Grade 10 Introduction to Welding Technology

Course Code	8378
Course Credit	1.0

Senior Years Technology Education Program

Discipline Overview

An approved technical-vocational education (TVE) program cluster comprises departmentally developed and/or approved courses in one specific trade or trained occupation that facilitates the transition from school to either post-secondary training (such as the training provided through Apprenticeship Manitoba) or entry into the workforce (often at an entry-level position).

When learners pursue their studies in an environment modelled after the workplace, they will acquire not only trade-related skills, but will also develop

- employability skills required to make an effective transition from school to work
- an understanding of career development and planning
- an understanding of the importance of becoming an autonomous, lifelong learner in order to adapt to the skills and knowledge needed in the future
- an awareness of safety in school, in the workplace, and at home
- an awareness of sustainability as it relates to the specific skilled trade area and society

Course Overview

In this course, learners will be introduced to the welding profession, including safety practices, tools and equipment, and the use of materials and consumables. They will begin developing foundational skills in the welding trade. By the end of the course, learners will be able to identify, describe, and perform basic welding activities using GMAW (MIG), SMAW (ARC), and oxy-acetylene equipment. They will also apply basic mathematical concepts used in the welding trade, such as measurements.

This course focuses on the following units in the Apprenticeship Manitoba Level 1 technical training:

- A1 Learning About Work
- A2 Trade Safety Awareness
- A3 Tools and Equipment

Manitoba

- A4 Trade Related Communications
- A8 Weld Process and Quality Inspection I
- A9 Thermal Cutting and Gouging

The learning outcomes in this course may not follow a fixed sequence, as they are organized to align with Apprenticeship Manitoba standards. Only the outcomes relevant to this course are included. A complete list of learning outcomes can be found in the primary learning outcomes resource.

Global Competencies in Welding Technology

Critical Thinking

Critical thinking in welding technology involves the intentional process of synthesizing and analyzing ideas using criteria and evidence, making reasoned judgments, and reflecting on the outcomes and implications of those judgments.

When critical thinking as a competency is applied in welding technology, learners

- find and use sources strategically, efficiently, and effectively for the design and management of projects
- evaluate sources for bias, relevance, and reliability for use in training and occupations
- analyze and synthesize ideas using criteria and evidence that demonstrate awareness of emerging trends
- reflect on sources and experiences from multiple perspectives
- enhance comprehension, clarify meaning, make connections, and expand experiences through questioning
- make judgments based on observation, experience, and evidence
- weigh criteria to apply safe practices and make ethical decisions

Creativity

Creativity in welding technology involves exploring and playing with ideas and concepts in order to represent thinking, solve problems, explore opportunities, and innovate in unique ways. It is the interaction between intuition and thinking.

When creativity as a competency is applied in welding technology, learners

- demonstrate initiative, open-mindedness, inventiveness, flexibility, and a willingness to take prudent risks in thinking through projects/processes and recognizing safety protocols

- demonstrate curiosity by exploring new ideas, possibilities, and emerging trends, as well as by asking relevant questions
- use theoretical and applied strategies by making adaptations and adjustments to solve a problem and generate innovative ideas
- enhance innovative ideas by building on the ideas of others
- create a plan for a project and adjust it as needed to achieve the goal of successfully meeting a learning outcome
- research, develop, test, and adapt designs and ideas, as well as build on prior knowledge to persevere through obstacles
- reflect by welcoming feedback from others to enhance the process

Citizenship

Citizenship in welding technology involves engaging and working toward a more equitable, compassionate, and sustainable world by developing and valuing relationships to self, others, and the natural world.

When citizenship as a competency is applied in welding technology, learners

- understand their own perspective on issues related to economies on a global, regional, and local level
- recognize discrimination, principles of equity, and human rights in their world
- explore the interconnectedness of self, the workplace, and the natural world
- welcome diverse viewpoints, experiences, and world views and how they contribute to building relationships and practices
- empathize with multiple viewpoints to better understand consumers, markets, workplaces, teams, and co-workers
- connect with others in responsible, respectful, and inclusive ways, both in person and in digital contexts
- realize their potential in contributing to the betterment of community near and far
- evaluate factors such as the impact of diversity, equity, and inclusion in the workplace, and propose solutions to support well-being
- make ethical choices to promote healthy and sustainable outcomes

Connection to Self

Connection to self in welding technology involves awareness of the related nature of emotional, intellectual, physical, social, cultural, and spiritual aspects of living and learning, and the responsibility for personal growth, well-being, and well-becoming.

When connection to self as a competency is applied in welding technology, learners

- recognize personal strengths, gifts, and challenges to support their learning and well-being
- come to know the factors that shape their identity through exploration
- use workplace skills and practices to enhance self-regulation, personal comfort, sense of well-being, and efficiency
- reflect on own decisions, effort, and experiences, and others' feedback for improvement
- set goals to strengthen their career and personal aspirations
- create a personal plan that reflects their career goals, encompassing their strengths and interests
- value and practise resilience as they work through mistakes and overcome obstacles
- adapt and modify their planning when presented with obstacles or new information
- recognize and embrace their role in lifelong learning, well-being, and well-becoming

Collaboration

Collaboration in welding technology involves learning with and from others and working together with a shared commitment to a common goal.

When collaboration as a competency is applied in welding technology, learners

- welcome diverse viewpoints, experiences, and world views, and appreciate how they contribute to building relationships and practices
- build on each other's ideas through discussion, sharing stories, models, and simulations, and incorporate this learning into practical applications
- value and put trust in others' contributions when working together to ensure safe practices
- formulate questions of themselves and others to generate new ideas and deepen understanding

- work through differences and show a willingness to compromise or change perspective by demonstrating effective conflict resolution practices/strategies and appropriate workplace etiquette and protocols
- co-construct understanding of current practices and emerging technologies
- commit to their roles to co-construct, design, and manage projects

Communication

Communication in welding technology involves interacting with others and allowing for a message to be received, expressed, and understood in multiple ways and for a variety of purposes.

