# What Is This About?

The Apprenticeship Training Standard Log Book identifies all the skills associated with your trade in Ontario. It is written in statements that describe how you, the apprentice, must perform each skill in order to be considered competent in that skill.

## Training As An Apprentice

- Notify Ministry of Advanced Education and Skills Development (MAESD) staff **immediately** of any changes to contact information or training agreement, especially if you change sponsors.
- Review the Log Book regularly with your trainer and sponsor to track your progress.
- Keep an accurate record of the hours you work.
- Attend classroom training when it is offered.
- Apply for the financial incentives for which you are eligible.
- Pay your annual membership fee to the Ontario College of Trades and keep your membership in good standing.

## Completing Your Log Book

There are two types of signatures required in your Log Book:

**Skill Confirmation**

You and your trainer sign off each required skill to confirm that you have demonstrated competency in that skill.

**Skill Set Confirmation**

After you and your trainer have signed off all the required skills in a skill set, your sponsor signs the signature box at the end of each skill set to confirm your competency in the skill set.

Shaded boxes in your Log Book mean the skills are optional and do not have to be confirmed by your trainer or sponsor. However, you are encouraged to complete them as part of your training.

## Changing Sponsors

- Contact MAESD immediately if you change sponsors as you will need to sign a new Registered Training Agreement.
- Record your original Sponsor’s information in Sponsor Record #1 (the sponsor who has signed your initial Registered Training Agreement).

---

This document is the property of the apprentice named inside and represents the official record of your training. For information about completing your apprenticeship, see inside of back cover.
Apprentice Name: ______________________________________________________________

Address: _____________________________________________________________________
_____________________________________________________________________________

Phone Number: ________________________________________________________________

Email Address: _________________________________________________________________

Trade: _______________________________________________________________________

Ministry of Advanced Education and Skills Development Registered Training Agreement #:

OCOT Membership #:

This document is the property of the Apprentice named herein and represents the official record of their training.

If you have questions about the use of this Training Standard Log Book or about your Apprenticeship program, contact your Apprenticeship office (see Appendix D in this book) or the Employment Ontario hotline at: 1-800-387-5656.

You must become a member of the College of Trades Apprentices Class and maintain your membership in good standing while you complete your training. For more information on membership, please visit the College of Trades website at: collegeoftrades.ca
**Apprenticeship Pathway to a Certificate of Qualification**

**Phase 1: Registration**
- Submit Application for Apprenticeship Training to local Employment Ontario office offering apprenticeship services
- Ministry registers training agreement signed by both apprentice and sponsor
- Submit College (Apprentice Class) membership application with annual membership fee
- Obtain Apprenticeship Training Standard from College collegeoftrades.ca/training-standards

**Phase 2: Apprenticeship**
- Complete on-the-job training
  - Complete the on-the-job training set out in the Apprenticeship Training Standard Log Book established by College
- Complete in-school training
  - Complete the in-class training set out in the Curriculum Training Standard established by College at an approved Training Delivery Agent
- Maintain College membership
- Submit proof of apprenticeship completion to Ministry

**Phase 3: Certification**
- Ministry issues Certificate of Apprenticeship
  - Trades without examination
  - Trades with examination*
- College activates 12-month membership in Journeyperson Candidates Class
- Contact College to make payment to attempt Certificate of Qualification examination
- Contact Ministry to schedule Certificate of Qualification examination attempt
- Pass Certificate of Qualification examination must receive grade of 70% or higher to pass
- College issues Certificate of Qualification and membership in Journeypersons Class

**Legend**
- Ontario College of Trades → College
- Ministry of Advanced Education and Skills Development → Ministry

**For information on the proof of completion required for your trade, contact your local Employment Ontario office offering apprenticeship services**
http://services.findhelp.ca/eo/tcu/appoff

**If the exam is failed, another attempt may be scheduled 15 days after previous exam date. An exam fee is required for each attempt. The exam results letter shows areas of strength and weakness to help prepare for the next attempt**

**For a list of trades subject to a certification examination, visit:**
collegeoftrades.ca/resources/exam-process

**Download the College’s Exam Preparation Guide to help prepare to attempt the Certificate of Qualification examination**
collegeoftrades.ca/resources/exam-process

**Apprentices eligible to apply for apprenticeship grants (Red Seal trades), incentives and loans**

**Sponsor eligible to apply for the Apprenticeship Training Tax Credit (in specific trades) and other incentives**

**Sponsor eligible to apply for Apprenticeship Completion Bonus**

**Apprentice eligible to apply for Apprenticeship Completion Employer Bonus**

* Version: 2016-07-04

* For a list of trades subject to a certification examination, visit: collegeoftrades.ca/resources/exam-process
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Any updates to this publication are available on-line; to download this document in PDF format, please follow the link: collegeoftrades.ca.

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Revised 2015 (V300)
TERMS AND CONDITIONS AS PER REGISTERED TRAINING AGREEMENT

The Apprentice agrees:
- to inform the Ministry of Advanced Education and Skills Development of any change to their contact information or change in sponsor within 7 days;
- to follow the Sponsor’s and Trainer’s lawful instructions and make every effort to acquire the skills identified in the Apprentice Training Standard Log Book (Log Book) for the Trade which is part of the apprenticeship program established by the Ontario College of Trades for the trade;
- to obtain written verification from the Sponsor and the Trainer(s) that the requirements in the Log Book for the trade have been met.

The Sponsor agrees:
- to ensure that the Apprentice is provided with the training required as part of the apprenticeship program established by the College of Trades for this trade;
- to ensure that the Trainer(s) verifies, in writing, when each skill identified in the Log Book for the trade has been successfully completed by the Apprentice;
- to review the progress of training with the Apprentice, and with the Trainer(s) where the Sponsor and the Trainer are not the same party.

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INTRODUCTION TO THE LOG BOOK

On April 8th, 2013, the Ontario College of Trades (College) became responsible for the development and maintenance of Log Books in the Province of Ontario.

Please refer to the College of Trades website for the most accurate and up-to-date information: collegeoftrades.ca

This Log Book is intended to be used by the Apprentice and Sponsor as an official record of training. The completion of this document is necessary to complete your apprenticeship and receive your Certificate of Apprenticeship.

The Log Book identifies skills required for this trade and its related training program. It has been written in statements which describe how you, the Apprentice, must perform each skill in order to become competent in your trade.

The Trainer and Apprentice are required to sign off and date each skill after the Apprentice has proven competence in these skills. However, if a skill is shaded, it is optional and does not need to be signed off.

This on-the-job Log Book is a document issued to Apprentices who sign a Registered Training Agreement in the Province of Ontario. It is designed to record an Apprentice’s acquired skills and time worked for the trade to which they are registered. This Log Book is developed by the Ontario College of Trades and used by the Ministry of Advanced Education and Skills Development.

This Apprenticeship Log Book for Instrumentation and Control Technician 447A was developed in consultation with representatives from industry and may include members from a related Trade Board/Working Committees.

The information presented in this standard is, to the best of our knowledge, current at time of printing and is intended for general application.
ROLES AND RESPONSIBILITIES

Ontario College of Trades
Under the *Ontario College of Trades and Apprenticeship Act, 2009 (OCTAA)*, the College of Trades is responsible for:

- Establishing and maintaining qualifications for membership;
- Issuing Certificates of Qualification and Statements of Membership;
- Maintaining a Public Register of members;
- Receiving and investigating complaints, and determining disciplinary action;
- Establishing Apprenticeship Programs, Training Standards and Scopes of Practice for each trade;
- Conducting Trade Equivalency Assessments;
- Determining Journeyperson-to-Apprentice ratios;
- Addressing compliance with legislation (OCTAA) and regulations; and,
- Promoting the skilled trades and conducting research.

For any matters related to your membership in the Apprentices class, you must contact the College of Trades directly at: (647) 847-3000 or toll free at: 1(855) 299-0028.

Ministry of Advanced Education and Skills Development
Is responsible for:

- Registering Training Agreements;
- Approving which persons may provide apprenticeship training;
- Approving Training Delivery Agents;
- Issuing Certificates of Apprenticeship;
- Administering Certificate of Qualification examinations;
- Promoting skilled trades and apprenticeship;
- Conducting policy development, evaluation and research; and,
- Passing regulations.

For any matter related to your Registered Training Agreement or completing your apprenticeship, you must contact your Local Apprenticeship Office at the Ministry of Advanced Education and Skills Development.
Roles and Responsibilities of the Apprentice

An Apprentice is an individual who has entered into a Registered Training Agreement with a Sponsor to receive training in a trade as part of an apprenticeship program established by the College of Trades.

As an Apprentice, you have certain roles and responsibilities to follow throughout your apprenticeship training:

Steps:

1. You must become a member of the College of Trades Apprentices Class and maintain your membership in good standing while you complete your training. For more information on membership, please visit the College of Trades website at: collegeoftrades.ca

2. As an Apprentice, you are responsible for completing skills or skill sets in this Log Book and ensuring that they are dated and signed by both you and your Trainer.

3. You must also ensure your Skill Set Completion Form is completed and signed by your current Sponsor once you have demonstrated competence in all the mandatory skills in this Log Book. Once this is done, we recommend you submit the Log Book to your local Ministry of Advanced Education and Skills Development office.

4. You are responsible for informing the staff at your local Ministry of Advanced Education and Skills Development office regarding changes to the following:
   - Your Sponsor’s address;
   - Your name and address; and/or,
   - Your Sponsor, including starting employment with a new Sponsor.

5. You must present the Apprentice Completion Form (Please refer to Appendix B), once all unshaded skills and skill sets have been completed within this document, along with your authorized Log Book to your local Ministry of Advanced Education and Skills Development office.
Roles and Responsibilities of Sponsors and Trainers

Log Books identify the on-the-job skills required for a trade and its related training program.

