



8503

APPLIED SPECIALTIES AND  
QUALIFICATIONS (12D)

40S/40E/40M

A Welding Technology Course



# 8503 APPLIED SPECIALTIES AND QUALIFICATIONS (12D) 40S/40E/40M

## Course Description

This course is intended for students who are intending to pursue a career in welding. The emphasis is on preparing for and performing the Manitoba Welder Practical Examination Structural Level 1 (Canadian Welding Bureau). Students are also introduced to hoisting, lifting, and rigging, as well as to access equipment.

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### **Goal 1:** Describe and apply **health and safety** practices.

#### **GLO 1.1:** Demonstrate adherence to **safe practices** and **procedures**.

- SLO 12D.1.1.1 Demonstrate adherence to safe practices and procedures for facilities, processes, tools, and equipment.
- SLO 12D.1.1.2 Identify safety and health requirements. (A1.1)
- SLO 12D.1.1.3 Identify personal protective equipment (PPE) and PPE procedures. (A1.2)
- SLO 12D.1.1.4 Identify electrical safety. (A1.3)
- SLO 12D.1.1.5 Identify fire safety. (A1.4)
- SLO 12D.1.1.6 Identify ergonomics. (A1.5)
- SLO 12D.1.1.7 Identify hazard recognition and control. (A1.6)
- SLO 12D.1.1.8 Describe the hazards of confined space entry. (A1.7)
- SLO 12D.1.1.9 Identify first aid/cardiopulmonary resuscitation (CPR). (A1.8)
- SLO 12D.1.1.10 Identify safety requirements as they apply to WHMIS. (A1.9)
- SLO 12D.1.1.11 Describe the identification and control of specified hazards. (A1.10)
- SLO 12D.1.1.12 Read, interpret, and communicate safety information (e.g., MSDS, etc.).
- SLO 12D.1.1.13 Safely store and handle compressed gas tanks.
- SLO 12D.1.1.14 Discuss hazards related to compressed gas.
- SLO 12D.1.1.15 Demonstrate the safe use of compressed air.
- SLO 12D.1.1.16 Demonstrate an understanding of and adherence to *Safe Work Procedures Job Hazards Analysis* documents for each piece of equipment that is used.

SLO 12D.1.1.17	Identify hazards and describe safe work practices pertaining to GMAW welding. (D6.2)
SLO 12D.1.1.18	Demonstrate an understanding of the worker's responsibility to refuse unsafe work.
SLO 12D.1.1.19	Identify hazards and describe safe work practices pertaining to SMAW welding. (D3.2)
SLO 12D.1.1.20	Identify hazards and describe safe work practices pertaining to FCAW welding. (D6.b.2)
SLO 12D.1.1.21	Identify hazards and describe safe work practices pertaining to MCAW welding. (D6.d2)
SLO 12D.1.1.22	Identify hazards and describe safe work practices pertaining to electric arc cutting and gouging. (D1.b.2)

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**GLO 1.2:** Demonstrate knowledge of the *Trade Safety Awareness Curriculum for Level 1 Apprentices*.

No applicable SLOs.

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**Goal 2:** Demonstrate an understanding of **metallurgy**.

**GLO 2.1:** Demonstrate an understanding of **metallurgy** as it applies to welding.

SLO 12D.2.1.1     Select appropriate filler materials to suit base metal.

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**Goal 3:** Demonstrate the **identification, operation, maintenance, and storage** of **equipment, materials, and consumable items**.

