



Welder

Guide to Course Content

2024

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Recognition:

To promote transparency and consistency, this document has been adapted from the 2014 Welder National Occupational Analysis (Employment and Social Development Canada).

A complete version of the Occupational Standard can be found at www.red-seal.ca

STRUCTURE OF THE GUIDE TO COURSE CONTENT

To facilitate understanding of the occupation, this guide to course content contains the following sections:

Task Matrix: a chart which outlines graphically the major work activities, tasks and sub-tasks of this standard detailing the essential skills and the level of training where the content is covered.

Major Work Activity (MWA): the largest division within the standard that is comprised of a distinct set of trade activities.

Task: distinct actions that describe the activities within a major work activity.

Sub-task: distinct actions that describe the activities within a task.

Training Profile Chart: a chart which outlines the model for Saskatchewan Apprenticeship and Trade Certification Commission (SATCC) technical training.

Technical Training Course Content for the Welder trade: a chart which outlines the model for SATCC technical training sequencing. For the harmonized level of training, a cross reference to the Harmonized apprenticeship technical training sequencing, at the learning outcome level, is provided.

TRAINING REQUIREMENTS FOR THE WELDER TRADE

To graduate from each level of the apprenticeship program, an apprentice must successfully complete the required technical training and compile enough on-the-job experience to total at least 1800 hours each year. Total trade time required is 5400 hours and at least 3 years in the trade.

There are three levels of technical training delivered by Saskatchewan Polytechnic in Moose Jaw, Regina, and Saskatoon.

Level One: 7 weeks

Level Two: 7 weeks

Level Three: 8 weeks

The information contained in this guide to course content details the technical training delivered for each level of apprenticeship. An apprentice spends approximately 15% of their apprenticeship term in a technical training institute learning the technical and theoretical aspects of the trade. The hours and percentages of technical and practical training may vary according to class needs and progress.

The content of the technical training components is subject to change without notice.

Entrance Requirements for Apprenticeship Training

Your grade twelve transcripts (with no modified classes) or GED 12 is your guarantee that you meet the educational entrance requirements for apprenticeship in Saskatchewan. In fact, employers prefer and recommend apprentices who have completed high school. This ensures the individual has all of the necessary skills required to successfully complete the apprenticeship program, and receive journeyman certification.

Individuals with “modified” or “general” classes in math or science do not meet our entry requirements. These individuals are required to take an entrance assessment prescribed by the SATCC.

English is the language of instruction in all apprenticeship programs and is the common language for business in Saskatchewan. Before admission, all apprentices and/or “upgraders” must be able to understand and communicate in the English language. Applicants whose first language is not English must have a minimum Canadian Language Benchmark Assessment of six (CLB6).

Note: A CLB assessment is valid for a one-year period from date of issue.

Designated Trade Name	Math Credit at the Indicated Grade Level❶	Science Credit at Grade Level
Welder	Grade 10	Grade 10
<p>❶ - (One of the following) WA – Workplace and Apprenticeship; or F – Foundations; or P – Pre-calculus, or a Math at the indicated grade level (Modified and General Math credits are not acceptable.).</p> <p>*Applicants who have graduated in advance of 2015-2016, or who do not have access to the revised Science curricula will require a Science at the minimum grade level indicated by trade.</p> <p>For information about high school curriculum, including Math and Science course names, please see: http://www.curriculum.gov.sk.ca/</p> <p>Individuals not meeting the entrance requirements will be subject to an assessment and any required training</p>		

WELDER TASK MATRIX CHART

This chart outlines the major work activities, tasks and sub-tasks from the 2014 Welder National Occupational Analysis. Each sub-task details the corresponding essential skill and level of training where the content is covered.

* Sub-tasks with numbers in the boxes is where the content will be delivered in training.