When communication as a competency is applied in welding technology, learners

- express ideas while using workplace conventions and professionalism
- understand context, adapting to different audiences, and conveying information clearly and concisely
- understand how their words and actions shape their identity or have an impact
- understand protocols and practices and use them to understand and interpret messages
- seek to understand others' ideas and instructions through active listening and questioning
- recognize that diverse perspectives (of language, culture, age, etc.) can influence understanding
- make meaning and deepen understanding through their language and the languages of clients and colleagues
- build relationships through meaningful interactions using inclusive and respectful language, and correct terminology, both in person and in digital contexts
- recognize the benefits of communication to build community

Enduring Understandings

Explore career opportunities.

Technical-vocational education supports learners to understand the unique characteristics, scope, working conditions, and career opportunities of various occupations to make informed choices.

Create safe, healthy, and effective workspaces.

Technical-vocational education provides learners with safe, healthy, and effective work practices and protocols that meet industry standards for technical competence and professionalism.

Navigate the world.

Technical-vocational education prepares learners with attitudes, skills, and knowledge to successfully navigate complex, competitive, and collaborative environments to develop an awareness of regulations, cultural competence, and ethical practices.

Experience connected and innovative learning.

Technical-vocational education readies learners to be entrepreneurial and innovative thinkers while making cross-curricular connections and transdisciplinary experiences (STEAM), utilizing industry standard digital tools and technologies, and fostering awareness of industry trends.

Promote inclusive and responsive systems.

Technical-vocational education promotes equity, diversity, and inclusion, is responsive to global challenges, and promotes environmental stewardship to prepare learners for an interconnected world.

Prepare for evolving economies.

Technical-vocational education equips learners with relevant and adaptable skills to become lifelong learners in an ever-changing world.

Learning Outcomes

With teacher guidance, learners can achieve the following learning outcomes.

Strand A: Trade Safety (A2)

WEL-10-A1 Define Manitoba safety and health requirements.

WEL-10-A1-1 Define Manitoba safety and health requirements under The Workplace Safety and Health Act and Regulations for **workers' rights,** including

- the right to know
- the right to participate
- the right to refuse
- the right to protection from reprisal

WEL-10-A1-2 Define Manitoba safety and health requirements under The Workplace Safety and Health Act and Regulations for **workers' responsibilities,** including

- taking reasonable care to protect themselves and others
- using safety equipment properly
- following safety rules and procedures
- cooperating with safety representatives and supervisors

WEL-10-A1-3 Define and describe Manitoba safety and health requirements under The Workplace Safety and Health Act and Regulations for

- the rights and responsibilities of **supervisors**
- the rights and responsibilities of **employers**

WEL-10-A1-4 Define and describe workplace **safety and health programs** and the roles of workers, including

- safety and health committee
- participation in investigation and inspection process

WEL-10-A1-5 Define and describe the Manitoba safety and health requirements for various **public agencies**, including

- Workplace Safety and Health (Enforcement)
- SAFE Work Manitoba (Prevention)

WEL-10-A2 Identify, describe, and demonstrate personal protective equipment (PPE) requirements and standards in the workplace.

WEL-10-A2-1 Identify various **personal protective equipment** (PPE), including

- eye protection
- face protection
- hearing protection
- foot protection
- head protection
- hand protection
- skin protection
- respiratory protection
- protective clothing
- fall protection (trade-specific)

WEL-10-A2-2 Describe various **personal protective equipment** (PPE), including

- selection of the appropriate PPE
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance

WEL-10-A2-3 Demonstrate how to use the required **personal protective equipment** (PPE), ensuring

- a proper fit
- a proper seal
- it is worn properly
- an understanding of the procedures for reporting any damage or malfunctions

WEL-10-A2-4 Identify **hierarchy of control measures** and describe the requirements and standards, including

- elimination
- substitution
- engineering controls
- administrative controls
- personal protective equipment (PPE)

WEL-10-A2-5 Describe each individual's responsibilities when using and managing **personal protective equipment** (PPE) at work or in training for **various roles**, including the

- employer
- supervisor

- worker
- teacher
- student

WEL-10-A2-6 Describe requirements for **personal protective equipment** (PPE), including

- the name of the provider
- its proper maintenance
- required training
- the different types of gear
- procedures in place to guarantee regulations are upheld

WEL-10-A3 Identify and describe the Workplace Hazardous Material Information System (WHMIS) and procedures.

WEL-10-A3-1 Describe how various hazardous materials are **identified**, including

- classification
- safety data sheets (SDS)
- labelling
- training
- access to information

WEL-10-A3-2 Describe what **suppliers and workplaces** must do when labelling hazardous products, including

- using safety symbols
- classifying chemicals

WEL-10-A3-3 Identify various **safety data sheets** (SDS).

WEL-10-A3-4 Identify various **chemical and biological hazards.**

WEL-10-A3-5 Describe how to deal with **chemical and biological hazards** safely, including

- how to wash off spills
- moving dangerous materials
- storing them properly

WEL-10-A4 Identify and describe safe work procedures (SWP).

WEL-10-A4-1 Identify a **safe work procedure** (SWP) that outlines specific steps to safely perform a task, including

- hazard identification
- risk assessment
- control measures

WEL-10-A4-2 Describe a **safe work procedure** (SWP), including

- purpose
- scope
- procedure
- training

WEL-10-A4-3 Identify a hazard and describe the procedures to follow for **managing uncontrolled risks**, including

- unsecured tools or equipment
- improper use of machinery
- electrical hazards
- chemical exposure
- lack of personal protective equipment (PPE)
- poor housekeeping

WEL-10-A5 Identify and describe injury prevention.

WEL-10-A5-1 Identify, describe, and demonstrate the **SAFE acronym**.

