Welder

Course Outline

2023

1-877-363-0536
apprenticeship@gov.sk.ca
saskapprenticeship.ca

Saskatchewan Apprenticeship and Trade Certification Commission

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	MATH 125A	21
Metallurgy and Material Designations	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	MATH 203	14
Metallurgy and Material Designation	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	MATH 310	10
Metallurgy	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	WELD 338	18
Wire Feed Processes	WELD 335 – Theory	12
	WELD 336 – Shop	21
		240

TECHNICAL TRAINING COURSE OUTLINE

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 Red Seal National Occupational Analysis (NOA) apprenticeship technical training sequencing, at the learning outcome level, is provided.

Level One — 7 weeks — 210 hours

Print Reading and Fabrication — **10 hours**

- interpret basic shop drawings
- interpret basic welding symbols

Industrial Mathematics — **21 hours**

- perform arithmetic calculations using whole numbers, fractions and decimals
- calculate areas, volumes, and weights
- calculate material requirements

Metallurgy and Material Designations — **10 hours**

- interpret steel classification information
- identify structural shapes, pipe and plate

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

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” MS using E7018
- weld vertical up single and three pass fillet on ¼” MS using E7018

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

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" V-groove butt joint in flat position
- weld 3/8" V-groove butt joint in vertical position
- weld single and three pass horizontal fillet on 3/8" T-joint using MCAW
- weld aluminum horizontal T joint
- weld single and three pass 3/8” horizontal fillet on flux core

---

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

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

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

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 metalsconnect basic rectifier filter circuits

Wire Feed Welding Processes — **23 hours**

- weld 3/8” MS horizontal, T-joint, 3 pass, using MCAW
- weld 1/4” 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

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

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

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

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

Metallurgy — **10 hours**

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

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

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” MS, vertical V-groove butt joints – E6010 root, E7018 fill and cap
- weld 3/8” 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

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

Gas Tungsten Arc Welding (GTAW) — **12 hours**

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

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

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. Harmonization for the Welder trade has been fully implemented for each level of technical training.

A - COMMON OCCUPATIONAL SKILLS

A-1 Maintains tools and equipment	**1.01 Maintains hand, power, layout and measuring tools** **1 (In Context 2, 3)**	**1.02 Maintains stationary machinery** **1 (In Context 2, 3)**	**1.03 Maintains thermal cutting equipment** **1 (In Context 2, 3)**	**1.04 Maintains welding equipment** **1, 2 (In Context 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 2, 3)**	**3.02 Maintains safe work environment** **2 (In Context 3)**	**3.03 Uses personal protective equipment (PPE) and safety equipment** **1 (In Context 2, 3)**		
A-4 Organizes work	**4.01 Uses documentation and reference material** **1**	**4.02 Plans job tasks** **1, 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**	**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 WEDLING

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	7.02 Fits components for welding 1, 2	7.03 Assembles components 1, 2

C – CUTTING AND GOUGING

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

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

***The Welder Red Seal National Occupational Analysis (NOA), describing the "full scope" of the trade, can be found at** www.red-seal.ca

***For more detailed information on course content, please refer to the Welder Guide to Course Content at** www.saskapprenticeship.ca