This Log Book has been written in concise statements which describe how well an Apprentice must perform each skill in order to become competent. Competence means being able to perform to the required standard.

By using this Log Book, Trainers will be able to ensure that the Apprentice is developing skills detailed for the trade.

Trainers and Apprentices are required to sign off and date the skills following each successful acquisition.

The detailed content listed for each skill is not intended to represent an inclusive list; rather, it is included to illustrate the intended direction for the skill acquisition.

The Trainer must provide their signature based on their assessment and professional judgment that the apprentice is competent in the skills described above. The Trainer’s signature is not a general warranty or guarantee of the apprentice’s future conduct.

Sponsors participating in this training program will be designated as the Signing Authority and are required to attest to successful achievement by signing the appropriate box included at the end of each skill set.
SAFETY

Safe working procedures and conditions, accident prevention and the preservation of health are of primary importance for apprenticeship programs in Ontario. These responsibilities are shared and require the joint efforts of government, sponsors, employers, employees and the public. Therefore, it is imperative that all parties become aware of circumstances that may lead to injury or harm. Safe learning experiences and environments can be created by controlling the variables and behaviours that may contribute to or cause an accident or injury.

It is generally recognized that a safe attitude contributes to an accident free environment. Everyone will benefit as a result of a healthy attitude towards prevention of accidents.

A tradesperson is possibly exposed to more hazards than any other person in the work force and, therefore, should be familiar with and apply Occupational Health and Safety Act and Regulations dealing with personal safety and the personal safety rules applying to each task.

Legal and Administrative Aspects of Safety:

Accident prevention and the provisions of safe working conditions are the responsibilities of an employer and employee.

Employer’s Responsibilities - The employer is responsible for:

- Providing and maintaining safety equipment and protective devices;
- Ensuring proper safe work clothing and personal protective equipment (PPE) is worn;
- Enforcing safe working procedures;
- Providing safeguards for machinery, equipment and tools;
- Observing all accident prevention regulations; and,
- Training employees in the safe use and operation of equipment.

Employee’s Responsibilities - The employee is responsible for:

- Working in accordance with the safety regulations pertaining to the job environment;
- Working in such a way as not to endanger themselves or fellow employees and the public.

Workplace Health and Safety’s Responsibilities:

- Workplace Health and Safety (Ontario’s Ministry of Labour) will conduct periodic inspections of the workplace to ensure that safety regulations for industry are being observed.
APPRENTICESHIP PROGRAM SUMMARY

Scope of Practice

The Scope of Practice for the trade of Instrumentation and Control Technician is set out in section 22 of Ontario Regulation 276/11 under OCTAA and reads as follows:

The scope of practice for the trade of Instrumentation and Control Technician includes installing, calibrating, configuring, maintaining, servicing, testing, troubleshooting, analysing and upgrading measuring and control devices and systems, which equip process industries, by doing the following:

1. Working with instruments such as transmitters, sensors, detectors, signal conditioners, recorders, controllers and final control elements, including various types of auto valves and variable frequency drives.
2. Practicing within all areas of industry to measure, record, research, analyze and control product output, as well as monitoring and controlling emissions to protect the environment.
3. Installing, calibrating, maintaining, servicing and troubleshooting, analyzing and upgrading measuring control and devices and systems, including the areas of distributed control systems, programmable logic controllers, supervisory control and data acquisition systems and other high-tech systems.
4. Servicing analytical instrumentation such as gas chromatography and gas detection and monitoring and analyzing instruments.
5. Servicing microprocessing instruments, including fieldbus systems and wireless communications. O. Reg. 276/11, s. 22.

*While the Log Book draws on the scope of practice regulation (Section 22 of Ontario Regulation 276/11 under OCTAA). The Log Book does not purport to add to or modify the scope of practice as provided in regulation.*

Program Guidelines

On-the-Job Training Duration
Industry has identified 8000 hours as the duration necessary for any Apprentice to become competent in the skills required. There may be circumstances in which the duration varies from this guideline.

Classroom Training Duration
Industry has identified 720 hours of in-school training as the duration necessary for an Apprentice to complete the in-school curriculum for this program.

Journeyperson to Apprentice Ratio
Ratio information is current at time of printing. Please check the Ontario College of Trades website for current information on Regulation 104/14 at www.collegeoftrades.ca/regulation
While some of the trades regulated under OCTAA are subject to Journeyperson to Apprentice ratios (ratios) set out in regulation, this trade is not one of them. Instead, industry has recommended a Journeyperson to Apprentice ratio guideline of 1 Journeyperson to 1 Apprentice as the ratio necessary for an Apprentice to be properly trained on the job in this program.

Ratio information is current at time of printing. Please check the Ontario College of Trades website for current information on ratios, please visit http://www.collegeoftrades.ca/public/journeyperson-to-apprentice-ratios

Compulsory and Voluntary Classification
Regulations under OCTAA set out the regulated trades in Ontario and the classification of each trade as either “compulsory” or “voluntary.” The trade of Instrumentation and Control Technician is Voluntary.

Eligibility for Apprenticeship Program Completion
The Apprentice must:
• Achieve competency in all mandatory (unshaded) skills as identified in the Log Book
• Complete the in-school training as outlined in the industry and College of Trades approved Curriculum Standard

It is the responsibility of an Apprentice to maintain a training record in the form of an Ontario College of Trades Apprenticeship Training Standard Log Book. The Sponsor and Trainer are required to sign off when competencies in the trade are achieved.

ESSENTIAL SKILLS SUMMARY
Essential skills are needed for work, learning and life. They provide the foundation for learning all other skills and enable people to evolve with their jobs and adapt to workplace change. Through extensive research, the Government of Canada and other national and international agencies have identified and validated nine essential skills. These skills are used in nearly every occupation and throughout daily life in different ways.

A series of tools endorsed by the Canadian Council of Directors of Apprenticeship (CCDA) have been developed to support apprentices in their training and to be better prepared for a career in the trades. The tools can be used independently or with the assistance of a tradesperson, trainer, employer, teacher or mentor to:
• Understand how essential skills are used in the trades;
• Learn about individual essential skills strengths and areas for improvement, and,
• Improve essential skills and increase success in an apprenticeship program.

A link to the complete essential skills profile for Red Seal trades can be found at red-seal.ca.

Other Required Certification(s) (if applicable):
A certification issued by the Technical Standards and Safety Authority as an Industrial Maintenance Technician (IMT) or Gas Fitter (G2) is needed to work on devices connected to pressurized gas lines.
TRAINING THE APPRENTICE

Tips for Apprentices
Remember, it takes time to learn. The following is a list of additional tips and tools to help make the most of your apprenticeship training:

- Practice safe work habits;
- Use your Apprenticeship Log Book as a journal to keep track of the skills you have achieved;
- Listen to the suggestions of your Trainer;
- Discuss your training needs with your Sponsor;
- Review your training plan with your Training Consultant, Trainer, or Sponsor;
- Ask your Trainer questions if you are unsure of any skill you need to perform or any tools or equipment you need to use to perform your duties;
- Show enthusiasm and develop good work habits; and,
- Upon demonstration of competency, ensure that you and your Trainer sign off the individual skills. Once a ‘set of skills’ have been signed off, ensure your Sponsor signs off this area as well.

Sponsor
Sponsors are responsible for ensuring all terms are met as per the Registered Training Agreement. They are named on the Registered Training Agreement as the entity responsible for ensuring Apprentices receive the training required as part of an apprenticeship program. As a signatory to this agreement, they are designated as the ‘Signing Authority’ for the Apprentice’s Skill Set Completion Form, and are required to attest to successful achievement by signing the appropriate box at the completion of each skill set.

Tips for Sponsors
- Select Trainers with good communication skills and who work well with others;
- Ensure that the Apprentice always works under the direction of or has access to a qualified Trainer;
- Encourage Trainers to take upgrading courses (e.g. Train the Trainer, Mentor, Coach, etc.);
- Encourage safe work habits;
- Provide time for the Trainer to demonstrate skills to the apprentice;
- Provide opportunities and time for the Apprentice to learn the trade;
- Ensure that the Apprentice receives the varied on-the-job trade training experience outlined in this document;
- Set out clear expectations, and recognize good performance;
- Involve both the Apprentice and Trainer in developing the training plan and observe frequently;
- Provide constructive feedback and conduct regular performance reviews involving the Apprentice and Trainer;
- Use the Log Book as a monitoring tool and a part of regular performance evaluations; and,
- Complete the Skill Set Completion Form once the Apprentice has demonstrated competency in the skills.
Trainer
A Trainer is an individual who oversees the performance of a task and sets the workplace expectations and practices for the Apprentice. In compulsory trades, a Trainer must hold a valid Certificate of Qualification and be a member of the College of Trades Journeypersons Class. In voluntary trades, a Trainer is an individual who holds one of the following:

- A valid Certificate of Qualification and is a member of the College of Trades Journeypersons Class; or,
- Holds a Statement of Membership in the College of Trades Tradespersons Class; or,
- Holds a Certificate of Qualification previously issued by Ministry of Advanced Education and Skills Development; or,
- Holds a Certificate of Apprenticeship in the trade; or,
- Has completed both the workplace-based training (competencies and/or hours as applicable) and classroom training components of the trade’s apprenticeship program; or,
- Has workplace experience equivalent to the apprenticeship program (eligible to apply to College membership in the Journeypersons or Tradespersons Classes) or has the skills outlined in the Log Book.