- **S**pot the hazard
- **A**ssess the risk
- **F**ind a safer way
- **E**very day

WEL-10-A5-2 Identify various **mental health risks** at work and school, such as

- stress
- bullying
- violence

WEL-10-A5-3 Describe how to prevent various **mental health risks**, including

- respectful communication
- implementation of clear policies
- access to support systems

WEL-10-A5-4 Demonstrate how to reduce various **mental health risks** at work and school, such as by

- promoting respect
- offering support
- proactively identifying and managing issues such as stress or bullying

WEL-10-A5-5 Identify various methods to prevent injuries among **young workers**, such as through

- completion of the Young Worker Readiness Certificate Course
- mandatory safety orientation and training
- supervision by experienced workers
- implementation of SAFE Work Manitoba's Young Worker Injury Prevention Strategy
- use of personal protective equipment (PPE)
- encouraging reporting of unsafe conditions
- promoting awareness of workers' rights

WEL-10-A5-6 Describe various methods to prevent injuries among **young workers**, including

- selection of the appropriate method
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance

WEL-10-A5-7 Identify various **chemical and biological hazards**, including

- dust
- fumes
- gases

WEL-10-A5-8 Describe how to prevent various **chemical and biological hazards**, such as by

- using proper ventilation
- using safety gear
- using personal protective equipment (PPE)
- implementing safe handling procedures

WEL-10-A5-9 Describe how to prevent various injuries related to **electrical safety**, including

- using proper tools
- turning off power before repairs
- following lockout/tagout steps to make sure machines cannot be turned on accidentally

WEL-10-A5-10 Demonstrate how to safely shut off and lock electrical equipment using a **lockout/tagout** procedure.

WEL-10-A5-11 Identify how to prevent various **fire injuries,** including

- identifying different types of fires
- identifying different kinds of fire extinguishers
- describing how to use fire extinguishers safely

WEL-10-A5-12 Demonstrate knowledge of the **locations of various fire emergency safety equipment** and evacuation safety measures, including

- fire extinguisher
- alarm pull stations
- emergency exits
- muster points

WEL-10-A5-13 Identify and describe how to prevent various work-related **diseases and illness,** such as

- asbestosis
- hearing loss
- carpal tunnel syndrome
- tendonitis
- lead poisoning

WEL-10-A5-14 Identify various **muscle and joint injuries.** and describe how to prevent them by using ergonomics prevention methods, including

- good posture
- proper workplace setup

WEL-10-A5-15 Identify various **confined spaces**.

WEL-10-A5-16 Describe methods to prevent injuries during **confined space** entry.

WEL-10-A6 Identify and describe injury response.

WEL-10-A6-1 Describe how to **manage a scene** when responding to an injury, such as by

- staying calm
- keeping the area safe
- providing support until trained help arrives

WEL-10-A6-2 Describe how to **report an injury**, including reporting the injury to

- a teacher or supervisor
- Workers Compensation Board of Manitoba (WCB)

WEL-10-A6-3 Demonstrate knowledge of the **locations of emergency safety equipment**, including

- first aid kit
- automated external defibrillator (AED)
- eyewash station

Strand B: Career Education (A1)

WEL-10-B1 Describe the structure and scope of the welding trade.

WEL-10-B1-1 Describe opportunities and future **career paths** in a trade, including

- becoming a specialist
- moving into leadership
- working in different locations
- growing with new technology

WEL-10-B1-2 Describe **The Apprenticeship and Certification Act**, including

- support training
- the board
- trade committees
- rules for each trade
- policies about attendance
- continuing training

WEL-10-B1-3 Describe the **Red Seal Occupational Standard (RSOS)**, including

- how it helps with training
- tracking work hours
- preparing for tests in a trade

WEL-10-B2 Describe the levels of workplace competency.

WEL-10-B2-1 Describe **job competencies** workers and learners need to know related to **workplace culture**, including

- understanding tools and materials
- using the right skills to do the job well

WEL-10-B2-2 Describe the **social competencies** workers and learners need to know related to **workplace culture**, including

- working well with others
- using appropriate language
- respecting different beliefs
- understanding workplace rules
- supporting fairness and inclusion

WEL-10-B3 Describe accommodation for apprentices with accessibility requirements.

WEL-10-B3-1 Describe **The Accessibility for Manitobans Act** and how it supports apprentices with accessibility, including

- customer service
- communication
- buildings
- transportation
- training at work

Strand C: Trade-Related Communications (A4)

WEL-10-C1 Describe and demonstrate techniques for effective verbal and non-verbal communication.

WEL-10-C1-1 Describe how to communicate clearly and respectfully with different people at school and/or work, using both **words and body language**.

WEL-10-C1-2 Demonstrate how to communicate clearly and respectfully with different people at school and/or work, using both **words and body language**.

WEL-10-C2 Identify workplace behaviours and communication that constitute bullying as defined by the Canadian Human Rights Act and jurisdictional human rights laws.

WEL-10-C2-1 Identify what **respectful workplace** values look like and what kinds of behaviour are considered bullying, harassment, or discrimination under Canadian law.

WEL-10-C3 Demonstrate effective communication skills, and practise active listening and response.

WEL-10-C3-1 Demonstrate **effective communication and active listening,** including

- listening carefully
- responding clearly
- using appropriate body language
- asking questions
- being open to feedback

WEL-10-C4 Identify types of communication devices, and describe their purpose and operation.

WEL-10-C4-1 Identify various types of **communication devices**, including

- telephones
- two-way radios
- computers
- smartphones
- tablets

WEL-10-C4-2 Describe various purposes and operation of **communication devices**, such as their use for

- speaking
- sending messages
- sharing information

WEL-10-C5 Demonstrate communication techniques using various communication devices.

WEL-10-C5-1 Demonstrate good **communication skills** when using various communication devices to speak, send messages, or share information, including

- keeping the message concise
- articulating ideas precisely to avoid confusion
- remaining polite and professional

WEL-10-C6 Identify types of trade-related documents and describe their applications.

WEL-10-C6-1 Identify various **documents** used in trade, such as

- invoices
- shipping documents
- work orders
- cut lists
- order sheets

WEL-10-C6-2 Describe different **documents** used in trade, such as

- selection of the appropriate documents
- characteristics and key features
- application (i.e., its role or utility in specific scenarios)
- limitations in scope or performance

WEL-10-C7 Describe the importance of communicating job requirements.

