

Apprenticeship and Industry Training

Apprenticeship Core Competence Statements

Welder



Apprenticeship
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Training

Alberta 



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Core competence statements

Apprenticeship and Industry Training (AIT) defines the core competences as the capabilities needed for each profession. AIT works with subject matter experts from across Alberta, including individuals from industry, associations, trade organizations and post-secondary institutions, to identify the core competences for each designated trade.

Breakdown of core competence statements

Core competence statements

These are a list of specific tasks that require essential skills, knowledge, activities, or functions for someone to be deemed proficient in their trade.

Section title

This term provides a heading and overview of the content, category of related topics and is crafted from tasks found within a trade's Board Order.

Competence statement

An observable major task, work activity, or outcome that an entry-level journeyperson performs on-the-job.

Competences

The skills and knowledge demonstrated on-the-job and in classroom instruction that supports achievement of the competence statement by an apprentice or journeyperson in their skilled trade.

Profile

A profile for an apprenticeship education program in Alberta outlines the specific skills, knowledge, abilities, and behaviours necessary to work in a profession. The profile consists of a set of core competence statements, a curriculum guide, a record book and supporting documents.

NOTE: These documents are available on the Apprenticeship and Industry Training website tradesecrets.alberta.ca.



Welder trade

A journeyperson Welder is an individual who can:

- Apply occupational health and safety legislation, hazard controls, and safe work practices to welding and cutting activities;
- Interpret drawings, specifications, welding symbols, and codes to plan and perform work;
- Identify, select, prepare, and handle metals, filler materials, and consumables;
- Lay out, fit up, and tack weld components for plate, structural, and pipe assemblies;
- Set up, operate, and maintain welding and cutting equipment and tools;
- Perform oxyfuel cutting, thermal cutting, gouging, and beveling operations;
- Produce fillet and groove welds using Shielded Metal Arc Welding (SMAW);
- Produce welds using Gas Tungsten Arc Welding (GTAW) on carbon steel, aluminum, and stainless steel;
- Produce welds using Gas Metal Arc Welding (GMAW), Flux-Cored Arc Welding (FCAW), Metal Cored Arc Welding (MCAW), and Submerged Arc Welding (SAW);
- Control welding variables, heat input, and distortion to meet procedure and quality requirements;
- Inspect welds, identify defects, and apply corrective actions;
- Apply knowledge of metallurgy, heat treatment, and material behavior to support weld integrity;
- Perform measurements, calculations, and basic estimating required for welding tasks;
- Communicate effectively and coordinate work with team members;
- Demonstrate professionalism, quality workmanship, and safe, ethical conduct;
- Provide guidance and mentorship to apprentices in the workplace.

Core competences

Welder Core Competences:

1. Foundational Skills, Safety and Procedures
2. Properties of Metals
3. Material Preparation, Handling and Identification
4. Drafting, Drawings and Specifications
5. Shielded Metal Arc Welding (SMAW)
6. Gas Tungsten Arc Welding (GTAW)
7. Gas Metal Arc Welding (GMAW), Flux-Cored Arc Welding (FCAW), Metal Cored Arc Welding (MCAW), and Submerged Arc Welding (SAW)

Core Competence 1: Foundational Skills, Safety and Procedures

Core Competence Statement:



Apply occupational health and safety legislation, hazard controls, industry codes, and safe work practices to welding, cutting, and gouging operations while demonstrating quality workmanship and mentorship in the Welder trade.

Competences:

- Apply OHS legislation, regulations, and industry standards.
- Apply WHMIS, hazardous materials, and fire protection procedures.
- Apply welding, cutting, and confined space safety.
- Perform climbing, rigging, lifting, and hoisting.
- Set up, operate, and maintain oxyfuel equipment.
- Perform arc cutting and gouging (plasma and carbon arc).
- Select, use, and maintain hand and power tools.
- Apply codes, standards, Red Seal requirements, and workplace coaching.

Core Competence 2: Properties of Metals

Core Competence Statement:



Apply knowledge of metallurgy, metal identification, heat treatment, and testing methods to support weld integrity and material selection in accordance with codes and specifications.