Tips for Trainers
Trainers are responsible for ensuring the Apprentice is developing the skills outlined in this document. Here is a list of tips and tools to help Trainers in their supervision of Apprentices:

- Demonstrate model safe work habits;
- Provide opportunities and time for the Apprentice to learn the trade;
- Treat Apprentices fairly and with respect;
- Review the Log Book with the Apprentice and develop a training plan;
- Set out clear expectations and recognize good performance;
- Ensure that the Apprentice receives on-the-job trade training experience as outlined in this document;
- Encourage and respond to all questions;
- Be patient;
- Explain, show and demonstrate the skill;
- Provide continuous feedback;
- Sign off skills when your Apprentice demonstrates competency, and,
- Use the Log Book as a guide to evaluate competence in each skill area. By using the Log Book, Trainers will be able to ensure that the Apprentice is developing skills outlined in this document.
NOTICE OF COLLECTION OF PERSONAL INFORMATION

1. At any time during your apprenticeship training, you may be required to show this Log Book to the Ministry of Advanced Education and Skills Development. You will be required to submit the signed Apprenticeship Completion form to the Ministry of Advanced Education and Skills Development in order to complete your program. The Ministry of Advanced Education and Skills Development will use your personal information to administer and finance Ontario’s apprenticeship training system, including confirming your completion and issuing your Certificate of Apprenticeship.

2. The Ministry of Advanced Education and Skills Development will disclose information about your program completion and your Certificate of Apprenticeship to the Ontario College of Trades, as it is necessary for the College of Trades to carry out its responsibilities.

3. Your personal information is collected, used and disclosed by the Ministry under the authority of the Ontario College of Trades and Apprenticeship Act, 2009.

4. Questions about the collection, use and disclosure of your personal information by the Ministry may be addressed to the:

Manager, Employment Ontario Contact Centre
Ministry of Advanced Education and Skills Development
33 Bloor St. E, 2nd floor, Toronto, Ontario M7A 2S3
Toll-free: 1-800-387-5656; Toronto: 416-326-5656
## COMPETENCY ANALYSIS PROFILE

### Instrumentation and Control Technician 447A

*(All unshaded skill sets must be demonstrated/completed)*

### SKILL SETS

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<td>U6551.01</td>
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<tr>
<td>Work nearby workplace health and safety hazards</td>
<td>Handle workplace hazardous materials</td>
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<tr>
<td>U6551.02</td>
<td>U6551.03</td>
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<tr>
<td>Follow procedures for handling worksite waste</td>
<td>Comply with federal, provincial or municipal workplace legislation and regulations</td>
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<tr>
<td>U6551.04</td>
<td>U6551.05</td>
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<td>Use Personal Protective Equipment</td>
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<td>U6551.06</td>
<td>U6551.07</td>
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<td>Shut down equipment</td>
<td>Follow fire safety procedures</td>
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<td>U6551.08</td>
<td>U6551.09</td>
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<td>Identify the impact of environmental and atmospheric extremes</td>
<td>Work nearby energy sources</td>
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<td>U6551.10</td>
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### OCCUPATIONAL SKILLS

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<thead>
<tr>
<th>OCCUPATIONAL SKILLS</th>
<th>SKILLS</th>
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<tbody>
<tr>
<td>U6552</td>
<td>U6552.01</td>
</tr>
<tr>
<td>Select, inspect, use and maintain hand tools</td>
<td>Select, inspect, use and maintain portable and stationary power tools</td>
</tr>
<tr>
<td>U6552.02</td>
<td>U6552.03</td>
</tr>
<tr>
<td>Maintain calibration, configuration or test equipment</td>
<td>Interpret schematics and drawings</td>
</tr>
<tr>
<td>U6552.04</td>
<td>U6552.05</td>
</tr>
<tr>
<td>Use job documentation</td>
<td>Install mounting hardware</td>
</tr>
<tr>
<td>U6552.06</td>
<td>U6552.07</td>
</tr>
<tr>
<td>Install process connections</td>
<td>Use specialized computer equipment and software</td>
</tr>
<tr>
<td>U6552.08</td>
<td>U6552.09</td>
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<tr>
<td>Operate material handling equipment</td>
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### PROCESS MEASUREMENT AND INDICATING DEVICES

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<tbody>
<tr>
<td>U6553</td>
<td>U6553.01</td>
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<tr>
<td>Install pressure, temperature, level or flow measuring and indicating devices</td>
<td>Troubleshoot pressure, temperature, level or flow measuring and indicating devices</td>
</tr>
<tr>
<td>U6553.02</td>
<td>U6553.03</td>
</tr>
<tr>
<td>Perform preventative maintenance on pressure, temperature, level or flow measuring and indicating devices</td>
<td>Install motion, speed, position or vibration measuring or indicating devices</td>
</tr>
<tr>
<td>U6553.04</td>
<td>U6553.05</td>
</tr>
<tr>
<td>Troubleshoot motion, speed, position or vibration measuring or indicating devices</td>
<td>Perform preventative maintenance on mass, density or consistency measuring or indicating devices</td>
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<tr>
<td>U6553.06</td>
<td>U6553.07</td>
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<tr>
<td>Perform preventative maintenance on motion, speed, position or vibration measuring or indicating devices</td>
<td>Install mass, density or consistency measuring or indicating devices</td>
</tr>
<tr>
<td>U6553.08</td>
<td>U6553.09</td>
</tr>
<tr>
<td>Troubleshoot mass, density or consistency measuring or indicating devices</td>
<td>Perform preventative maintenance on mass, density or consistency measuring or indicating devices</td>
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### INSTRUMENTATION AND CONTROL TECHNICIAN

#### PROCESS, QUALITY CONTROL AND ENVIRONMENTAL ANALYZERS

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<tr>
<th>U6554</th>
<th>U6554.01</th>
<th>U6554.02</th>
<th>U6554.03</th>
<th>U6554.04</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install process analyzers</td>
<td>Troubleshoot process, quality control and environmental emission analyzers</td>
<td>Perform preventative maintenance on process, quality control and environmental emission analyzers</td>
<td>Calibrate process, quality control and environmental emission analyzers</td>
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#### SAFETY AND SECURITY SYSTEMS AND DEVICES

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<th>U6555.05</th>
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<tbody>
<tr>
<td>Install safety systems</td>
<td>Install security systems</td>
<td>Install Service Safety Instrumented Systems (SISs)</td>
<td>Troubleshoot safety, security and SISs systems</td>
<td>Perform preventative maintenance on safety, security and SISs systems</td>
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#### ENERGY DELIVERY SYSTEMS

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<tr>
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<th>U6556.03</th>
<th>U6556.04</th>
<th>U6556.05</th>
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</thead>
<tbody>
<tr>
<td>Install pneumatic equipment</td>
<td>Troubleshoot pneumatic equipment</td>
<td>Perform preventative maintenance on pneumatic equipment</td>
<td>Install electrical and electronic equipment</td>
<td>Troubleshoot electrical and electronic equipment</td>
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<tr>
<td>Install hydraulic equipment</td>
<td>Troubleshoot hydraulic equipment</td>
<td>Perform preventative maintenance on hydraulic equipment</td>
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#### COMMUNICATION SYSTEMS AND DEVICES

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<tbody>
<tr>
<td>Demonstrate knowledge of types of signal transmission systems</td>
<td>Install signal transmission systems</td>
<td>Troubleshoot signal transmission systems</td>
<td>Install signal converters</td>
<td>Troubleshoot signal converters</td>
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<tr>
<td>Perform preventative maintenance on signal converters</td>
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#### FINAL CONTROL DEVICES

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<thead>
<tr>
<th>U6558</th>
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<th>U6558.04</th>
<th>U6558.05</th>
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<tbody>
<tr>
<td>Install valves</td>
<td>Troubleshoot valves</td>
<td>Install actuators (pneumatic, electric or hydraulic)</td>
<td>Troubleshoot actuators (pneumatic, electric or hydraulic)</td>
<td>Install positioners</td>
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<tr>
<td>Troubleshoot positioners</td>
<td>Install Variable Speed Drives (VSDs)</td>
<td>Troubleshoot Variable Speed Drives (VSDs)</td>
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<tr>
<td>U6558.06</td>
<td>U6558.07</td>
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<td>U6559.04</td>
<td>U6559.05</td>
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<tr>
<td>Install Programmable Logic Controllers (PLCs)</td>
<td>Configure Programmable Logic Controllers (PLCs)</td>
<td>Troubleshoot Programmable Logic Controllers (PLCs)</td>
<td>Install Distributed Control Systems (DCSs)</td>
<td>Configure Distributed Control Systems (DCSs)</td>
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<td>U6559.06</td>
<td>U6559.07</td>
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<tr>
<td>Troubleshoot Distributed Control Systems (DCSs)</td>
<td>Perform preventative maintenance on Distributed Control Systems (DCSs)</td>
<td>Install Human Machine Interfaces (HMIs)</td>
<td>Configure Human Machine Interfaces (HMIs)</td>
<td>Troubleshoot Human Machine Interfaces (HMIs)</td>
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<tr>
<td>U6559.11</td>
<td>U6559.12</td>
<td>U6559.13</td>
<td>U6559.14</td>
<td>U6559.15</td>
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<tr>
<td>Demonstrate knowledge of Supervisory Control And Data Acquisition (SCADA) systems</td>
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<td>U6559.16</td>
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U6551 SAFE WORKING PRACTICES AND PROCEDURES

GENERAL PERFORMANCE OBJECTIVE

Demonstrate safe working practices and procedures by working nearby workplace health and safety hazards; handling workplace hazardous materials; following procedures for handling worksite waste; complying with federal, provincial or municipal workplace legislation and regulations; using personal protective equipment; practicing good housekeeping in the workplace; shutting down equipment; following fire safety procedures; identifying the impact of environmental and atmospheric extremes; and working nearby energy sources.

SKILLS

U6551.01 Work nearby workplace health and safety hazards including but not limited to noxious fumes and dust, high-intensity light, fires, radiation, X-rays, Radio Frequencies (RF), elevated worksites, suspended loads, poor lighting, extreme temperatures, inadequate ventilation, confined spaces, untidy worksites and uncontrolled powers sources by identifying hazards, taking corrective actions, documenting and posting hazardous conditions so that the potential for person injury and damage to equipment, facilities and environment are prevented in accordance with applicable manufacturers’ specifications, safety legislation and company standards/procedures.