**GLO 3.1:** Demonstrate the **identification** and **operation** of equipment, materials, and consumable items.

SLO 12D.3.1.1	Demonstrate the safe and appropriate operation and handling of equipment, tools, materials, products, and consumable items used in advanced specialties and qualifications.
SLO 12D.3.1.2	Identify FCAW welding equipment, consumables, and accessories, and describe their applications. (D6.b.4)
SLO 12D.3.1.3	Identify MCAW welding equipment, consumables, and accessories, and describe their applications. (D6.d4)
SLO 12D.3.1.4	Identify electric arc cutting and gouging equipment and accessories, and describe their applications. (D1B4)
SLO 12D.3.1.5	Perform the procedures used to set up, adjust, and shut down electric arc cutting and gouging equipment. (D1B5)

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**GLO 3.2:** Demonstrate the safe and appropriate **maintenance** and **storage** of equipment, materials, and consumable items.

- SLO 12D.3.2.1 Practise the cleaning, maintenance, and storage of equipment, tools, materials, products, and consumable items used in applied specialties and qualifications.
  - SLO 12D.3.2.2 Describe the procedures used to inspect, maintain, and troubleshoot FCAW welding equipment. (D6.b.7)
  - SLO 12D.3.2.3 Identify the requirements and describe the procedures to store consumables used for FCAW welding of plate. (D6.c.4)
  - SLO 12D.3.2.4 Describe the procedures used to assemble and disassemble MCAW welding equipment. (D6.d5)
  - SLO 12D.3.2.5 Describe the procedures used to inspect, maintain, and troubleshoot MCAW welding equipment. (D6.d7)
  - SLO 12D.3.2.6 Identify requirements and describe the procedures to store consumables used for MCAW welding. (D6.e.4)
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**GLO 3.3:** Demonstrate an awareness of **hoisting, lifting, and rigging** procedures.

- SLO 12D.3.3.1 Define terminology associated with hoisting, lifting, and rigging. (A3.b.1)
- SLO 12D.3.3.2 Identify hazards and describe safe work practices pertaining to hoisting, lifting, and rigging. (A3.b.2)
- SLO 12D.3.3.3 Identify regulations pertaining to hoisting, lifting, and rigging. (A3.b.3)
- SLO 12D.3.3.4 Identify types of rigging equipment and accessories, and describe their limitations, applications, and procedures for use. (A3.b.4)
- SLO 12D.3.3.5 Identify types of hoisting and lifting equipment and accessories, and describe their applications and procedures for use. (A3.b.5)
- SLO 12D.3.3.6 Describe the procedures used to inspect, maintain, and store hoisting, lifting, and rigging equipment. (A3.b.6)
- SLO 12D.3.3.7 Describe the procedures used to rig material/equipment for lifting. (A3.b.7)
- SLO 12D.3.3.8 Describe the procedures used to attach and use tag lines. (A3.b.8)
- SLO 12D.3.3.9 Describe the procedures used to ensure the work area is safe for lifting. (A3.b.9)
- SLO 12D.3.3.10 Identify and describe the procedures used to communicate during hoisting, lifting, and rigging operations. (A3.b.10)

- SLO 12D.3.3.11 Identify the factors to consider when selecting rigging equipment. (A3.b.11)
- SLO 12D.3.3.12 Describe the procedures used to perform a lift. (A3.b.12)
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**GLO 3.4:** Demonstrate an awareness of **access equipment**.

- SLO 12D.3.4.1 Define terminology associated with access equipment. (A3.c1)
- SLO 12D.3.4.2 Identify hazards and describe safe work practices pertaining to access equipment. (A3.c2)
- SLO 12D.3.4.3 Identify regulations pertaining to access equipment. (A3.c3)
- SLO 12D.3.4.4 Identify types of access equipment, and describe their characteristics and applications. (A3.c4)
- SLO 12D.3.4.5 Identify types of fall protection and fall arrest equipment.
- SLO 12D.3.4.6 Erect and dismantle access equipment. (A3.c5)
- SLO 12D.3.4.7 Describe the procedures used to erect and dismantle access equipment. (A3.c6)
- SLO 12D.3.4.8 Describe the procedures used to inspect and maintain access equipment. (A3.c7)
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**Goal 4:** Demonstrate an understanding of **welding processes** and exhibit competence in those processes.