Competences:

- Identify ferrous and non-ferrous metals.
- Describe mechanical and physical properties of metals.
- Perform chip, spark, file, hardness, and flame tests.
- Apply preheat, interpass, and post-weld heat treatment.
- Identify carbon, alloy, stainless, clad steels, and nickel and aluminum alloys.
- Select filler metals per AWS and CSA specifications.
- Interpret mill test reports and apply hardfacing principles.
- Apply non-destructive and destructive testing methods.

Core Competence 3: Material Preparation, Handling and Identification

Core Competence Statement:



Prepare, handle, and identify materials by performing layout, cutting, fit-up, and quality control activities to meet drawing, code, and inspection requirements.

Competences:

- Verify materials and use measuring tools to confirm dimensions.
- Prepare surfaces for welding.
- Perform layout on plate and pipe.
- Develop patterns and use templates.
- Perform oxyfuel and plasma cutting on plate, pipe, and structural shapes.
- Perform beveling, coping, and piercing operations.
- Perform fit-up, alignment, and tack welding.
- Apply quality control procedures and document inspection results.

Core Competence 4: Drafting, Drawings and Specifications

Core Competence Statement:



Interpret drawings, specifications, welding and NDT symbols, and apply trades math to plan and perform fabrication in accordance with structural, pressure vessel, and piping requirements.

Competences:

- Interpret welding, NDT, and supplementary symbols.
- Identify basic joint and weld types.
- Apply fractions, decimals, ratios, percentages, and measurement systems.
- Apply geometric formulas and perform related calculations.
- Interpret orthographic and isometric drawings.
- Interpret structural, pressure vessel, and piping drawings.
- Develop spool sheets, bills of materials, and project estimates.
- Adapt to drawing revisions and field conditions

Core Competence 5: Shielded Metal Arc Welding (SMAW)

Core Competence Statement:



Perform SMAW fillet and groove welds on mild steel plate and pipe using appropriate electrodes and procedures to produce sound welds that meet code and inspection standards.

Competences:

- Identify SMAW equipment and power sources.
- Identify, select, and store mild steel SMAW electrodes.
- Perform surface welds and stringer beads.
- Perform fillet welds in 1F, 2F, 3F, and 4F positions.
- Perform groove welds in 1G, 2G, 3G, and 4G positions on plate.
- Perform groove welds on mild steel pipe (2G, 5G).
- Apply E4310 (E6010) root and E4918 (E7018) fill and cap procedures.
- Troubleshoot equipment issues affecting weld quality.

Core Competence 6: Gas Tungsten Arc Welding (GTAW)

Core Competence Statement:



Perform GTAW on carbon steel, aluminum, and stainless steel using appropriate equipment, electrodes, filler metals, and shielding gases to produce welds that meet procedure and code requirements.

Competences:

- Describe the GTAW process and applications.
- Identify GTAW equipment, torches, and power sources.
- Identify and prepare GTAW electrodes.
- Select filler metals and shielding gases.
- Perform touch, lift, and high-frequency arc starts.
- Perform GTAW welds on mild steel plate and pipe.
- Perform GTAW welds on aluminum and stainless steel.
- Troubleshoot and maintain GTAW equipment.

Core Competence 7: Gas Metal Arc Welding (GMAW), Flux-Cored Arc Welding (FCAW), Metal Cored Arc Welding (MCAW), and Submerged Arc Welding (SAW)

Core Competence Statement:



Perform wire-feed welding processes on mild steel and aluminum plate and pipe using appropriate equipment, consumables, and shielding gases to produce welds that meet code and inspection standards.

Competences:

- Identify wire feed power sources, feeders, and gun assemblies.
- Identify filler metals and modes of metal transfer.
- Identify shielding gases and supply systems.
- Set up, maintain, and troubleshoot wire feed equipment.
- Perform GMAW welds on mild steel plate and pipe.
- Perform GMAW welds on aluminum.
- Perform FCAW and MCAW welds on mild steel plate and pipe.
- Describe and apply Submerged Arc Welding (SAW) principles.

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