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◊ A Trainer may be a Supervisor or the competent employee designated by the Apprentice’s Sponsor

U6551.02 Handle workplace hazardous materials including but not limited to lead, mercury, gases, acids, caustics and solvents, calibration standards (chemicals) by wearing personal protective equipment, disposing and storing hazardous materials and preventing toxic spills/emissions, so that individuals are protected from injury, the environment from contamination and safety practices are followed in accordance with Workplace Hazardous Materials Information System (WHMIS) guidelines, safety legislation, manufacturers’ specifications and company standards/procedures.

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**U6551.03**  **Follow procedures for handling worksite waste** by wearing personal protective equipment, disposing and storing hazardous materials, and preventing toxic spills/emissions so that individuals are protected from injury, the environment from contamination and safety practices are followed, so that waste is recycled, reduced and reused in accordance with safety and environmental legislation, manufacturers' specifications and company standards/procedures.

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**U6551.04**  **Comply with federal, provincial, or municipal workplace legislation and regulations** including but not limited to Environmental Protection Act (EPA), Occupational Health and Safety Act (OHSA), Workplace Safety Insurance Act (WSIA), Ontario Electrical Safety Code (OESC), Provincial and Municipal Building Codes, Dangerous Goods Transportation Act (DGTA), Workplace Hazardous Materials Information System (WHMIS), the Ontario Fire Code (OFC), Canadian Standard Association (CSA), Training Standards and Safety Authority (TSSA) so that all worksite-specific work is completed safely and effectively.

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**U6551.05**  **Use Personal Protective Equipment (PPE)** including but not limited to eye, ear, hand, respiratory, body and foot protection by ensuring that a correct fit and optimum protection is provided to the wearer for the specific task in accordance with applicable safety legislation, government regulations, manufacturers' specifications and company standards/procedures.

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**U6551.06** Practice good housekeeping in the workplace by ensuring that the workplace is clean, organized and free of obstructions, spills, or fire hazard and that materials and equipment are cleaned and stored in designated areas after use, and that protective barriers, UV shields and guards are erected so that accident or injury potential is prevented in accordance with safety legislation and company standards/procedures.

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**U6551.07** Shut down equipment including electrical, mechanical, hydraulic or pneumatic and nuclear equipment by locking and tagging, and de-energizing procedures before commencing job in accordance with the Ontario Electrical Code, safety legislation, manufacturers' specifications and company standards/procedures.

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**U6551.08** Follow fire safety procedures including but not limited to determining the potential for fire posed by the work being performed; locating and assessing the severity of the fire; selecting and operating fire extinguishing equipment; suppressing minor fires; activating alarms; following fire evacuation plans and reporting incidents in accordance with applicable Acts, Regulations, Legislation and Codes, manufacturers’ specifications and company standards/procedures.

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U6551.09  Identify the impact of environmental and atmospheric extremes including but not limited to wind, temperature, humidity, UV, sound or precipitation on job functions to ensure personal safety.

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U6551.10  Work nearby energy sources by observing limits and procedures for approaching energy sources to ensure personal safety and protection of equipment in accordance with safety legislation, applicable Acts, Regulations, Legislation and Codes, and company standards/procedures.

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SPONSOR CONFIRMATION FOR U6551: SAFE WORKING PRACTICES AND PROCEDURES

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U6552 OCCUPATIONAL SKILLS

GENERAL PERFORMANCE OBJECTIVE

Perform occupational skills by selecting, inspecting, using and maintaining hand tools, portable and stationary power tools; maintaining calibration, configuration or testing equipment; interpreting schematics and drawings; using job documentation and specialized computer equipment and software; installing mounting hardware and process connections; and operating material handling equipment.

SKILLS

U6552.01 Select, inspect, use and maintain hand tools including but not limited to:
- hammers, wrenches, screwdrivers, pliers, drills, saws, files, tube benders, tap and die sets, wire crimpers, cutters, strippers and reamers;
ensuring that the selected hand tools are the correct ones for the application and ready for use to install, service, or maintain instrument and control systems, in accordance with work order, manufacturers’ specifications, company standards/procedures and applicable Acts, Regulations, Legislation and Codes.

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◊ A Trainer may be a Supervisor or the competent employee designated by the Apprentice’s Sponsor

U6552.02 Select, inspect, use and maintain portable and stationary power tools including but not limited to:
- saws, drill presses, grinders, high pressure tools, pipe threaders, portable drills, portable generators, vacuum pumps;
ensuring that the selected power tools are the correct ones for the application and ready for use, install, service or maintain instrument and control systems, in accordance with work order, manufacturer’s specifications, company standards/procedures and applicable Acts, Regulations, Legislation and Codes.

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U6552.03 Maintain calibration, configuration or test equipment by:
- selecting equipment including but not limited to manometers, process calibrators, multimeters, simulators, analyzers, function generators, deadweight testers and handheld communicators;
- inspecting or testing equipment;
- verifying functionality of equipment;
- confirming versions and performing updates of software and firmware;
- identifying calibration procedures;
- storing calibration, configuration and test equipment;
- completing documentation;
so that the equipment is maintained and ready for use, in accordance with work order, manufacturer’s specifications, company standards/procedures and applicable Acts, Regulations, Legislations and Codes.

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U6552.04 Interpret schematics and drawings including but not limited to pipe drawings, wiring diagrams, process and instrumentation drawings (P&ID), loop sheets, CAD drawings and specification sheets to identify:
- logical sequence;
- components and parts;
- location of equipment;
- full set of documentation;
- revision level and process;
so that information is obtained for the job, in accordance with ISA (Instrumentation Systems and Automation Society standards) or company standards/procedures.

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INSTRUMENTATION AND CONTROL TECHNICIAN

**U6552.05** Use job documentation including but not limited to calibration documents, data sheets, manufacturers’ or job specifications, maintenance practices and schedules, or work orders to identify:
- work to be performed;
- required materials and equipment;
- work schedules;
- isolation and safety procedures;
- environmental protocols;
- International Society of Automation (ISA) standards;
- hazardous area classifications;
- required permits;
- disposal and recycling procedures;

so that job can be completed in accordance with company standards/procedures and applicable Acts, Regulations, Legislation and Codes.

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**U6552.06** Install mounting hardware by:
- determining location for installation;
- selecting mounting hardware including but not limited to channels, supports, stands, clamps, brackets, u-bolts, adapters and enclosures;
- using hand, power, or stationary tools;
- modifying, fabricating or fastening mounting hardware;

so that hardware is installed in accordance with manufacturers’ and job specifications, drawings, schematics, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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U6552.07 Install process connections by:
- identifying system requirements;
- selecting process connections including but not limited to welded, threaded, or surface-mounted fittings, instrumentation wiring, tubing, and fibre-optic cable;
- identifying limitations of piping and tubing;
- fabricating by cutting, bending and flaring tubing;
- applying adhesives, sealants, and gaskets;
- using required tools;
- connecting to the process;
so that process connections are positioned and installed in accordance with manufacturers’ and job specifications, drawings, schematics, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

U6552.08 Use specialized computer equipment and software by:
- selecting applicable diagnostic or configuration software;
- identifying required configuration licensing;
- using software including but not limited to spreadsheets, databases, and word processors;
- using interfaces including but not limited to communication devices and computer equipment;
- updating software and firmware;
- backing-up data and equipment configurations;
so that controls, instruments, equipment and systems can be calibrated, configured and tested in accordance with manufacturers’ specifications and company standards/procedures.
U6552.09  Operate material handling equipment by:
• determining approximate weight of lift;
• identifying capacity of equipment;
• identifying type of lift and weight of workpiece;
• selecting handling equipment including but not limited to jacks, hoists, come-along, belts, ropes, cables, slings, pallet jacks, forklifts, or stationary cranes;
• inspecting equipment for defects and expiration dates;
• identifying potential hazards including but not limited to pinch points, load instability, obstructions, and overhead lines;
• identifying regulatory and workplace limitations to determine what rigging and hoisting operations need to be done by other qualified personnel;
so that materials, parts and equipment are moved and stored in accordance with manufacturers’ and job specifications, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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**SPONSOR CONFIRMATION FOR U6552: OCCUPATIONAL SKILLS**

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**U6553  PROCESS MEASUREMENT AND INDICATING DEVICES**

**GENERAL PERFORMANCE OBJECTIVE**

Work with process measurement and indicating devices by installing, troubleshooting and performing preventative maintenance on pressure, temperature, level or flow measuring and indicating devices; motion, speed, position or vibration measuring and indicating devices; mass, density or consistency measuring and indicating devices.
SKILLS

U6553.01 Install pressure, temperature, level or flow measuring and indicating devices by:
- selecting required devices including but not limited to pressure gauges, manometers, electronic and pneumatic pressure transmitters, pressure switches, thermometers, thermostats, thermocouples, Resistance Temperature Detector (RTDs), pyrometers, temperature switches, sight glasses, mechanical level indicators, pneumatic/electronic level measuring devices, level switches, primary elements (annubars, orifice plates, venturi tubes, pitot tubes, flow nozzles, flumes, weirs), and flowmeters (magnetic, electronic, mechanical);
- using installation tools and equipment;
- determining locations and methodology for devices;
- modifying holding enclosures and panels;
- fastening or bracketing to secure devices;
- applying sealants and gaskets;
- connecting device to the control system or indicator;
- configuring or calibrating devices;
- verifying operation;
- completing and updating documentation;
so that devices are installed in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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U6553.02 Troubleshoot pressure, temperature, level or flow measuring or indicating devices by:
- using tools and equipment;
- diagnosing source of problem;
- using specialized computer equipment and software;
- isolating device and performing safety procedures;
- clearing out obstructions/debris from sensing or impulse lines;
- cleaning the device;
- repairing/rebuilding defective devices;
- replacing consumables, parts or device;
- making required adjustments;
INSTRUMENTATION AND CONTROL TECHNICIAN