A – Common Occupational Skills

19%

A-1 Maintains tools and equipment	1.01 Maintains hand, power, layout and measuring tools 1, In Context in 2, 3	1.02 Maintains stationary machinery 1, In Context in 2, 3	1.03 Maintains thermal cutting equipment 1, In Context in 2, 3	1.04 Maintains welding equipment 1, In Context in 3	
A-2 Uses access and material handling equipment	2.01 Uses access equipment 1	2.02 Uses rigging, hoisting and lifting equipment 1			
A-3 Performs safety-related activities	3.01 Performs hazard assessments 1, In Context in 2, 3	3.02 Maintains safe work environment 1, In Context in 3	3.03 Uses personal protective equipment (PPE) and safety equipment 1, In Context in 2, 3		
A-4 Organizes work	4.01 Uses documentation and reference material 1	4.02 Plans job tasks 2	4.03 Organizes materials 1, 2		
A-5 Performs routine trade activities	5.01 Performs quality inspection 2, 3	5.02 Marks welds, materials and parts 2, 3	5.03 Controls temperature of weldments 1, 2, 3	5.04 Stores welding consumables 1, 2, 3	5.05 Selects welding processes and power source 1, 2, 3
	5.06 Performs equipment start-up and shut-down 1, 2, 3	5.07 Finishes final product 1, 2			

B – Fabrication and Preparation of Components For Welding

20%

B-6 Performs layout	6.01 Develops templates 1, 2	6.02 Transfers dimensions from drawings to materials 1, 2	
B-7 Fabricates components	7.01 Prepares materials 1, 2	7.02 Fits components for welding 1, 2	7.03 Assembles components 1, 2

C – Cutting and Gouging

17%

C-8 Uses tools and equipment for non-thermal cutting and grinding	8.01 Selects cutting and grinding tools 1	8.02 Cuts using stationary band saws and power hacksaws 1	8.03 Cuts using shears and ironworkers 1	8.04 Cuts using hand tools 1	8.05 Cuts using handheld power tools 1
C-9 Uses oxy-fuel gas cutting (OFC) process for cutting and gouging	9.01 Selects OFC gas equipment 1	9.02 Sets up OFC equipment 1	9.03 Sets operating parameters for OFC equipment 1	9.04 Performs cut and gouge using OFC equipment 1	
C-10 Uses plasma arc cutting (PAC) process for cutting and gouging	10.01 Selects PAC equipment and consumables 1	10.02 Sets up PAC equipment 1	10.03 Sets operating parameters for PAC equipment 1	10.04 Performs cut and gouge using PAC equipment 1	
C-11 Uses air carbon arc cutting (CAC-A) process for cutting and gouging	11.01 Selects CAC-A equipment and consumables 1	11.02 Sets up CAC-A equipment 1	11.03 Sets up parameters for CAC-A equipment 1	11.04 Performs cut and gouge using CAC-A equipment 1	

D – Welding Processes

44%

<p>D-12 Welds using shielded metal arc welding (SMAW) process</p>	<p>12.01 Selects SMAW equipment and consumables</p> <p>1, 2, 3</p>	<p>12.02 Sets up SMAW equipment</p> <p>1, 2, 3</p>	<p>12.03 Sets operating parameters for SMAW</p> <p>1, 2, 3</p>	<p>12.04 Performs weld with SMAW equipment</p> <p>1, 2, 3</p>
<p>D-13 Welds using flux cored arc welding (FCAW), metal cored arc welding (MCAW) and gas metal arc welding (GMAW) processes</p>	<p>13.01 Selects FCAW, MCAW and GMAW gas, equipment and consumables</p> <p>1, 2, 3</p>	<p>13.02 Sets up FCAW, MCAW, and GMAW equipment</p> <p>1, 2, 3</p>	<p>13.03 Sets operating parameters for FCAW, MCAW and GMAW</p> <p>1, 2, 3</p>	<p>13.04 Performs weld using FCAW, MCAW, and GMAW equipment</p> <p>1, 2, 3</p>
<p>D-14 Welds using gas tungsten arc welding (GTAW) process</p>	<p>14.01 Selects GTAW gas, equipment and consumables</p> <p>2, 3</p>	<p>14.02 Sets up GTAW equipment</p> <p>2, 3</p>	<p>14.03 Sets operating parameters for GTAW</p> <p>2, 3</p>	<p>14.04 Performs weld using GTAW equipment</p> <p>2, 3</p>
<p>D-15 Welds using submerged arc welding (SAW) process</p>	<p>15.01 Selects SAW equipment and consumables</p> <p>2, 3</p>	<p>15.02 Sets up SAW equipment</p> <p>2, 3</p>	<p>15.03 Sets operating parameters for SAW</p> <p>2, 3</p>	<p>15.04 Performs weld using SAW equipment</p> <p>2, 3</p>

TRAINING PROFILE CHART

This Training Profile Chart represents Saskatchewan Apprenticeship and Trade Certification Commission (SATCC) technical training at the topic level.