**GLO 4.1:** Demonstrate **pre-welding** procedures.

- SLO 12D.4.1.1 Prepare material for the Manitoba Welder Practical Examination Structural Level.
- SLO 12D.4.1.2 Describe the procedures used to assemble and disassemble FCAW welding equipment. (D6.b.5)
- SLO 12D.4.1.3 Identify the considerations when selecting consumables and determining equipment set-up for performing FCAW fillet and groove welds on plate. (D6.c.3)
- SLO 12D.4.1.4 Describe the procedures used to prepare plate for FCAW fillet and groove welds. (D6.c.5)
- SLO 12D.4.1.5 Identify the considerations when selecting consumables and determining equipment set-up for performing MCAW fillet and groove welds. (D6.e.3)
- SLO 12D.4.1.6 Describe the procedures used to prepare base metals and joints for MCAW fillet and groove welds. (D6.e.5)
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**GLO 4.2: Demonstrate ability to weld.**

- SLO 12D.4.2.1 Identify GTAW, stud welding, resistance welding, and SAW welding processes, and describe their characteristics and applications. (D1A.5e, f, g, & h)
  - SLO 12D.4.2.2 Describe the procedures and techniques used to deposit a weld bead using FCAW welding equipment. (D6.b.6)
  - SLO 12D.4.2.3 Describe the procedures used to perform fillet and groove welds on plate using the FCAW process. (D6.c.6)
  - SLO 12D.4.2.4 Describe the procedures and techniques used to weld bead using MCAW equipment. (D6.d.6)
  - SLO 12D.4.2.5 Perform the procedures used to perform fillet and groove welds using the MCAW process. (D6.e.6)
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**GLO 4.3: Perform post-welding procedures.**

- SLO 12D.4.3.1 Perform post-welding procedures for the Manitoba Welder Practical Examination Structural Level.
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**GLO 4.4: Inspect and troubleshoot welding projects.**

- SLO 12D.4.4.1 Inspect and troubleshoot Manitoba Welder Practical Examination Structural Level welds.
  - SLO 12D.4.4.2 Describe the procedures used to prevent and correct weld faults. (D6.e.7, D1B6)
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**GLO 4.5: Perform cutting and gouging.**

- SLO 12D.4.5.1 Perform the procedures used to gouge using oxy-fuel equipment. (C3.10)
  - SLO 12D.4.5.2 Define terminology associated with electric arc cutting and gouging. (D1B.1)
  - SLO 12D.4.5.3 Describe the electric arc cutting and gouging processes and their applications. (D1B.3)
  - SLO 12D.4.5.4 Describe the procedures used to cut using electric arc cutting equipment. (D1B.7)
  - SLO 12D.4.5.5 Describe the procedures used to gouge using electric arc gouging equipment. (D1B.8)
  - SLO 12D.4.5.6 Identify air-carbon arc gouging. (D1B.9)
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**GLO 4.6: Perform the Manitoba Welder Practical Examinations.**

- SLO 12D.4.6.1 Identify welding test positions and describe their characteristics and restrictions. (D1.10)
- SLO 12D.4.6.2 Perform the Oxy/Acetylene Cutting Practical Examination. (E1A)

- SLO 12D.4.6.3 Successfully complete the Flat GMAW Practical 1F Examination. (E1B)
- SLO 12D.4.6.4 Successfully complete the Flat MCAW Practical 1F Examination. (E1C)
- SLO 12D.4.6.5 Successfully complete the Flat SMAW Practical 1F Examination. (E1D)
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**Goal 5: Demonstrate an understanding of metal design and fabrication.**

**GLO 5.1: Design** metal projects.

- SLO 12D.5.1.1 Interpret information pertaining to FCAW fillet and groove welds found on drawings and specifications. (D6.c.2)
- SLO 12D.5.1.2 Interpret information pertaining to the MCAW fillet and groove welds found on drawings and specifications. (D6.e.2)
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**GLO 5.2: Fabricate** metal projects.