WEL-10-C7-1 Describe the importance of clearly defining what a job entails so that each team member understands exactly what is expected of them.

Strand D: Trade-Related Mathematics (A5)

WEL-10-D1 Use mathematical properties to solve problems involving whole, fractional, decimal, and percentage numbers, with an emphasis on trade-related problems.

WEL-10-D1-1 Demonstrate how to solve math problems with both **positive and negative numbers**, indicating how the signs (+ or –) affect the answer, when

- adding
- subtracting
- multiplying
- dividing

WEL-10-D1-2 Identify various **types of fractions**, including

- proper fractions
- improper fractions
- mixed fractions

WEL-10-D1-3 Describe various **types of fractions**, including

- a proper fraction has a smaller number on top (like 3/4)
- an improper fraction has a bigger number on top (like 5/3)
- a mixed fraction combines a whole number and a fraction (like 1 2/3)

WEL-10-D1-4 Demonstrate how to add and subtract **fractions**.

WEL-10-D1-5 Demonstrate how to multiply, divide, simplify (reduce), and expand **fractions.**

WEL-10-D1-6 Demonstrate how to change a fraction into a **decimal** and a decimal into a fraction.

WEL-10-D1-7 Demonstrate how to calculate **percentages** in trade situations, such as

- when material costs increase by 10%
- when applying a 15% discount

WEL-10-D2 Demonstrate how to communicate measurements.

WEL-10-D2-1 Demonstrate how to **measure.**

WEL-10-D2-2 Demonstrate how to **measure** using both **metric and customary** (imperial) measurement systems, such as when

- measuring length
- measuring materials

WEL-10-D2-3 Demonstrate how to provide **measurements,** including how much the measurements can vary (e.g., torque specs).

Strand E: Tools and Equipment (A3)

WEL-10-E1 Identify, describe, and demonstrate an understanding of terminology associated with tools and equipment.

WEL-10-E1-1 Identify **key terms** and **names** of various tools and equipment.

WEL-10-E1-2 Describe the **names** and **purposes** of various tools and equipment.

WEL-10-E1-3 Demonstrate an understanding of the **names** and **purposes** of various tools and equipment.

WEL-10-E2 Identify the various hazards associated with tools and equipment, and describe and demonstrate the related safe work practices.

WEL-10-E2-1 Identify various **hazards of tools** and equipment, including

- harmful noise levels
- lacerations caused by sharp tools or materials
- crush injury hazards
- moving parts on machines that can catch and trap hands or garments
- flying debris hazards

WEL-10-E2-2 Describe various tools and equipment **safe work practices**, including

- wearing appropriate personal protective equipment (PPE)
- inspecting tools and equipment before use
- using the correct tool for the job
- keeping the work area clean and organized
- following manufacturer instructions and safety guidelines
- disconnecting power tools when not in use or during maintenance
- reporting and removing damaged tools from service
- staying alert and avoiding distractions while working
- using guards and safety devices as intended
- storing tools properly after use

WEL-10-E2-3 Demonstrate safe work practices related to tools and equipment.

WEL-10-E3 Identify, describe, and demonstrate tools and equipment, including their selection, characteristics, applications, and limitations.

WEL-10-E3-1 Identify various **hand tools**.

WEL-10-E3-2 Describe various **hand tools**, including

- selection of the appropriate tool
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance
- procedures for conducting a thorough inspection
- procedures for regular maintenance
- guidelines for proper storage

WEL-10-E3-3 Demonstrate how to safely and properly use various **hand tools**.

WEL-10-E3-4 Identify various tools used for **layout, measuring, and marking**.

WEL-10-E3-5 Describe various tools used for **layout, measuring, and marking**, including

- selection of the appropriate tool
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance
- procedures for conducting a thorough inspection
- procedures for regular maintenance
- guidelines for proper storage

WEL-10-E3-6 Demonstrate how to safely and properly use various tools used for layout, measuring, and marking.

WEL-10-E3-7 Identify various **portable power tools**, including

- electric power tools
- hydraulic power tools
- pneumatic power tools

WEL-10-E3-8 Describe various **portable power tools**, including

- selection of the appropriate tool
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance
- procedures for conducting a thorough inspection

- procedures for regular maintenance
- guidelines for proper storage

WEL-10-E3-9 Demonstrate how to safely and properly use various **portable power tools**.

WEL-10-E3-10 Identify various **stationary power tools**, including

- drill press
- band saw
- pedestal grinder
- power roller
- belt sander
- cold cut saw

WEL-10-E3-11 Describe various **stationary power tools**, including

- selection of the appropriate tool
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance
- procedures for conducting a thorough inspection
- procedures for regular maintenance
- guidelines for proper storage

WEL-10-E3-12 Demonstrate how to safely and properly use various **stationary power tools**.

WEL-10-E3-13 Identify various **stationary machinery**, including

- shear
- ironworker

WEL-10-E3-14 Describe various **stationary machinery**, including

- selection of the appropriate tool
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance
- procedures for conducting a thorough inspection
- procedures for regular maintenance
- guidelines for proper storage

WEL-10-E3-15 Demonstrate how to safely and properly use various **stationary machinery**.

WEL-10-E3-16 Identify various **non-thermal cutting and grinding tools.**

WEL-10-E3-17 Describe various **non-thermal cutting and grinding tools**, including

- selection of the appropriate tool
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance
- procedures for conducting a thorough inspection
- procedures for regular maintenance
- guidelines for proper storage

WEL-10-E3-18 Demonstrate how to safely and properly use various **non-thermal cutting and grinding tools**.

Strand F: Materials and Consumables

WEL-10-F1 Share and discuss Indigenous perspectives and environmental impacts.

WEL-10-F1-1 Share and discuss an **Indigenous perspective** on material selection, emphasizing sustainability, respect for natural resources, and cultural significance, such as

- principles of the honourable harvest
- four sacred elements (earth, wind, water, fire)
- inviting an Elder to teach sustainability

WEL-10-F1-2 Share and discuss the **environmental impact** of selecting and disposing of various materials.