Level One	Transcript Code	Hours
Industrial Mathematics (Exceeds)	MATH 125A	21
Metallurgy and Material Designations (Exceeds)	METL 106	10
Oxy-Fuel Processes	WLDR 112 – Theory	12
	WLDR 128 – Shop	18
Print Reading	BPRT 105	10
Shielded Metal Arc Welding	WLDR 111 – Theory	13
	WLDR 110 – Shop	33
Thermal Cutting	WELD 134	14
Trade Safety	SFTY 132	12
Wire Feed Processes	WLDR 115 – Theory	13
	WLDR 116 – Shop	54
		210

Level Two	Transcript Code	Hours
Gas Tungsten Arc Welding	WELD 254 – Theory	9
	WELD 255 – Shop	21
Welding Mathematics 2 (Exceeds)	MATH 203	14
Metallurgy and Material Designation (Exceeds)	WELD 215	11
Print Reading and Fabrication	BPRT 251	10
Quality Assurance	WELD 213	12
Shielded Metal Arc Welding	WELD 252 – Theory	18
	WELD 253 – Shop	92
Wire Feed Processes	WELD 216	23
		210

Level Three	Transcript Code	Hours
Gas Tungsten Arc Welding	WELD 337	12
Welding Mathematics 3 (Exceeds)	MATH 310	10
Metallurgy (Exceeds)	WELD 334	10
Print Reading and Fabrication	BPRT 322	17
SMAW Plate/Pipe Process	WELD 311 – Theory	25
SMAW Pipe Process	WELD 318 – Shop	20
SMAW Plate Process	WELD 317 – Shop	95
Special Welding and Cutting Processes (Exceeds)	WELD 338	18
Wire Feed Processes	WELD 335 – Theory	12
	WELD 336 – Shop	21
		240

TECHNICAL TRAINING COURSE CONTENT

This chart outlines the model for Saskatchewan Apprenticeship and Trade Certification Commission (SATCC) technical training sequencing. For the harmonized level of training, a cross reference to the National Occupational Analysis apprenticeship technical training sequencing, at the learning outcome level, is provided.

Sub-tasks listed are the minimum to be covered in a topic. Related sub-tasks not listed may be used as a reference and taught “in context” in other topics.

Level One	7 weeks	210 hours
Print Reading and Fabrication <ul style="list-style-type: none">• interpret basic shop drawings• interpret basic welding symbols NOA topics covered in this section of training: A-5 Performs routine trade activities A-5.07 Finishes final product B-6 Performs layout B-6.01 Develops templates B-6.02 Transfers dimensions from drawings to materials B-7 Fabricates components B-7.01 Prepares materials B-7.02 Fits components for welding B-7.03 Assembles components		10 hours
Industrial Mathematics <ul style="list-style-type: none">• perform arithmetic calculations using whole numbers, fractions and decimals• calculate areas, volumes, and weights• calculate material requirements This section of training exceeds the minimum sequencing as set out in the Welder NOA.		21 hours
Metallurgy and Material Designations <ul style="list-style-type: none">• interpret steel classification information• identify structural shapes, pipe and plate NOA topics covered in this section of training: A-4 Organizes Work A-4.01 Uses documentation and reference material A-4.03 Organizes materials		10 hours

Trade Safety**12 hours**

- describe fire-fighting equipment and procedures
- describe personal protective equipment and safety practices
- demonstrate safe shop work practices for housekeeping, equipment and tool use
- describe WHMIS
- interpret occupational health and safety regulations
- describe rigging and material handling procedures and equipment

NOA topics covered in this section of training:**A-1 Maintains Tools and Equipment**

