fundamentals of air carbon arc cutting process as applied to gouging
 - 12.01.02 knowledge of power sources
 - 12.01.03 knowledge of manual air carbon arc cutting equipment used for gouging
 - 12.01.04 knowledge of automated air carbon arc cutting equipment used for gouging
 - 12.01.05 knowledge of mechanized air carbon arc cutting equipment used for gouging
 - 12.01.06 knowledge of cable size
 - 12.01.07 knowledge of compressed air sources
 - 12.01.08 ability to assess requirements

- 12.02 Selects consumables.
 - 12.02.01 knowledge of sizes and shapes of electrodes
 - 12.02.02 knowledge of application of consumables
 - 12.02.03 ability to differentiate between consumables

- 12.03 Selects operating parameters.
 - 12.03.01 knowledge of base metal thickness
 - 12.03.02 knowledge of required depth of gouge
 - 12.03.03 knowledge of voltage
 - 12.03.04 knowledge of polarity
 - 12.03.05 knowledge of amperage
 - 12.03.06 knowledge of voltage and amperage related to electrode size
 - 12.03.07 knowledge of required air pressure and volume
 - 12.03.08 ability to set dials according to requirements

- 12.04 Sets up air carbon arc cutting equipment for gouging.
 - 12.04.01 knowledge of air carbon arc cutting components
 - 12.04.02 knowledge of set-up procedures for air carbon arc cutting equipment used to gouge
 - 12.04.03 knowledge of ventilation procedures
 - 12.04.04 ability to verify set-up of air carbon arc cutting equipment used to gouge

- 12.05 Operates air carbon arc cutting equipment for gouging.
 - 12.05.01 knowledge of air carbon arc gouging techniques
 - 12.05.02 knowledge of shutdown procedures for selected air carbon arc cutting equipment
 - 12.05.03 knowledge of safety hazards
 - 12.05.04 ability to determine quality of gouge
 - 12.05.05 ability to detect carbon deposits
 - 12.05.06 ability to detect equipment malfunctions
 - 12.05.07 ability to make necessary equipment adjustments

Block E - Welding Processes

Task 13 Welds Using Gas Metal Arc Welding Process (GMAW)

- 13.01 Selects gas metal arc welding equipment.
 - 13.01.01 knowledge of fundamentals of gas metal arc welding process (GMAW)
 - 13.01.02 knowledge of semi-automated gas metal arc welding equipment
 - 13.01.03 knowledge of mechanized gas metal arc welding equipment
 - 13.01.04 knowledge of quality of end product
 - 13.01.05 knowledge of cooling systems
 - 13.01.06 knowledge of direct current
 - 13.01.07 knowledge of polarity
 - 13.01.08 knowledge of duty cycle
 - 13.01.09 knowledge of power sources
 - 13.01.10 knowledge of base metal thickness
 - 13.01.11 knowledge of cable size and length
 - 13.01.12 knowledge of guns
 - 13.01.13 knowledge of drive rolls
 - 13.01.14 knowledge of contact tips
 - 13.01.15 knowledge of nozzles
 - 13.01.16 knowledge of gas diffusers
 - 13.01.17 knowledge of flowmeters
 - 13.01.18 knowledge of regulators
 - 13.01.19 knowledge of liners
 - 13.01.20 ability to detect damaged welding equipment
 - 13.01.21 ability to detect welding equipment malfunctions

- 13.02 Selects gases.
 - 13.02.01 knowledge of type of base metal and thickness
 - 13.02.02 knowledge of types of gases
 - 13.02.03 knowledge of gas characteristics
 - 13.02.04 ability to match gases to application

- 13.03 Selects consumables.
 - 13.03.01 knowledge of metallurgy
 - 13.03.02 knowledge of characteristics of electrode wire
 - 13.03.03 knowledge of characteristics of base metal
 - 13.03.04 knowledge of characteristics of shielding gases
 - 13.03.05 knowledge of manufacturer's specifications
 - 13.03.06 knowledge of wire handling procedures
 - 13.03.07 knowledge of wire storage requirements
 - 13.03.08 ability to detect damage or defects in consumables

- 13.04 Selects operating parameters.
 - 13.04.01 knowledge of direct current
 - 13.04.02 knowledge of polarity
 - 13.04.03 knowledge of current characteristics
 - 13.04.04 knowledge of amperage characteristics
 - 13.04.05 knowledge of wire feed speed (current)
 - 13.04.06 knowledge of metal transfer methods
 - 13.04.07 knowledge of gas flow rates
 - 13.04.08 knowledge of pulsing techniques
 - 13.04.09 knowledge of wire stick out
 - 13.04.10 ability to follow manufacturer's recommendations
 - 13.04.11 ability to make required adjustments