WEL-10-F2 Identify the various hazards associated with consumables and materials, and describe and demonstrate the related safe work practices.

WEL-10-F2-1 Identify various **hazards** for welding consumables and materials, including

- burns
- lifting
- flux dust

WEL-10-F2-2 Describe various **safe work practices** for consumables and materials, including

- wearing appropriate personal protective equipment (PPE)
- inspecting consumables and materials before use
- using the correct consumables and materials for the job
- keeping the work area clean and organized

- following manufacturer instructions and safety guidelines
- reporting and removing damaged consumables and materials from service
- staying alert and avoiding distractions while working
- storing consumables and materials properly after use

WEL-10-F2-3 Demonstrate safe work practices related to **consumables and materials**.

WEL-10-F3 Identify and describe organizing materials, including their characteristics, applications, and procedures.

WEL-10-F3-1 Identify various types of **materials and consumables**, such as

- base materials
- filler materials
- shielding gases
- flux
- consumable parts

WEL-10-F3-2 Describe various types of **materials and consumables**, including

- selection of the appropriate type of materials or consumables
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance
- procedures for conducting a thorough inspection
- procedures for regular maintenance
- guidelines for proper storage

WEL-10-F3-3 Identify various ways to **collect materials** required, including

- cut list
- job specifications

WEL-10-F3-4 Describe various ways to **collect materials**, including

- characteristics and key features
- application (i.e., role or utility in specific scenarios)

WEL-10-F4 Identify and describe non-thermal cutting and grinding consumables, including their selection, characteristics, applications, and limitations.

WEL-10-F4-1 Identify various **non-thermal cutting and grinding** consumables, including

- carbon steel

WEL-10-F4-2 Describe various **non-thermal cutting and grinding** consumables, including

- selection of the appropriate non-thermal cutting and grinding consumables
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance
- procedures for conducting a thorough inspection
- procedures for regular maintenance
- guidelines for proper storage

WEL-10-F4-3 Identify various non-thermal cutting and grinding **disk and wheel types**, including

- abrasive
- composite
- carbide
- wire

WEL-10-F4-4 Describe various non-thermal cutting and grinding **disk and wheel types**, including

- selection of the appropriate non-thermal cutting and grinding disk and wheel types
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance
- procedures for conducting a thorough inspection
- procedures for regular maintenance
- guidelines for proper storage

WEL-10-F4-5 Identify various non-thermal cutting and grinding **consumable selection considerations**, including

- grade and thickness of material
- type of cut
- size and cut finish
- tool limitation

WEL-10-F4-6 Describe various non-thermal cutting and grinding **consumable selection considerations**, including

- selection of the appropriate non-thermal cutting and grinding consumables
- characteristics and key features
- application (i.e., role or utility in specific scenarios)

- limitations in scope or performance
- procedures for conducting a thorough inspection
- procedures for regular maintenance
- guidelines for proper storage

WEL-10-F5 Demonstrate how to safely and properly use various types of materials and consumables.

WEL-10-F5-1 Demonstrate how to safely and properly use various types of materials and consumables.

Strand G: Material Handling and Access Equipment (A6)

WEL-10-G1 Identify, define, and demonstrate an understanding of terminology associated with material handling.

WEL-10-G1-1 Identify **key terms** and **names** of various types of material handling.

WEL-10-G1-2 Describe the **names** and **purposes** of various types of material handling.

WEL-10-G1-3 Demonstrate an understanding of the **names** and **purposes** of various types of material handling.

Strand I: Weld Process and Quality Inspection (A8)

WEL-10-I1 Identify, describe, and demonstrate an understanding of terminology associated with weld processes and quality inspection.

WEL-10-I1-1 Identify **key terms** and **names** of various weld processes, and of quality inspection.

WEL-10-I1-2 Describe the **names** and **purposes** of various weld processes, and of quality inspection.

WEL-10-I1-3 Demonstrate an understanding of the **names** and **purposes** of various weld processes, and of quality inspection.

WEL-10-I2 Identify the various hazards associated with weld processes and quality inspection, and describe and demonstrate the related safe work practices.

WEL-10-I2-1 Identify various **gas cylinder hazards**, including

- explosions
- displacement of oxygen (asphyxiation)

WEL-10-I2-2 Describe the safe work practices for gas cylinder hazards, including safety data sheets (SDS).

WEL-10-I2-3 Identify various **final product hazards**, including

- cuts
- particulate projection/sparks
- dust particulate inhalation
- toxic chemicals

WEL-10-I2-4 Describe various safe work practices for **final product hazards**.

WEL-10-I2-5 Identify various hazards related to **controlling temperature of weldments**, including

- electrical shock
- burns

WEL-10-I2-6 Describe various safe work practices related to **controlling temperature of weldments**.

WEL-10-I2-7 Demonstrate safe work practices related to **weld processes and quality inspection.**

WEL-10-I3 Interpret jurisdictional codes, regulations, and job specifications pertaining to weld processes and quality inspection.

WEL-10-I3-1 Understand and apply the rules and job requirements that relate to how welding is done and how its quality is checked, based on the laws and standards in a specific area.

WEL-10-I4 Identify and describe welding consumables and gas cylinders, including their characteristics, applications, and storage.

WEL-10-I4-1 Identify various **welding consumables**, including

- electrodes
- welding wires
- welding fluxes

WEL-10-I4-2 Describe various **welding consumables**, including

- selection of the appropriate welding consumable
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance procedures for conducting a thorough inspection
- procedures for regular maintenance
- guidelines for proper storage

WEL-10-I4-3 Identify various **gas cylinder** product types and identification, including

- fuel gas
- oxygen gas
- inert gas
- active gas

WEL-10-I4-4 Describe various **gas cylinder** product types and identification, including

- selection of the appropriate gas cylinder product type
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance procedures for conducting a thorough inspection
- procedures for regular maintenance
- guidelines for proper storage

WEL-10-I5 Demonstrate how to safely and properly use welding consumables and gas cylinders.