A-1.01 Maintains hand, power, layout and measuring tools

A-1.02 Maintains stationary machinery

A-2 Uses access and material handling equipment

A-2.01 Uses access equipment

A-2.02 Uses rigging, hoisting and lifting equipment

C-8 Uses tools and equipment for non-thermal cutting and grinding

C-8.01 Selects cutting and grinding tools

C-8.02 Cuts using stationary band saws and power hacksaws

C-8.03 Cuts using shears and ironworkers

C-8.04 Cuts using hand tools

C-8.05 Cuts using handheld power tools

Shielded Metal Arc Welding – Theory**13 hours**

- describe the components and accessories of SMAW welding station
- describe operation of constant current power supply
- describe setup procedures
- describe maintenance and troubleshooting procedures
- describe SMAW safety concerns

Shielded Metal Arc Welding – Shop**33 hours**

- setup a SMAW welding station
- demonstrate safe SMAW work procedures
- weld 14 gauge, horizontal fillet using E6010/11
- weld 14 gauge, lap joint, vertical down
- weld one and three pass horizontal fillet on 1/4 in. MS using E7018
- weld vertical up single and three pass fillet on 1/4 in. MS using E7018

NOA topics covered in this section of training:**A-1 Maintains tools and equipment**

A-1.04 Maintains welding equipment

A-5 Performs routine trade activities

A-5.03 Controls temperature of weldments

A-5.04 Stores welding consumables

A-5.05 Selects welding process and power source

A-5.06 Performs equipment start-up and shut-down

D-12 Welds using shielded metal arc welding (SMAW) process

D-12.01 Selects SMAW equipment and consumables

D-12.02 Sets up SMAW equipment

D-12.03 Sets operating parameters for SMAW

D-12.04 Performs weld with SMAW equipment

Oxy-Fuel Processes – Theory**12 hours**

- describe oxy-fuel equipment and accessories
- describe setup, use and shut down procedures
- describe OFW, braze welding, soldering, brazing and OFC
- describe OFW and OFC safety concerns

Oxy-Fuel Processes – Shop**18 hours**

- demonstrate safe setup, use and shut down procedures
- weld gauge metal and flat
- perform braze welding and soldering
- cut plate to fit structural shape contour
- cut plate to bevel
- pierce and cut holes in plate

NOA topics covered in this section of training:**A-1 Maintains tools and equipment**

A-1.03 Maintains thermal cutting equipment

A-1.04 Maintains welding equipment

C-9 Uses oxy-fuel gas cutting (OFC) process for cutting and gouging

C-9.01 Selects OFC gas and equipment

C-9.02 Sets up OFC equipment

C-9.03 Sets operating parameters for OFC equipment

C-9.04 Performs cut and gouge using OFC equipment

Wire Feed Welding Processes – Theory**13 hours**

- describe the components and accessories of a GMAW welding station
- describe operation of a constant voltage power supply
- describe setup procedures
- describe maintenance and troubleshooting procedures
- identify GMAW safety concerns
- describe the function of all major components of a GMAW, MCAW and FCAW power source

Wire Feed Welding Processes – Shop**54 hours**

- setup a GMAW weld station
- set up weld joints
- weld 14 gauge T-joint downhand
- weld 14 gauge lap joint horizontal pulse
- weld 14 gauge butt joint downhand
- weld 3/8 in. V-groove butt joint in flat position
- weld 3/8 in. V-groove butt joint in vertical position
- weld single and three pass horizontal fillet on 3/8 in. T-joint using MCAW
- weld aluminum horizontal T joint
- weld single and three pass 3/8 in. horizontal fillet on flux core

NOA topics covered in this section of training:**A-1 Maintains tools and equipment**

A-1.04 Maintains welding equipment

A-5 Performs routine trade activities

A-5.03 Controls temperature of weldments

A-5.04 Stores welding consumables

A-5.05 Selects welding process and power source

A-5.06 Performs equipment start-up and shut-down

D-13 Welds using flux cored arc welding (FCAW), metal cored arc welding (MCAW) and gas metal arc welding (GMAW) processes