- calibrating or configuring using multimeters, temperature baths, hand-held calibrators, signal generators, calibration software and dead weight testers;
- performing a completion test to confirm operation;
- returning to operational service;
- completing and updating documentation;

so that devices are operational and functioning in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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**U6553.03 Perform preventative maintenance on pressure, temperature, level or flow measuring or indicating devices** by:

- interpreting job documentation;
- inspecting the devices;
- using tools and equipment;
- verifying functionality;
- isolating device and performing safety procedures;
- cleaning;
- clearing out obstructions/debris from device and primary element;
- replacing out-of-specification device or components including but not limited to seals, electronic parts, springs, or mechanical devices;
- repairing/rebuilding devices;
- verifying calibration;
- returning to operational service;
- performing a completion test to confirm operation;
- completing and updating documentation;

so that devices are maintained in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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U6553.04 Install motion, speed, position or vibration measuring or indicating devices by:
- using installation tools and equipment;
- selecting devices including but not limited to torque switches, proximity switches, proximity probes, analog position sensors, tachometers, strobes, proximeters, chart recorders, digital displays, and gauges;
- determining locations for devices;
- performing safety procedures;
- fastening or bracketing to secure devices;
- applying sealants and gaskets;
- connecting device to the control system or indicator;
- configuring or calibrating devices;
- verifying operation;
- completing and updating documentation;
so that devices are installed in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

U6553.05 Troubleshoot motion, speed, position or vibration measuring or indicating devices by:
- using required tools and equipment;
- diagnosing source of problem;
- using specialized computer equipment and software;
- isolating device and performing safety procedures;
- cleaning and remove obstruction/debris from the devices;
- testing device and recording results;
- repairing or replacing out-of-specification components including but not limited to proximity switches and probes;
- repairing defective connections;
- calibrating or configuring using strobe lights, multimeters, tachometers, micrometers, feeler gauges, or calibration software;
- performing a completion test to confirm operation;
- returning to operational service;
- completing and updating documentation;
so that devices are operational and functioning in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.
### U6553.06 Perform preventative maintenance on motion, speed, position, or vibration measuring or indicating devices

- interpreting job documentation;
- inspecting the devices;
- using required tools and equipment;
- verifying functionality;
- isolating device and performing safety procedures;
- cleaning probe faces, reflectors, optical lenses or fire-eyes;
- repairing defective connections;
- replacing out-of-specification components including but not limited to switches and probes;
- calibrating or configuring using strobe lights, multimeters, tachometers, micrometers, feeler gauges, or calibration software;
- returning to operational service;
- performing a completion test to confirm operation;
- completing and updating documentation;

so that devices are maintained in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.
U6553.07 Install mass, density, or consistency measuring or indicating devices by:
- selecting devices including but not limited to load cells, scales, strain gauges, u-tube, displacer, nuclear gauges, refractometer, consistency transmitters, chart recorders, digital displays, gauges and display monitors;
- determining location for devices;
- performing safety procedures;
- using required tools and equipment;
- selecting connections for piping and wiring;
- modifying enclosures and panels;
- fastening or bracketing to secure devices;
- applying sealants and gaskets;
- configuring devices;
- calibrating devices;
- verifying operation;
- completing and updating documentation;
so that devices are installed in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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U6553.08 Troubleshoot mass, density or consistency measuring and indicating devices by:
- using required tools and equipment;
- diagnosing source of problem;
- isolating device and performing safety procedures;
- using specialized computer equipment and software;
- testing device and recording results;
- replacing out-of-specification components including but not limited to load cells, strain gauges, and bearings;
- identifying hazards of working with nuclear measuring devices;
- repairing defective connections;
- calibrating or configuring using handheld calibrators, Geiger counters, calibrated standards, or calibration software;
- performing completion tests to confirm operation;
- returning to operational service;
- completing and updating documentation;
so that devices are operational and functioning in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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**U6553.09 Perform preventative maintenance on mass, density or consistency measuring and indicating devices** by:
- interpreting job documentation;
- inspecting the devices;
- using required tools and equipment;
- verifying functionality;
- isolating device and performing safety procedures;
- identifying hazards of working with nuclear measuring devices;
- cleaning;
- repairing defective connections;
- rebuilding devices;
- replacing out-of-specification components including but not limited to load cells, strain gauges, or bearings;
- calibrating or configuring using strobe lights, multimeters, tachometers, micrometers, feeler gauges, or calibration software;
- returning to operational service;
- performing post-maintenance tests;
- completing and updating documentation;

so that devices are maintained in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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**SPONSOR CONFIRMATION FOR U6553: PROCESS MEASUREMENT AND INDICATING DEVICES**

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GENERAL PERFORMANCE OBJECTIVE

Work with process measurement and indicating devices by installing, troubleshooting, performing preventative maintenance and calibrating process, quality control and environmental emission analyzers.

SKILLS

U6554.01 Install process analyzers by:

- identifying environmental conditions including but not limited to extreme ambient temperature, cleanliness, and contamination;
- selecting quality control analyzers including but not limited to oil and gas (chromatographs and spectrometers);
- selecting environmental emission analyzer including but not limited to noise, hazardous gases (CO, H2S, NH3), or greenhouse gases;
- identify process analyzers including but not limited pH, conductivity, turbidity, or oxidation reduction potential (ORP) and chemical analyzers;
- identifying sampling systems, conditions and methods;
- determining locations for analyzers;
- using tools and equipment including but not limited mounting jigs and calibration standards;
- fastening or bracketing to secure devices;
- applying sealants and gaskets;
- connecting analyzer to the control system or indicator;
- configuring analyzers;
- calibrating analyzers;
- verifying operation;
- completing updating documentation;

so that process analyzers are installed in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.
U6554.02 Troubleshoot process, quality control and environmental emission analyzers by:
- diagnosing source of problem;
- isolating analyzer and performing safety procedures;
- removing, cleaning, or replacing components including but not limited to filters, conditioners, solenoids, valves, tubing, chillers, and sampling system components;
- clearing and flushing sample lines;
- determining and preparing a reference standard;
- connecting calibration equipment to analyzer;
- connecting sample devices and carrier gases;
- calibrating analyzers using multimeters, calibrated standard, water, oil, analyzer device, handheld calibrators, or calibration software;
- storing sampling and calibration materials;
- returning to operational service;
- completing and updating documentation;
so that analyzers are operational and functioning in accordance with manufacturers’ specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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U6554.03 Perform preventative maintenance on process, quality control and environmental emission analyzers by:
- interpreting job documentation;
- inspecting the analyzers;
- isolating analyzer and performing safety procedures;
- using required materials, carrier gases, calibrated standards, tools and equipment;
- determining and preparing a reference standard;
- configuring using software and handheld devices;
- removing, cleaning or replacing analyzer components;
- verifying functionality;
- returning to operational service;
- completing and updating documentation;
so that analyzers are maintained in accordance with manufacturers’ specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.
U6554.04 Calibrate process, quality control and environmental emission analyzers by:
- identifying type and function of the analyzer;
- obtaining calibration procedures and materials;
- obtaining calibration standards, limitations and parameters;
- determining and preparing a reference standard;
- isolating analyzer and performing safety procedures;
- connecting calibration equipment to analyzer;
- connecting sample devices;
- calibrating analyzers using multimeters, calibration standard, analyzer device, handheld calibrators or calibration software;
- interpreting results;
- returning to operational service;
- completing and updating documentation;
so that analyzers are calibrated in accordance with manufacturers’ specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

**SPONSOR CONFIRMATION FOR U6554: PROCESS, QUALITY CONTROL AND ENVIRONMENTAL ANALYZERS**

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U6555 SAFETY AND SECURITY SYSTEMS AND DEVICES

GENERAL PERFORMANCE OBJECTIVE

Work with safety and security systems by installing, troubleshooting, performing preventative maintenance on safety and security systems.

SKILLS

U6555.01 Install safety systems by:

- identifying environmental conditions;
- selecting safety systems including but not limited to gas (infrared and catalytic bead), flame (ultraviolet and infrared), heat (thermal pencils and heat sensors), smoke (ionic and particle detectors) and spill detection;
- identifying operational parameters and acceptable limits;
- determining locations for devices;
- using required tools, equipment and technology;
- fastening or bracketing to secure devices;
- applying sealants and gaskets;
- connecting safety systems to the control system or indicator;
- configuring safety system using specialized equipment and software;
- verifying alarming method such as stench gas, flashing lights, or audible alarms;

so that safety systems are installed in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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U6555.02  Install security systems by:
- identifying installation conditions;
- selecting security including but not limited to intruder alarms, remote monitoring, cameras, motion sensors or access systems;
- identifying operational parameters and acceptable limits;
- determining locations for devices;
- using required tools, equipment and technology;
- fastening or bracketing to secure devices;
- applying sealants and gaskets;
- connecting security systems to the control system or indicator;
- configuring security system using specialized equipment and software;
so that security systems are installed in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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U6555.03  Install Service Safety Instrumented Systems (SISs) by:
- identifying installation conditions;
- selecting SISs including but not limited to controller and input/output (I/O) devices;
- labeling SIS components clearly due to importance of dedicated purpose;
- verifying accuracy and operation of SIS components according to specifications;
- selecting mounting hardware for the system and components according to manufacturers’ specifications and engineered designs;
- verifying and determining the location of SIS components to ensure process can be brought to a safe state;
- positioning and mounting SIS components independently from process control components;
- selecting and using required tools, equipment and technology including but not limited to stop watches and high accuracy pressure calibrators;
- verifying the operation of SISs and components within specified parameters by using test equipment, documentation and established procedures;
- configuring SISs system using specialized equipment and software;
- backing-up and documenting configuration settings for future data recovery and notify appropriate personnel;
so that SISs systems are installed in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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**U6555.04 Troubleshoot safety, security and SISs systems by:**
- using required tools, equipment and technology
- assessing system reaction to alarms;
- diagnosing source of problem;
- isolating systems and performing safety procedures;
- performing functional checks of systems;
- determining systems operational parameters and alarm points;
- removing and replacing system components;
- calibrating system components;
- returning to operational service;
- completing and updating documentation;

so that systems are operational and functioning in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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U6555.05 Perform preventative maintenance on safety, security and SISs systems by:
- interpreting job documentation;
- inspecting the devices;
- isolating systems and performing safety procedures;
- using software and handheld devices;
- removing and replacing systems components;
- verifying functionality;
- returning to operational service;
- completing and updating documentation;

so that systems are maintained in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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**SPONSOR CONFIRMATION FOR U6555: SAFETY AND SECURITY SYSTEMS AND DEVICES**

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U6556 ENERGY DELIVERY SYSTEMS

GENERAL PERFORMANCE OBJECTIVE

Work with energy delivery systems by installing, troubleshooting and performing preventative maintenance on pneumatic, electrical, electronic and hydraulic equipment.