- 13.05 Sets up gas metal arc welding equipment.
 - 13.05.01 knowledge of manufacturer's recommendations
 - 13.05.02 knowledge of welding cables
 - 13.05.03 knowledge of gas cylinder safety
 - 13.05.04 knowledge of troubleshooting techniques
 - 13.05.05 knowledge of set-up procedures for selected gas metal arc welding equipment
 - 13.05.06 ability to hook up cables to correct polarity
 - 13.05.07 ability to check cables and connections
 - 13.05.08 ability to check equipment for leaks

- 13.06 Operates gas metal arc welding equipment.
 - 13.06.01 knowledge of required task-specific personal protective clothing and equipment
 - 13.06.02 knowledge of ventilation requirements
 - 13.06.03 knowledge of shutdown procedures for selected gas metal arc welding equipment
 - 13.06.04 knowledge of equipment maintenance requirements
 - 13.06.05 knowledge of welding techniques
 - 13.06.06 knowledge of characteristics of electrodes during the welding process
 - 13.06.07 knowledge of pulsing techniques
 - 13.06.08 ability to manipulate electrodes
 - 13.06.09 ability to manipulate guns
 - 13.06.10 ability to remove spatter
 - 13.06.11 ability to detect flaws
 - 13.06.12 ability to make adjustments to pulsing techniques
 - 13.06.13 ability to maintain equipment
 - 13.06.14 ability to apply appropriate welding techniques

Task 14 Welds Using Flux Cored Arc Welding Process (FCAW)

- 14.01 Selects flux cored arc welding equipment.
 - 14.01.01 knowledge of fundamentals of flux cored arc welding process (FCAW)
 - 14.01.02 knowledge of semi-automated flux cored arc welding equipment
 - 14.01.03 knowledge of mechanized flux cored arc welding equipment
 - 14.01.04 knowledge of power sources
 - 14.01.05 knowledge of type and thickness of base metal
 - 14.01.06 knowledge of cable sizes
 - 14.01.07 knowledge of direct current
 - 14.01.08 knowledge of polarity
 - 14.01.09 knowledge of duty cycle
 - 14.01.10 knowledge of quality of end product
 - 14.01.11 knowledge of wire feeders
 - 14.01.12 knowledge of drive rolls

- 14.01.13 knowledge of guns
- 14.01.14 knowledge of contact tips
- 14.01.15 knowledge of nozzles
- 14.01.16 knowledge of gas diffusers
- 14.01.17 knowledge of cooling systems
- 14.01.18 ability to match welding equipment to application

14.02 Selects consumables.

- 14.02.01 knowledge of metal cored wires
- 14.02.02 knowledge of shielded/self-shielded electrode wires
- 14.02.03 knowledge of characteristics of shielding gases
- 14.02.04 knowledge of wire handling procedures
- 14.02.05 knowledge of wire storage requirements
- 14.02.06 ability to detect damage or defects in consumables
- 14.02.07 ability to follow manufacturer's recommendations

14.03 Selects operating parameters.

- 14.03.01 knowledge of direct current
- 14.03.02 knowledge of polarity
- 14.03.03 knowledge of current characteristics
- 14.03.04 knowledge of voltage characteristics
- 14.03.05 knowledge of wire feed speed (current)
- 14.03.06 knowledge of filler metal transfer modes
- 14.03.07 knowledge of gas flow rates
- 14.03.08 knowledge of pulsing techniques
- 14.03.09 knowledge of wire stick out
- 14.03.10 ability to follow manufacturer's recommendations
- 14.03.11 ability to make required adjustments

14.04 Sets up flux cored arc welding equipment.

- 14.04.01 knowledge of manufacturer's recommendations
- 14.04.02 knowledge of welding cables
- 14.04.03 knowledge of gas cylinder safety
- 14.04.04 knowledge of equipment leak testing procedures
- 14.04.05 knowledge of troubleshooting techniques
- 14.04.06 knowledge of equipment set-up procedures
- 14.04.07 ability to hook up cables to proper polarity
- 14.04.08 ability to check cables and connections
- 14.04.09 ability to check for equipment leaks

- 14.05 Operates flux cored arc welding equipment.
 - 14.05.01 knowledge of required task-specific personal protective clothing and equipment
 - 14.05.02 knowledge of ventilation requirements
 - 14.05.03 knowledge of welding techniques
 - 14.05.04 knowledge of characteristics of electrodes during welding process
 - 14.05.05 knowledge of pulsing techniques
 - 14.05.06 knowledge of equipment maintenance requirements
 - 14.05.07 knowledge of shutdown procedures
 - 14.05.08 ability to manipulate guns
 - 14.05.09 ability to detect flaws
 - 14.05.10 ability to remove spatter
 - 14.05.11 ability to remove slag
 - 14.05.12 ability to make welding equipment adjustments
 - 14.05.13 ability to maintain welding equipment
 - 14.05.14 ability to apply appropriate welding techniques