D-13.01 Selects FCAW, MCAW and GMAW gas, equipment and consumables

D-13.02 Sets up FCAW, MCAW and GMAW equipment

D-13.03 Sets operating parameters for FCAW, MCAW and GMAW

D-13.04 Performs weld using FCAW, MCAW and GMAW equipment

Thermal Cutting

14 hours

- use oxy-fuel cutting to cut a nut from a bold and cut a sleeve from a shaft
- use air carbon arc cutting to remove a weld, prepare grooves and back gouge
- use plasma arc cutting and gouging process

NOA topics covered in this section of training:

A-1 Maintains tools and equipment

A-1.03 Maintains thermal cutting equipment

C-10 Uses plasma arc cutting (PAC) processes for cutting and gouging

C-10.01 Selects PAC equipment and consumables

C-10.02 Sets up PAC equipment

C-10.03 Sets operating parameters for PAC equipment

C-10.04 Performs cut or gouge using PAC equipment

C-11 Uses air carbon arc cutting (CAC-A) process for cutting and gouging

C-11.01 Selects CAC-A equipment and consumables

C-11.02 Sets up CAC-A equipment

C-11.03 Sets operating parameters for CAC-A equipment

C-11.04 Performs cut or gouge using CAC-A equipment

No specific topics from the NOA are taught in context in Level one.

For details regarding the In Context Topic, see page 20

Level Two

7 weeks

210 hours

Quality Assurance

12 hours

- identify applicable codes and standards
- describe mill test result, heat numbers and material traceability
- describe weld procedure data sheets, electrode data sheets and procedure qualification records
- interpret welder qualification information

NOA topics covered in this section of training:

A-5 Performs routine trade activities

A-5.01 Performs quality inspection

A-5.02 Marks welds, materials and parts

Print Reading and Fabrication

10 hours

- interpret intermediate welding symbols
- interpret intermediate shop drawings
- use notching and mitre functions of iron worker
- use press brake
- describe weld positioners

NOA topics covered in this section of training:

A-4 Organizes work

A-4.02 Plans job tasks

A-4.03 Organizes materials

A-5 Performs routine trade activities

A-5.07 Finishes final product

B-6 Performs layout

B-6.01 Develops templates

B-6.02 Transfers dimensions from drawings to materials

B-7 Fabricates components

B-7.01 Prepares materials

B-7.02 Fits components for welding

B-7.03 Assembles components

Metallurgy and Material Designation

11 hours

- describe the physical, chemical and mechanical properties of selected metals
- identify steels by classification system
- identify use of different metals
- describe shop tests used to identify metals

This section of training exceeds the minimum sequencing as set out in the Welder NOA

Wire Feed Welding Processes**23 hours**

- weld 3/8 in. MS horizontal, T-joint, 3 pass, using MCAW
- weld 1/4 in. MS, vertical, T-joint, 3 pass, using FCAW
- describe the welding gases and the CSA and AWS welding wire classification systems
- describe submerged arc welding

NOA topics covered in this section of training:**A-1 Maintains tools and equipment**

A-1.04 Maintains welding equipment

A-5 Performs routine trade activities

A-5.03 Controls temperature of weldments

A-5.04 Stores welding consumables

A-5.05 Selects welding process and power source

A-5.06 Performs equipment start-up and shut-down

D-13 Welds using flux cored arc welding (FCAW), metal cored arc welding (MCAW) and gas metal arc welding (GMAW) processes

D-13.01 Selects FCAW, MCAW and GMAW gas, equipment and consumables

D-13.02 Sets up FCAW, MCAW and GMAW equipment

D-13.03 Sets operating parameters for FCAW, MCAW and GMAW

D-13.04 Performs weld using FCAW, MCAW and GMAW equipment

D-15 Welds using submerged arc welding (SAW) process

D-15.01 Selects SAW equipment and consumables

D-15.02 Sets up SAW equipment

D-15.03 Sets operating parameters for SAW

D-15.04 Performs weld using SAW equipment

Shielded Metal Arc Welding – Theory**18 hours**

- select power sources
- interpret power source technical data
- describe the effect of adjusting all weld parameters
- select electrodes