SKILLS

U6556.01 Install pneumatic equipment by:

- interpreting job documentation and manufacturers’ specifications;
- using required tools and equipment;
- selecting pneumatic equipment according to the application and materials including but not limited to air dryers, conditioning components (filter assemblies, volume boosters, relays), compressors, solenoid valves, regulators, seals, springs, flapper nozzles, links, levers, diaphragms and pistons;
- determining locations for pneumatic equipment;
- fastening or bracketing to secure pneumatic equipment;
- connecting components including but not limited to regulators, separators, or tubing;
- making adjustments;
- verifying operation;
- completing and updating documentation;

so that pneumatic equipment is installed in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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**U6556.02 Troubleshoot pneumatic equipment** by:
- diagnosing source of problem;
- isolating pneumatics and performing safety procedures;
- using required tools and equipment;
- replacing or repairing defective connections;
- rebuilding pneumatic components;
- cleaning components;
- making adjustments;
- performing a completion test to verify confirm operation;
- returning to operational service;
- completing and updating documentation;

so that pneumatic equipment is operational and functioning in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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**U6556.03 Perform preventative maintenance on pneumatic equipment** by:
- interpreting job documentation and manufacturers’ specifications;
- inspecting the pneumatic equipment;
- using required tools and equipment;
- isolating pneumatics and performing safety procedures;
- removing and replacing components;
- cleaning equipment;
- repairing defective connections;
- returning to operational service;
- performing a completion test to verify confirm operation;
- completing and updating documentation;

so that pneumatic equipment is maintained in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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### U6556.04 Install electrical and electronic equipment

- interpreting job documentation and manufacturers’ specifications;
- using required tools, equipment and technology;
- selecting electrical and electronic equipment including but not limited to power supplies, Uninterruptible Power Supplies (UPS), solenoids, relays, cabling, fuses, resistors, circuit boards and transformers;
- determining locations for electrical and electronic equipment;
- fastening or bracketing to secure equipment;
- connecting equipment to the control system;
- making adjustments to equipment settings;
- completing and updating documentation;

so that electrical and electronic equipment is installed in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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### U6556.05 Troubleshoot electrical and electronic equipment

- diagnosing source of problem;
- isolating equipment and performing safety procedures;
- using required tools, equipment and technology
- replacing out-of-specification components including but not limited to circuit boards, power supply, relays, capacitors and fuses;
- repairing defective connections;
- cleaning components;
- making adjustments;
- performing a completion test to confirm operation;
- returning equipment to operational service;
- completing and updating documentation;

so that electrical and electronic equipment is operational and functioning in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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U6556.06 Install hydraulic equipment by:
• interpreting job documentation and manufacturers’ specifications;
• selecting hydraulic equipment including but not limited to hydraulic fluids
  and filters, controls, valves, lines, pumps, relays and regulators;
• determining locations for hydraulic equipment;
• connecting equipment including but not limited to solenoids,
  accumulators, servo-valves, motors and pumps to the control system;
• applying seals, gaskets, springs and pistons
• making adjustments to flow and pressure;
• verifying operation of system;
so that hydraulic equipment is installed in accordance with manufacturers’ and
job specifications, drawings, schematics, environmental protocols, company
standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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U6556.07 Troubleshoot hydraulic equipment by:
• diagnosing source of problem;
• isolating hydraulics and performing safety procedures;
• replacing out-of-specification components including but not limited to
  seals, gaskets, springs and pistons;
• replacing consumables including but not limited to fluids, filters and
  strainers;
• repairing defective connections;
• rebuilding hydraulic equipment;
• cleaning components;
• making adjustments to out-of-specification components including but not
  limited to pressure regulators, relief valves and flow regulators;
• performing a completion test to confirm operation;
• returning to operational service;
• completing and updating documentation;
so that hydraulic equipment is operational and functioning in accordance with
manufacturers’ and job specifications, drawings, schematics, environmental
protocols, company standards/procedures and applicable Acts, Legislation, Codes
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U6556.08 Perform preventative maintenance on hydraulic equipment by:

- interpreting job documentation;
- inspecting the hydraulic equipment;
- using required tools and equipment;
- isolating hydraulics and performing safety procedures;
- removing and replacing components including but not limited to seals, springs, or pistons;
- replacing consumables including but not limited to fluids, filters, and strainers;
- cleaning components;
- repairing defective connections;
- rebuilding hydraulic equipment;
- making adjustments to out-of-specification components including but not limited to pressure regulators, relief valves and flow regulators;
- returning hydraulic equipment to operational service;
- performing a completion test to confirm operation;
- completing and updating documentation;

so that hydraulic equipment is maintained in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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SPONSOR CONFIRMATION FOR U6556: ENERGY DELIVERY SYSTEMS

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INSTRUMENTATION AND CONTROL TECHNICIAN

U6557 COMMUNICATION SYSTEMS AND DEVICES

GENERAL PERFORMANCE OBJECTIVE

Work with communication systems and devices by demonstrating knowledge of types of signal transmission systems; installing and troubleshooting signal transmission systems; installing, troubleshooting and performing preventative maintenance on signal converters.

SKILLS

U6557.01 Demonstrate knowledge of types of signal transmission systems, including but not limited to:

- networks, signal transmitters, communication protocols and media (RS232, RS422/485, MODBUS, TCP/IP, and Highway Addressable Remote Transducer (HART);
- wiring, connection and tubing methods;
- fibre-optics;
- twisted pair wiring;
- potential causes of interference;
- grounding and shielding methods;
- addressing methods and components;
- programming;

to ensure that system selected is the correct one for the application in accordance with communication protocols, manufacturers’ and job specifications, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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◊ A Trainer may be a Supervisor or the competent employee designated by the Apprentice’s Sponsor
U6557.02  Install signal transmission systems by:
• locating wireless transmission and antennas;
• identifying potential causes of interference;
• selecting system components including but not limited to wireless transmission and antennas, panels, modems, fibre-optic cable, tubing, Ethernet switches, software or firmware;
• connecting transmission systems;
• mounting and testing transmission and antennas;
• planning the tubing and wiring runs;
• connecting fibre-optic cabling, wiring, and tubing;
• grounding and shielding methods;
• programming;
• bringing system online;
• completing and updating documentation;
so that signal transmission systems are installed, avoiding interferences with other systems and processes in accordance with communication protocols, manufacturers’ and job specifications, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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U6557.03  Troubleshoot signal transmission systems by:
• performing system diagnostics;
• identifying installation problems and deficiencies;
• isolating equipment and performing safety procedures;
• testing system using specialized equipment and software;
• testing wireless signal strength;
• performing upgrading of software and firmware;
• removing and replacing components;
• cleaning components including but not limited to panels, fibre-optic connections and environmental filters;
• clearing, bending, replacing, connecting and torquing tubing and cable connectors lines;
• configuring system using software and hardware;
• returning system to operational service;
• completing and updating documentation;
so that the signal transmission system is operational and functioning in accordance with communication protocols, manufacturers’ and job specifications, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.
U6557.04  Install signal converters by:

- identifying features and limitations of the converters;
- selecting signal converter components including but not limited to digital to analog, analog to digital, current to pneumatic (I/P), pneumatic to electrical, current transformers, potential transformers and voltage to pneumatic, and converter components including but not limited to wiring, tubing, connections, software or firmware;
- connecting converters;
- planning and bending the tubing runs;
- routing and stripping wiring;
- connecting wiring and tubing;
- mounting signal converter components;
- verifying operation;
- completing and updating documentation;

so that the signal converters are installed avoiding interferences with other systems and processes in accordance with communication protocols, manufacturers’ and job specifications, company standards/procedures and applicable Acts, Legislation, Codes, and Regulations.
U6557.05  Troubleshoot signal converters by:
• performing system diagnostics and making adjustments;
• identifying installation problems and deficiencies;
• isolating equipment and performing safety procedures;
• upgrading software and firmware;
• removing and replacing components;
• clearing tubing lines;
• calibrating signal converters using instruments including but not limited to current and voltage simulators and pneumatic test equipment;
• returning system to operational service;
• completing and updating documentation;
so that signal converter is operational and functioning, in accordance with manufacturers’ and job specifications, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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U6557.06 Perform preventative maintenance on signal converters by:

- interpreting job documentation and manufacturers’ specifications;
- inspecting converters and connections;
- performing system diagnostics;
- isolating equipment and performing safety procedures;
- upgrading software and firmware;
- removing and replacing components including but not limited to restrictors and air filters;
- clearing, bending, replacing, connecting and torquing, tubing and cable connectors;
- returning signal converters to operational service;
- completing and updating documentation;

so that the signal converter is maintained in accordance with communication protocols, manufacturers’ and job specifications, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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**SPONSOR CONFIRMATION FOR U6557: COMMUNICATION SYSTEMS AND DEVICES**

| Date Completed (mm/dd/yy) | Sponsor Name (Print) | Sponsor Signature |
U6558  FINAL CONTROL DEVICES

GENERAL PERFORMANCE OBJECTIVE

Work with final control devices by installing and troubleshooting valves, actuators (pneumatic, electric or hydraulic), positioners and Variable Speed Drives (VSDs).