No applicable SLOs.

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**Goal 6: Describe and apply the transferable cross-curricular knowledge and skills.**

**GLO 6.1: Apply** knowledge and skills from the **language arts**.

- SLO 12D.6.1.1 Define terminology associated with FCAW welding. (D6.b.1)
- SLO 12D.6.1.2 Define terminology associated with FCAW fillet and groove welds. (D6.c.1)
- SLO 12D.6.1.3 Define terminology associated with MCAW welding. (D6.d.1)
- SLO 12D.6.1.4 Define terminology associated with MCAW fillet and groove welds. (D6.e.1)
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**GLO 6.2: Demonstrate the mathematics** skills related to welding.

No applicable SLOs.

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**GLO 6.3: Demonstrate** knowledge of **other subject areas**.

- SLO 12D.6.3.1 Demonstrate an awareness of the use of information and communication technology in creating electronic portfolios and searching for employment.



SLO 12D.6.3.2 Read, interpret, and communicate welding symbols.

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**Goal 7:** Follow the **ethical** and **legal standards** that pertain to the welding industry.

**GLO 7.1:** Demonstrate an awareness of the **ethical** and **legal expectations** of welders.

- SLO 12D.7.1.1 Demonstrate an awareness of various types of welding certification.
  - SLO 12D.7.1.2 Identify codes and standards pertaining to FCAW welding. (D6.b.3)
  - SLO 12D.7.1.3 Identify codes and standards pertaining to MCAW welding. (D6.d3)
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**Goal 8:** Demonstrate **employability skills**.

**GLO 8.1:** Demonstrate **employability skills**.

- SLO 12D.8.1.1 Demonstrate problem-solving skills.
  - SLO 12D.8.1.2 Demonstrate critical thinking skills.
  - SLO 12D.8.1.3 Demonstrate regular attendance and punctuality.
  - SLO 12D.8.1.4 Demonstrate accountability for their actions.
  - SLO 12D.8.1.5 Demonstrate adaptability, initiative, and effort.
  - SLO 12D.8.1.6 Demonstrate the ability to accept and follow direction and feedback.
  - SLO 12D.8.1.7 Demonstrate teamwork skills.
  - SLO 12D.8.1.8 Demonstrate the ability to stay on task and effectively use time in class and shop environments.
  - SLO 12D.8.1.9 Demonstrate the ability to communicate respectfully and effectively with teachers and students.
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**Goal 9:** Demonstrate an awareness of **sustainability** as it pertains to the welding industry.

**GLO 9.1:** Describe the impact of **human sustainability** on the health and well-being of welders.

No applicable SLOs.

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**GLO 9.2:** Describe the welding industry's **sustainability practices** and impact on the environment.

- SLO 12D.9.2.1 Demonstrate an awareness of the impact of welding work sites on the environment.
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**GLO 9.3:** Describe the **sustainable business practices** within the welding industry.

No applicable SLOs.

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**Goal 10:** Demonstrate an understanding of the **structure** and **scope** of welding.

**GLO 10.1:** Describe the **scope** of welding.

No applicable SLOs.

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**GLO 10.2:** Describe **apprenticeship, post-secondary,** and **employment opportunities.**

- SLO 12D.10.2.1 Describe the Manitoba Welder Apprenticeship Program. (A2.2)
  - SLO 12D.10.2.2 Explain special challenges and opportunities re: apprenticeship training. (A2.3)
  - SLO 12D.10.2.3 Demonstrate an awareness of the advantages of certification for welders.
  - SLO 12D.10.2.4 Demonstrate the skills required to obtain employment as a welder or in a related occupation.
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**Goal 11:** Demonstrate an understanding of the **evolution, technological progression,** and **emerging trends** in welding.

**GLO 11.1:** Demonstrate an understanding of the **evolution, technological progression,** and **emerging trends** in welding.

No applicable SLOs.

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