Shielded Metal Arc Welding – Shop**92 hours**

- weld 3/8 in. MS Flat V-groove, butt joints – E6010 root, E7018 fill and cap
- weld 3/8 in. MS Vertical V-groove butt joints - E6010 root, E7018 fill and cap
- weld 3/8 in. MS Horizontal, V-groove butt joint - E6010

NOA topics covered in this section of training:**A-1 Maintains tools and equipment**

A-1.04 Maintains welding equipment

B-7 Fabricates components

B-7.01 Prepares materials

D-Welds using shielded metal arc welding (SMAW) process

12.01 Selects SMAW equipment and consumables

12.02 Sets up SMAW equipment

12.03 Sets operating parameters for FCAW, MCAW and GMAW

12.04 Performs weld using FCAW, MCAW and GMAW equipment

Gas Tungsten Arc Welding – Theory**9 Hours**

- describe features of a GTAW power source
- select shielding gas, tungsten, current type, polarity, and amperage
- identify safety concerns in GTAW

Gas Tungsten Arc Welding - Shop**21 hours**

- weld gauge stainless steel lap joint horizontal fillet
- weld gauge stainless steel corner joint horizontal fillet
- weld gauge aluminum lap joint horizontal fillet
- weld gauge aluminum corner joint horizontal fillet

NOA topics covered in this section of training:**A-1 Maintains tools and equipment**

A-1.04 Maintains welding equipment

A-5 Performs routine trade activities

A-5.03 Controls temperature of weldments

A-5.04 Stores welding consumables

A-5.05 Selects welding process and power source

A-5.06 Performs equipment start-up and shut-down

D-14 Welds using gas tungsten arc welding (GTAW) process

D-14.01 Selects GTAW gas, equipment and consumables

D-14.02 Sets up GTAW equipment

D-14.03 Sets operating parameters for GTAW

D-14.04 Performs weld using GTAW equipment

Welding Mathematics 2**14 hours**

- apply manipulations to basic formulas to match modifications to basic shapes and objects
- perform equivalent Imperial and Metric calculations and conversions involving weight-volume, weight-length, and vice-versa
- perform advanced welding problems using ratios, proportions and percent
- perform advanced lineal and non-lineal problems involving irregular and odd shapes and objects

This section of training exceeds the minimum sequencing as set out in the Welder NOA

Level Two topics from the NOA that are taught in context:**A-1 Maintains tools and equipment****A-3 Performs safety-related activities*****For details regarding the In Context Topic, see page 20***

Level Three

8 weeks

240 hours

Print Reading and Fabrication

17 hours

- interpret advanced welding symbols
- interpret basic piping drawings
- determine material and weld requirements from shop drawings
- use rolls to form material
- fabricate project

NOA topics covered in this section of training:

A-4 Organizes work

A-4.02 Plans job tasks

A-4.03 Organizes materials

A-5 Performs routine trade activities

A-5.07 Finishes final product

B-6 Performs layout

A-6.01 Develops templates

A-6.02 Transfers dimensions from drawings to materials

B-7 Fabricates components

B-7.01 Prepares materials

B-7.02 Fits components for welding

B-7.03 Assembles components

Metallurgy

10 hours

- describe tempering, normalizing and annealing
- determine the mechanical properties of metals
- describe pre-heat, interpass and post-heat considerations

This section of training exceeds the minimum sequencing as set out in the Welder NOA

Special Welding and Cutting Processes

18 hours

- perform cutting procedures on plate – 30-degree bevel, contour cut and hole
- use air carbon arc cutting to remove backing plate
- perform specialized welding processes - SAW, SW, PAW, TW and RW

NOA topics covered in this section of training:

A-5 Performs routine trade activities

A-5.03 Controls temperature of weldments

A-5.04 Stores welding consumables

A-5.05 Selects welding process and power source

A-5.06 Performs equipment start-up and shut-down

D-15 Welds using submerged arc welding (SAW) process

D-15.01 Selects SAW equipment and consumables

D-15.02 Sets up SAW equipment

D-15.03 Sets operating parameters for SAW

D-15.04 Performs weld using SAW equipment

SMAW Plate/Pipe Process – Theory**25 hours**

- describe weld faults
- describe joint preparation for plate
- describe joint preparation for pipe