WEL-10-I5-1 Demonstrate how to safely and properly use welding consumables and gas cylinders.

WEL-10-I6 Identify and describe welding processes, including their selection, characteristics, and applications.

WEL-10-I6-1 Identify various **welding processes**, including

- shielded metal arc welding (SMAW)
- gas metal arc welding (GMAW)
- oxy-fuel welding and cutting (OFW, OFC)

WEL-10-I6-2 Describe various **welding processes**, including

- selection of the appropriate welding process
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance

WEL-10-I7 Identify and describe marking welds and material types, including their characteristics and applications.

WEL-10-I7-1 Identify various **material types**, including

- ferrous
- non-ferrous

WEL-10-I7-2 Describe various **material types**, including

- selection of the appropriate material type
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance
- procedures for conducting a thorough inspection
- procedures for regular maintenance
- guidelines for proper storage

WEL-10-I7-3 Identify various **marking devices**, such as

- soapstone
- steel stamps

WEL-10-I7-4 Describe various **marking devices**, including

- selection of the appropriate marking device
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance
- procedures for conducting a thorough inspection
- procedures for regular maintenance
- guidelines for proper storage

WEL-10-I7-5 Identify various **personalized welder identifications**, including

- initials
- numbers

WEL-10-I7-6 Describe various **personalized welder identifications**, including

- selection of the appropriate welder identifications
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance

WEL-10-I8 Identify and describe controlling temperature of weldments.

WEL-10-I8-1 Identify various tools and equipment for **controlling temperature** of weldments, including rod ovens.

WEL-10-I8-2 Describe various tools and equipment for **controlling temperature** of weldments, including

- selection of the appropriate tools and equipment for controlling temperature of specific weldments
- characteristics and key features

- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance
- procedures for conducting a thorough inspection
- procedures for regular maintenance
- guidelines for proper storage

WEL-10-I9-9 Identify and describe final product finishing, including its characteristics and applications.

WEL-10-I9-1 Identify various **tools and equipment** related to final product finishing, including

- grinders
- wire wheels
- buffers

WEL-10-I9-2 Describe various **tools and equipment** related to final product finishing, including

- selection of the appropriate finishing tools and equipment
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance
- procedures for conducting a thorough inspection
- procedures for regular maintenance
- guidelines for proper storage

WEL-10-I9-3 Identify various **weld discontinuities** related to final product finishing, including

- porosity
- undercut
- cold lap
- excess or incomplete penetration

WEL-10-I9-4 Describe various **weld discontinuities** related to final product finishing, including

- their identification
- their characteristics
- their effects on the final product
- correction of weld discontinuities on the final product finishing

WEL-10-I9-5 Identify various **undesirable materials** related to final product finishing, including

- oils
- oxides

WEL-10-I9-6 Describe various **undesirable materials** related to final product finishing, including

- their identification
- their characteristics
- their effects on the final product
- correction of undesirable materials on the final product finishing

WEL-10-I9-7 Identify various **surface imperfections** related to final product finishing, including

- welding spatter
- gouges
- stray arc strikes
- sharp edges
- plate clamp gouges
- miscellaneous defects

WEL-10-I9-8 Describe various **surface imperfections** related to final product finishing, including

- their identification
- their characteristics
- their effects on the final product
- correction of surface imperfections on the final product finishing

WEL-10-I10 Identify and describe quality inspection, including their characteristics and applications.

WEL-10-I10-1 Identify various quality inspection **tools and equipment**, including

- magnifying lenses
- inspection mirrors
- flashlights

WEL-10-I10-2 Describe various quality inspection **tools and equipment**, including

- selection of the appropriate quality inspection tools and equipment
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance
- procedures for conducting a thorough inspection

- procedures for regular maintenance
- guidelines for proper storage

WEL-10-I10-3 Identify various quality inspection various quality inspection **measuring devices**, including

- steel rulers
- measuring tapes

WEL-10-I10-4 Describe various quality inspection **measuring devices**, including

- selection of the appropriate measuring device
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance
- procedures for conducting a thorough inspection
- procedures for regular maintenance
- guidelines for proper storage

WEL-10-I10-5 Identify various quality inspection **material defects**, including

- surface irregularities
- laminations
- surface contamination

WEL-10-I10-6 Describe various quality inspection **material defects**, including

- their identification
- their characteristics
- their effects on the final product
- correction of fabrication defects on the final product

WEL-10-I10-7 Identify various quality inspection **fabrication defects**, including

- improper fit-up
- misalignment
- distortion
- incorrect dimensions and orientation

WEL-10-I10-8 Describe various quality inspection **fabrication defects**, including

- their identification
- their characteristics
- their effects on the final product
- correction of fabrication defects on the final product

WEL-10-I10-9 Identify various quality inspection **weld discontinuities**, including

- porosity
- undercut
- cold lap
- excess or incomplete penetration

WEL-10-I10-10 Describe various quality inspection **weld discontinuities**, including

- their identification
- their characteristics
- their effects on the final product
- correction of fabrication defects on the final product

WEL-10-I10-11 Identify various quality inspection **surface imperfections**, including

- welding spatter
- gouges
- stray arc strikes
- sharp edges

WEL-10-I10-12 Describe various quality inspection **surface imperfections**, including

- their identification
- their characteristics
- their effects on the final product
- correction of fabrication defects on the final product

WEL-10-I11 Demonstrate how to safely and properly use weld processes and quality inspections.

WEL-10-I11-1 Demonstrate how to safely and properly use weld processes and quality inspections.

Strand J: Thermal Cutting and Gouging (A9)

WEL-10-J1 Identify, describe, and demonstrate an understanding of terminology associated with thermal cutting and gouging.

WEL-10-J1-1 Identify **key terms** and **names** of various types of thermal cutting and gouging.

WEL-10-J1-2 Describe the **names** and **purposes** of various types of thermal cutting and gouging.

WEL-10-J1-3 Demonstrate an understanding of the **names** and **purposes** of various types of thermal cutting and gouging.

WEL-10-J2 Identify the various hazards associated with thermal cutting and gouging, and describe and demonstrate the related safe work practices.