SMAW Plate Process – Shop**95 hours**

- weld 3/8 in. MS, vertical V-groove butt joints – E6010 root, E7018 fill and cap
- weld 3/8 in. MS, horizontal, V-groove butt joint – E6010
- perform 4GF test using 7018

SMAW Pipe Process – Shop**20 hours**

- weld 6-inch schedule 80 pipe in the 2G – 5G position, E6010/7018

NOA topics covered in this section of training:**A-1 Maintains tools and equipment**

A-1.04 Maintains welding equipment

B-7 Fabricates components

B-7.01 – prepares materials

D-Welds using shielded metal arc welding (SMAW) process

12.01 Selects SMAW equipment and consumables

12.02 Sets up SMAW equipment

12.03 Sets operating parameters for FCAW, MCAW and GMAW

12.04 Performs weld using FCAW, MCAW and GMAW equipment

Wire Feed Welding Processes – Theory**12 hours**

- describe the function of all major components of a GMAW, FCAW and MCAW power source
- identify the applications of each process
- identify all weld parameters

Wire Feed Welding Processes – Shop**21 hours**

- weld 3/8 in. MS, flat V-groove butt joint using GMAW joint
- weld 3/8 in. MS vertical V-groove butt joint using FCAW

NOA topics covered in this section of training:**A-1 Maintains tools and equipment**

A-1.04 Maintains welding equipment

B-7 Fabricates components

B-7.01 Prepares materials

A-5 Performs routine trade activities

A-5.03 Controls temperature of weldments

A-5.04 Stores welding consumables

A-5.05 Selects welding process and power source

A-5.06 Performs equipment start-up and shut-down

D-13 Welds using flux cored arc welding (FCAW), metal cored arc welding (MCAW) and gas metal arc welding (GMAW) processes

D-13.01 Selects FCAW, MCAW and GMAW gas, equipment and consumables

D-13.02 Sets up FCAW, MCAW and GMAW equipment

D-13.03 Sets operating parameters for FCAW, MCAW and GMAW

D-13.04 Performs weld using FCAW, MCAW and GMAW equipment

D-15 Welds using submerged arc welding (SAW) process

- D-15.01 Selects SAW equipment and consumables
- D-15.02 Sets up SAW equipment
- D-15.03 Sets operating parameters for SAW
- D-15.04 Performs weld using SAW equipment

Gas Tungsten Arc Welding (GTAW)

12 hours

- weld 3/8 in. MS flat open root butt joints in the horizontal position

NOA topics covered in this section of training:

A-5 Performs routine trade activities

- A-5.03 Controls temperature of weldments
- A-5.05 Selects welding process and power source
- A-5.06 Performs equipment start-up and shut-down

D-14 Welds using gas tungsten arc welding (GTAW) process

- D-14.01 Selects GTAW gas, equipment and consumables
- D-14.02 Sets up GTAW equipment
- D-14.03 Sets operating parameters for GTAW
- D-14.04 Performs weld using GTAW equipment

Welding Mathematics 3

10 hours

- advanced welding-related calculations involving layouts, rollouts, fitting and loading/lift problems
- calculation management involving compound combinations of welding related materials
- calculation management involving a small project involving diagrams or partial blueprint

This section of training exceeds the minimum sequencing as set out in the Welder NOA.

Level Three topics from the NOA that are taught in context:

A-1 Maintains tools and equipment

A-3 Performs safety-related activities

For details regarding the In Context Topic, see page 20

In Context Topics

In context means learning that has already taken place and is being applied to the applicable task. Learning outcomes for in context topics are accomplished in other topics in that level.

A-1 Maintains Tools and Equipment

A-1.01 Maintains hand, power, layout and measuring tools

A-1.02 Maintains stationary machinery

A-1.03 Maintains thermal cutting equipment

A-1.04 Maintains welding equipment

A-3 Performs safety-related activities

A-3.01 Performs hazard assessments

A-3.02 Maintains safe work environment

A-3.03 Uses personal protective equipment (PPE) and safety equipment