WEL-10-J2-1 Identify **oxy-fuel gas cutting (OFC) hazards** and describe safe work practices, including for the following:

- fumes
- sparks
- burns
- eye hazards
- high-pressure cylinders
- maximum safe working pressures
- regulator blowouts
- critical explosion level

WEL-10-J2-2 Identify **plasma arc cutting (PAC) hazards** and describe safe work practices, including for the following:

- fumes
- burns
- noise
- electrical shocks
- sparks
- radiation

WEL-10-J2-3 Identify **air carbon arc cutting and gouging (CAC-A) hazards**, and describe safe work practices, including for the following:

- fumes
- sparks
- burns
- noise
- electrical shocks
- radiation
- molten materials

WEL-10-J2-4 Demonstrate **safe work practices** related to thermal cutting and gouging.

WEL-10-J3 Identify and describe oxy-fuel gas cutting (OFC) equipment.

WEL-10-J3-1 Identify various oxy-fuel gas cutting (OFC) base **metals and metallurgy**, such as

- metals
  - carbon steel (mild steel)
  - low-alloy steel
  - wrought iron
- metallurgy
  - oxidation behaviour
  - thermal conductivity
  - carbon content

WEL-10-J3-2 Describe various oxy-fuel gas cutting (OFC) base **metals and metallurgy**, including

- selection of the base metals and metallurgy
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance

WEL-10-J3-3 Identify various oxy-fuel gas cutting (OFC) types of **regulators**, including

- single-stage and two-stage
- low-pressure and high-pressure

WEL-10-J3-4 Describe various oxy-fuel gas cutting (OFC) types of **regulators**, including

- selection of the appropriate regulator
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance

WEL-10-J3-5 Identify various oxy-fuel gas cutting (OFC) types of **oxy-fuel gases**, including

- acetylene
- oxygen
- propane

WEL-10-J3-6 Describe various oxy-fuel gas cutting (OFC) types of **oxy-fuel gases**, including

- selection of the appropriate oxy-fuel cutting types
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance

WEL-10-J3-7 Identify various oxy-fuel gas cutting (OFC) oxygen and **high-pressure fuel cylinders**, such as

- acetylene cylinder
- propane cylinder
- MAP-Pro gas cylinder

WEL-10-J3-8 Describe various oxy-fuel gas cutting (OFC) oxygen and **high-pressure fuel cylinders**, including

- selection of the appropriate fuel cylinders
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance

WEL-10-J3-9 Identify various oxy-fuel gas cutting (OFC) **types of flames**, including

- neutral
- carburizing
- oxidizing

WEL-10-J3-10 Describe various oxy-fuel gas cutting (OFC) **types of flames**, including

- selection of the appropriate OFC type of flame
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance

WEL-10-J3-11 Identify various oxy-fuel gas cutting (OFC) **torch components**, including

- torch bodies
- hoses
- tips
- flashback arrestors
- reverse flow check valves

WEL-10-J3-12 Describe various oxy-fuel gas cutting (OFC) **torch components**, including

- selection of the appropriate OFC torch components
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance
- procedures for conducting a thorough inspection

- procedures for regular maintenance
- guidelines for proper storage

WEL-10-J3-15 Identify various oxy-fuel gas cutting (OFC) **factors** of oxy-fuel cutting and gouging, including

- heat input
- base metal and thickness

WEL-10-J3-16 Describe various oxy-fuel gas cutting (OFC) **factors** of oxy-fuel cutting and gouging, including

- selection of the appropriate OFC factors
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance
- procedures for conducting a thorough inspection
- procedures for regular maintenance
- guidelines for proper storage

WEL-10-J4 Describe and demonstrate the procedures to cut and gouge using oxy-fuel cutting (OFC) processes.

WEL-10-J4-1 Describe and demonstrate the process to **set up** oxy-fuel cutting (OFC) start-up equipment.

WEL-10-J4-2 Describe and demonstrate the process to **ignite fuel** gas and **adjust torch** valves according to type of flame for oxy-fuel cutting (OFC) equipment.

WEL-10-J4-3 Describe and demonstrate the process to **pre-heat** material to a kindling point to initiate a cut with oxy-fuel cutting (OFC) equipment.

WEL-10-J4-4 Describe and demonstrate the process to perform a **cut** with oxy-fuel cutting (OFC) equipment.

WEL-10-J4-5 Describe and demonstrate the process to identify and correct **defects** with oxy-fuel cutting (OFC) equipment.

WEL-10-J4-6 Describe and demonstrate the process to adjust and maintain **travel speed** and **torch angle** with oxy-fuel cutting (OFC) equipment.

WEL-10-J4-7 Describe and demonstrate the process to identify and correct **backfire** and **flashback** conditions with oxy-fuel cutting (OFC) equipment.

WEL-10-J4-8 Describe and demonstrate the process to **shut down** equipment and purge oxy-fuel cutting (OFC) equipment.

WEL-10-J5 Identify and describe plasma arc cutting (PAC) equipment, components, and consumables.

WEL-10-J5-1 Identify various types of plasma arc cutting (PAC) **equipment**, including

- power source
- track and pipe bevelling cutters
- manual
- semi-automatic
- automatic
- shields
- compressor

WEL-10-J5-2 Describe various types of plasma arc cutting (PAC) **equipment**, including

- selection of the appropriate PAC equipment
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance
- procedures for conducting a thorough inspection
- procedures for regular maintenance
- guidelines for proper storage

WEL-10-J5-3 Identify various plasma arc cutting (PAC) **components**, including

- heat shield
- torch bodies
- hoses
- work lead clamp

WEL-10-J5-4 Describe various plasma arc cutting (PAC) **components**, including

- selection of the appropriate PAC components
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance
- procedures for conducting a thorough inspection
- procedures for regular maintenance
- guidelines for proper storage

WEL-10-J5-5 Identify various plasma arc cutting (PAC) **consumables**, including

- electrodes

- constricting nozzles (tips)
- coolant level for liquid-cooled equipment

WEL-10-J5-6 Describe various plasma arc cutting (PAC) **consumables**, including

- selection of the appropriate PAC consumables
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance
- procedures for conducting a thorough inspection
- procedures for regular maintenance
- guidelines for proper storage

WEL-10-J5-7 Identify various types of plasma arc cutting (PAC) **compressed air equipment**, including

- driers
- filters

WEL-10-J5-8 Describe various types of plasma arc cutting (PAC) **compressed air equipment**, including

- selection of the appropriate PAC compressed air equipment
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance
- procedures for conducting a thorough inspection
- procedures for regular maintenance
- guidelines for proper storage

WEL-10-J5-9 Identify various types of plasma arc cutting (PAC) **equipment to aid cutting**, including

- stand-off
- circle cutting attachments
- drag nozzle

WEL-10-J5-10 Describe various types of plasma arc cutting (PAC) **equipment to aid cutting**, including

- selection of the appropriate PAC cutting aids equipment
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance
- procedures for conducting a thorough inspection
- procedures for regular maintenance
- guidelines for proper storage

WEL-10-J6 Describe and demonstrate the procedures to cut and gouge using plasma arc cutting (PAC) processes.

WEL-10-J6-1 Describe and demonstrate the process to **set up** plasma arc cutting (PAC) equipment, including

- visually inspecting for damage
- assembling consumables on torch head
- connecting torch to power source
- setting up regulator
- attaching work lead clamp to base metal
- adjusting power supply

WEL-10-J6-2 Describe and demonstrate the process to **set operating parameters** used to cut and gouge with plasma arc cutting (PAC) equipment, including

- amperage
- air pressure
- travel speed
- verify for cut defects

WEL-10-J6-3 Describe and demonstrate the process to perform **cutting and gouging** with plasma arc cutting (PAC) equipment, including

- starting up equipment
- maintaining travel speed and torch angle

WEL-10-I6-4 Describe and demonstrate **techniques** used to cut and gouge with plasma arc cutting (PAC) equipment, including

- initiating the arc and cut
- starting at the correct stand-off distance

WEL-10-J7 Identify and describe air carbon cutting (CAC-A) equipment and consumables, including their characteristics, applications, and operation.

WEL-10-J7-1 Identify various **air carbon cutting (CAC-A) equipment**, including

- power source
- current type
- duty cycle
- compressor

WEL-10-J7-2 Describe various **air carbon cutting (CAC-A) equipment**, including

- selection of the appropriate CAC-A equipment
- characteristics and key features

- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance
- procedures for conducting a thorough inspection
- procedures for regular maintenance
- guidelines for proper storage

WEL-10-J7-3 Identify the various **components** of air carbon cutting (CAC-A) equipment, including

- hoses
- electrode holder
- cables
- work lead clamp

WEL-10-J7-4 Describe the various **components** of air carbon cutting (CAC-A) equipment, including

- selection of the appropriate components of CAC-A equipment
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance
- procedures for conducting a thorough inspection
- procedures for regular maintenance
- guidelines for proper storage

WEL-10-J7-5 Identify the various **carbon electrodes** used with air carbon cutting (CAC-A) equipment, including

- coated
- non-coated
- flat
- round
- half-round
- alternating current (AC)
- direct current (DC)

WEL-10-J7-6 Describe the various **carbon electrodes** used with air carbon cutting (CAC-A) equipment, including

- selection of the appropriate carbon electrodes used with CAC-A equipment
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance
- procedures for conducting a thorough inspection

- procedures for regular maintenance
- guidelines for proper storage

WEL-10-J7-7 Identify various air carbon cutting (CAC-A) **defects**, including

- copper and carbon deposits
- poor gouge quality

WEL-10-J7-8 Describe various air carbon cutting (CAC-A) **defects**, including

- their identification
- their characteristics
- their effects on the final product
- correction of material defects

WEL-10-J7-9 Identify various air carbon cutting (CAC-A) **applications**, including

- depth and width of gouge
- removing material

WEL-10-J7-10 Describe various air carbon cutting (CAC-A) **applications**, including

- selection of the appropriate CAC-A applications
- characteristics and key features
- application (i.e., role or utility in specific scenarios)
- limitations in scope or performance

WEL-10-J8 Describe and demonstrate the procedures to cut and gouge using air carbon cutting (CAC-A) processes.

WEL-10-J8-1 Describe and demonstrate the process to **set up** air carbon cutting (CAC-A) equipment, including

- visually inspecting for damage
- attaching components to power source
- attaching components to air supply
- attaching work lead clamp to base metal

WEL-10-J8-2 Describe and demonstrate the process to set the **operating parameters** for **air carbon cutting (CAC-A) equipment**, including

- setting amperage
- adjusting regulator
- verifying operating parameters and electrode selection

WEL-10-J8-3 Describe and demonstrate the process to perform **cutting and gouging** with **air carbon cutting (CAC-A) equipment**, including

- starting up CAC-A equipment
- inserting electrode into holder

- maintaining electrode to work angle
- adjusting carbon electrode stick-out during use
- maintaining travel speed
- identifying defects after gouging
- cleaning material
- shutting down equipment

WEL-10-J9 Demonstrate the procedures to cut and gouge using thermal processes.

WEL-10-J9-1 Describe and demonstrate the process to **cut and gouge** using **oxy-fuel gas cutting** (OFC) equipment, including

- straight cuts
- circular cuts
- bevel cuts
- internal shaped cuts

WEL-10-J9-2 Describe and demonstrate the process to **cut and gouge** using **plasma arc cutting** (PAC) equipment, including

- straight cuts
- circular cuts
- bevel cuts
- internal shaped cuts

WEL-10-J9-3 Describe and demonstrate the process to **cut and gouge** using **air carbon arc cutting** (CAC-A) equipment, including

- removing welds
- gouging practice plates
- gouging and removing backing plates

Curriculum Implementation Resources

Curriculum implementation resources are frequently added. Please refer to https://edu.gov.mb.ca/k12/framework/sytep/welding/resources/index.html.