SKILLS

U6558.01  Install valves by:
• identifying process equipment operations and performance expectations;
• selecting valves for the application including but not limited to globe, plug, gate, ball, butterfly, v-ball;
• applying sealants and gaskets;
• installing valve in the process system;
• securing valves in system;
• checking functionality of valves;
• completing and updating documentation;
so that the valves are installed in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

A Trainer may be a Supervisor or the competent employee designated by the Apprentice’s Sponsor

U6558.02  Troubleshoot valves by:
• interpreting job documentation and manufacturers’ specifications;
• identifying type and characteristics of valves;
• identifying faults including but not limited to leaking, packing and worn or damaged parts;
• function-testing the valve for faults;
• isolating valve and performing safety procedures;
• repacking the valves using Teflon, graphite or rope;
• replacing valve components including but not limited to cages, plugs, seats and stems;
• cleaning and lubricating components;
• making adjustments;
• performing completion tests by stroking the valve;
• completing and updating documentation; so that the valves are operational and functioning in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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U6558.03 Install actuators (pneumatic, electric or hydraulic) by:

• selecting the actuator for the application including but not limited to spring return, double-acting, rotary, fail-open and fail-close;

• selecting actuator size and components including but not limited to cylinders, diaphragms, pistons, couplings, springs, motors, bushings and O-rings;

• configure the actuator for the applications;

• connecting actuator to the valve;

• bench-setting the actuators;

• verifying operation of the actuators;

• completing and updating documentation; so that actuators are matched and connected to the valve in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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U6558.04 Troubleshoot actuators (pneumatic, electric or hydraulic) by:
• inspecting the actuators;
• isolating equipment and performing safety procedures;
• diagnosing source of problem;
• identifying faults including but not limited to air supply, leaking diaphragms, broken springs, and defective O-rings;
• removing and replacing components including but not limited to O-rings, diaphragms, pistons, motors and springs;
• cleaning and lubricating actuator components;
• re-building actuator;
• returning actuator to operational service;
• performing a completion test to confirm operation;
• completing and updating documentation;
so that the actuators are operational and functioning in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

U6558.05 Install positioners by:
• selecting positioners for application and actuator type;
• installing positioner components including but not limited to levers, nozzles, flappers, diaphragms, feedback linkages, I/P transducers, cams, rollers, regulators, limit switches and bellows;
• selecting the auxiliaries including but not limited to position locks and boosters;
• orientating and mounting the positioner to the actuator;
• connecting the positioner to the signal and supply lines;
• configuring the positioners;
• verifying operation of positioners;
• completing and updating documentation;
so that the positioners are operational and functioning in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.
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**U6558.06 Troubleshoot positioners** by:
- identifying type and parameters of positioners;
- identifying faults in equipment including but not limited to leaks and defective parts;
- isolating equipment and performing safety procedures;
- removing and replacing components including but not limited to seals, flappers, nozzles, springs, relays, motors and auxiliaries;
- cleaning positioner components;
- calibrating positioners using equipment including but not limited to handheld calibrators, computers and hand pumps;
- making adjustments;
- returning positioner to operational service;
- performing a completion test to confirm operation
- completing and updating documentation;
so that positioners are operational and functioning in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.
U6558.07  Install Variable Speed Drives (VSDs) by:

- selecting drives for the application;
- selecting drive components including but not limited to fans, environmental filters, panels and enclosures;
- selecting auxiliaries including but not limited to dynamic braking unit, surge suppression and harmonic filters;
- fastening or bracketing to secure the drives;
- connecting the drives to the signal and supply lines;
- configuring the drives;
- verifying operation of the drives;
- completing and updating documentation;

so that drives are operational and functioning, in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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U6558.08  Troubleshoot Variable Speed Drives (VSDs) by:

- identifying type and parameters of the drives;
- identifying faults including but not limited to connections and defective parts;
- isolating equipment and performing safety procedures;
- removing and replacing components including but not limited to fans, environmental filters, wiring, rectifiers, dynamic braking unit and fuses;
- verify configuration;
- making adjustments;
- performing a completion test to verify confirm operation;
- returning the drives to operational service;
- completing and updating documentation;

so that the drives are operational and functioning in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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U6559  PROCESS CONTROL SYSTEMS

GENERAL PERFORMANCE OBJECTIVE

Work with process control systems by determining and configuring process control strategy; installing, configuring and troubleshooting stand-alone controllers (pneumatic and electronic) and Programmable Logic Controllers (PLCs); installing, configuring, troubleshooting and performing preventative maintenance on Distributed Control Systems (DCSs); installing, configuring and troubleshooting Human Machine Interfaces (HMIs); demonstrating knowledge of Supervisory Control and Data Acquisition (SCADA) systems.

SKILLS

U6559.01 Determine process control strategy by:

- reading and interpreting job documentation and manufacturers’ specifications;
- identifying type of control strategy including but not limited to Proportional, Integral, Derivative (PID), feed forward/back, cascade, ratio, continuous, batch, single-loop and multi-loop;
- identifying process to be controlled;
- identifying control equipment characteristics and limitations;
- identifying memory restrictions and number of input/output points;
- using specialized equipment including but not limited to computers and software;

so that the end results of the control strategy are identified in accordance with manufacturers’ and job specifications, drawings, and documentation.

A Trainer may be a Supervisor or the competent employee designated by the Apprentice’s Sponsor.
U6559.02 Configure process control strategy by:

- identifying configuration methods and requirements;
- identifying specific control strategies and interaction of other processes;
- identifying control parameters limits including but not limited to PID, alarm settings and limits;
- using specialized equipment including but not limited to computers and software;
- implementing control strategy using configuration software and routines;
- optimizing process controls using various loop tuning methods;
- verifying the end results;
- complete and updating documentation;

so that process control strategies are configured in accordance with manufacturers’ and job specifications, drawings and documentation.

U6559.03 Install stand-alone controllers (pneumatic and electronic) by:

- identifying type and number of inputs and outputs;
- identifying environmental conditions including but not limited to extreme ambient temperature, cleanliness, or contamination;
- selecting controllers according to application, process and control strategy;
- determining required power supply;
- determining locations for controllers;
- fastening or bracketing to secure controllers;
- connecting, configuring and calibrating controllers to the process system;
- verifying operation;
- completing and updating documentation;

so that stand-alone controllers are installed in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.
U6559.04 Configure stand-alone controllers (pneumatic and electronic) by:
- identifying configuration techniques applied to specific control strategies;
- using specialized equipment including but not limited to computers and software;
- configuring controllers using user interfaces, handheld programmers and computers;
- identifying control parameters and process limitations;
- isolating equipment and performing safety procedures;
- tuning controllers to the process conditions;
- returning controllers to service;
- completing and updating documentation;
so that stand-alone controllers are configured in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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U6559.05 Troubleshoot stand-alone controllers (pneumatic and electronic) by:
- identifying controller functions and process control strategy;
- performing system diagnostics;
- isolating equipment and performing safety procedures;
- identifying controller deviations, faults and errors;
- identifying process upset conditions and limitations;
- tuning controller parameters to varying process conditions;
- upgrading software and firmware;
- calibrating controller;
- returning controller to operational service;
- completing and updating documentation;
so that stand-alone controllers are maintained in accordance with manufacturers’ and job specifications, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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U6559.06  **Install Programmable Logic Controllers (PLCs)** by:
- identifying type of PLC, architecture and capabilities;
- identifying environmental conditions including but not limited to heat, cleanliness, and contamination;
- selecting PLC and components for the process;
- determining required power supply;
- determining locations for PLCs;
- mounting PLC;
- connecting PLC and terminating I/O;
- completing and updating documentation;
so that PLCs are installed in accordance with manufacturers’ and job specifications, licensing, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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U6559.07  **Configure Programmable Logic Controllers (PLCs)** by:
- identifying PLC language including but not limited to ladder, function block, sequential function chart and script;
- identifying PLC programs and associate software including but not limited to word processors, spreadsheets and databases;
- using specialized equipment including but not limited to user interfaces, computers and software;
- configuring PLCs using programming/configuring software;
- establishing I/O list
- identifying PLC parameters and process limitations;
- isolating the controller from the process;
- returning PLC to operational service;
- commissioning and verification of operation;
- completing and updating documentation;
so that PLCs are configured in accordance with manufacturers’ and job specifications, licensing, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.
U6559.08  Troubleshoot Programmable Logic Controllers (PLCs) by:

- identifying computer applications related to PLC functions;
- identifying communication systems used by PLCs;
- identifying PLC language;
- identifying configuration parameters;
- using programming/configuring software, diagnostic tools and equipment;
- interpreting software reports and documentation to identify network programs;
- forcing, disabling or bypassing I/Os;
- performing shut-down and start-up of PLCs;
- upgrading software and firmware;
- making program modifications;
- removing and re-installing components;
- replacing batteries, fans and environmental filters;
- backing-up programs, and completing and updating documentation;

so that PLCs are returned to operating specifications in accordance with manufacturers’ and job specifications, licensing, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.
U6559.09 Install Distributed Control Systems (DCSs) by:
- identifying types of DCS, architectures and capabilities;
- identifying DCS language including but not limited to ladder, function block and script;
- identifying DCS components including but not limited to power supply, processor, memory and I/O;
- selecting required power supply and grounding methods;
- identifying signals including but not limited to digital or analog signals;
- determining compatibility with other process control systems;
- identifying environmental conditions including but not limited to heat, cleanliness or contamination;
- confirming installation details of DCS components including but not limited to cabinets, operator stations and servers;
- mounting DCS components including but not limited to I/O cards and power supplies;
- connecting wiring, I/O and network to DCS; so that DCSs are installed in accordance with manufacturers’ and job specifications, licensing, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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U6559.10 Configure Distributed Control Systems (DCSs) by:
- identifying DCS programs and associated software;
- identifying DCSs language including but not limited to ladder, function block and script;
- updating operating software;
- creating and validating DCS configuration according to rack and cabinet layout;
- establish I/O list
- programming DCS to include comments and displays;
- configuring external communication with other systems and devices;
- backing-up and restoring configurations;
- commissioning and verification of operation;
- completing and updating documentation;
so that DCSs are configured in accordance with manufacturers’ and job specifications, licensing, drawings, schematics, environmental protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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**U6559.11 Troubleshoot Distributed Control Systems (DCSs)** by:
- identifying computer programs and software related to DCS functions;
- identifying DCS language including but not limited to function block and script;
- backing-up and restoring program and configuration;
- forcing, disabling and bypassing I/Os;
- shutting down and starting up DCS components;
- upgrading software and firmware;
- making program modifications;
- removing and re-installing devices;
- replacing backup batteries;
- cleaning fans and environmental filters;
- completing and updating documentation;
so that DCSs are returned to operating specifications in accordance with manufacturers’ and job specifications, licensing, drawings, schematics, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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U6559.12 Perform preventative maintenance on Distributed Control Systems (DCSs) by:
• using diagnostic tools and software;
• investigating symptoms and conditions including but not limited to network and communication problems;
• isolating problem by reviewing error codes, logs and status lights;
• using diagnostic procedures including but not limited to forcing I/O and setting traps or counters;
• checking power source for appropriate voltage level;
• running and interpreting self-diagnostic and alarm indicators;
• backing-up program and configuration;
• completing and updating documentation;
so that DCS is maintained in accordance with manufacturers’ and job specifications, licensing, drawings, schematics, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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U6559.13 Install Human Machine Interfaces (HMIs) by:
• identifying types of HMI software, hardware, design and capabilities;
• determining compatibility with other process control systems;
• identifying communication networks and protocols;
• identifying environmental conditions including but not limited to heat, cleanliness and contamination;
• selecting HMI software and operator interface equipment;
• installing operating software;
• connecting communication links;
• fastening to secure the HMI;
so that HMIs are installed in accordance with manufacturers’ and job specifications, licensing, drawings, schematics, communication networks and protocols, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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U6559.14 Configure Human Machine Interfaces (HMIs) by:
- identifying HMI programs and associated software;
- identifying data types and addressing scheme;
- updating programming/configuring software and firmware;
- generating operator displays;
- configuring external communication;
- backing-up and restoring configurations;
- commissioning HMI;
- completing and updating documentation;
so that HMIs are configured in accordance with manufacturers’ and job specifications, licensing, drawings, schematics, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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U6559.15 Troubleshoot Human Machine Interfaces (HMIs) by:
- identifying HMI programs and associated software;
- investigating faulty configuration or errors;
- determining interaction with PLCs and DCS systems;
- using diagnostic procedures, tools and software;
- isolating problem by reviewing error codes, logs and status lights;
- identifying probable root cause;
- locating faults;
- backing-up program and configuration;
- returning HMI to operational service;
so that HMIs are interacting with PLCs and DCS in accordance with manufacturers’ and job specifications, licensing, drawings, schematics, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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Demonstrate knowledge of Supervisory Control and Data Acquisition (SCADA) systems, including but not limited to:

- RTUs, PLCs, DCSs, HMIs, communication systems and interconnection media;
- wireless SCADA system components including but not limited to satellite, radio and cellular;
- servers for data acquisition and storage;
- they may have the added ability to store, measure, trend and manipulate data for reporting purposes;

so they can be used for control applications including but not limited to remote shut-down and start-up of equipment in accordance with manufacturers’ and job specifications, licensing, drawings, schematics, company standards/procedures and applicable Acts, Legislation, Codes and Regulations.

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**SPONSOR CONFIRMATION FOR U6559: PROCESS CONTROL SYSTEMS**

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DEFINITIONS

Apprentices Class
Individuals in this class:

- Hold one or more valid Registered Training Agreements with the Ministry of Advanced Education and Skills Development in either compulsory or voluntary trades;
- Hold a valid statement of membership with the Ontario College of Trades in the Apprenticeship class;
- Are subject to any ratios or wage rates that have been set out in regulation for their trade(s);
- Can remain in this class until they receive their Certificate of Apprenticeship;
- Can hold themselves out as Apprentices.

Certificate of Apprenticeship (C of A)
A certificate issued by the Minister of Training, Colleges and Universities to individuals who have demonstrated that they have completed an apprenticeship program in Ontario.

Certificate of Qualification (C of Q)
A certificate issued by the Registrar on behalf of the College of Trades to a Journeyperson. A Certificate of Qualification will serve as proof of having met any testing/program requirements and membership in the College’s Journeypersons Class.

Competence
The ability of an individual to perform a skill repeatedly and without assistance in the workplace as set out in the Log Book.

Competency Analysis Profile (CAP Chart)
A chart that identifies the training needs of an individual trade and details the skills/skill sets that must be demonstrated during an apprenticeship program.

Competent Person
A competent person is defined by the Occupational Health and Safety Act as being a person who:

- Is qualified because of their knowledge, training and experience to organize the work and its performance;
- Is familiar with the Occupational Health and Safety Act and its regulations that apply to the work; and has knowledge of any potential or actual danger to health or safety in the workplace.
Competent Worker
A competent worker is defined by the Occupational Health and Safety Act as being a person who:

- Is qualified because of knowledge, training and experience to perform the work;
- Is familiar with the Occupational Health and Safety Act and with the provisions of the regulations that apply to the work; and
- Has knowledge of all potential or actual danger to health or safety in the work.

Sponsor
Means a person that has entered into a Registered Training Agreement under which the person is required to ensure that an individual is provided with workplace-based training in a trade as part of an apprenticeship program established by the College of Trades.

Sponsor of Record
Refers to the Sponsor documented as being signatory to the current training agreement or contract. In order for a Sponsor to be considered for the training of Apprentices, they must identify that the workplace has qualified Journeypersons or the equivalent on site, and can identify that the workplace has the tools, equipment, materials, and processes which have been identified by the Industry representatives for the trade.

Incompetence
According to the Ontario College of Trades and Apprenticeship Act, 2009, a member of the College of Trades may be found to be incompetent by the College Of Trades Discipline Committee if the Committee feels that the member has displayed a lack of knowledge, skill or disregard for another person’s welfare while practicing their trade. If this happens, the individual may be found unfit to practise their trade and their Statement of Membership/Certificate of Qualification may be revoked, suspended, or be subject to terms, conditions or limitations.

Journeyperson
Compulsory Trades Journeyperson:

- Someone who holds a valid Certificate of Qualification in the trade and who is a member in good standing of the College of Trades Journeypersons Class for the same trade; or
- Someone who holds a valid Provisional Certificate of Qualification in the trade and who is a member in good standing of the College of Trades Journeypersons Class for the same trade.

Voluntary Trades Journeyperson:

- Someone who holds a valid Certificate of Qualification in the trade and who is a member in good standing of the College of Trades Journeypersons Class for the same trade; or
- Someone who holds a Certificate of Qualification in the trade that was issued by the Ministry of Advanced Education and Skills Development prior to April 8, 2013 (membership in the College of Trades is not required in this scenario).
Journeyperson Candidates Class
An individual who has completed an Ontario apprenticeship program (Certificate of Apprenticeship) in a voluntary or compulsory trade that has a Certificate of Qualification examination, but has not passed the Certificate of Qualification examination for their trade. There is a maximum time limit of one year to remain in the Journeyperson Candidates Class. Individuals in this class:

- are subject to any ratios and/or wage rates that have been set out for their trade(s), if they practise a compulsory trade.

- can continue to work legally in their trade if they are in a compulsory trade, as they prepare to write their examination (individuals in voluntary trades do not have to be members of the College of Trades to work legally); and can hold themselves out as Journeyperson Candidates (they are neither Apprentices nor Journeypersons).

- can remain in this class for a maximum of one year or until they pass the Certificate of Qualification exam and become members of the Journeypersons class. However, they can only remain in this class for a maximum of one year. After one year they can move into the Tradespersons Class if they are in a voluntary trade. If they are in a compulsory trade and have been in the Journeyperson Candidates Class for one year, they can no longer work legally in that trade until they pass the Certificate of Qualification examination.

Mandatory Skill
Status assigned to unshaded individual skills, skill sets or general performance objectives which must be signed off for the Apprentice to complete their program.

OCTAA
*Ontario College of Trades and Apprenticeship Act, 2009*

Optional Skill
Status assigned to shaded individual skills, skills sets or general performance objectives for which sign off is not required for the Apprentice to complete the program.

Ratios
For up to date information regarding Journeyperson to Apprentice ratios, please visit: collegeoftrades.ca
**Red Seal Program**
The Interprovincial Standards Red Seal Program (also known as the Red Seal Program) was established more than 50 years ago to provide greater mobility across Canada for skilled workers and represents a standard of excellence for industry. Through the program, individuals are able to obtain a Red Seal endorsement on their provincial/territorial certificates by achieving 70% or higher on an interprovincial Red Seal examination. The Interprovincial Standards Red Seal Program acknowledges their competence and ensures recognition of their certification throughout Canada without further examination. There are currently over 50 Red Seal designated trades. The Red Seal Program is recognized as the interprovincial *standard of excellence* in the skilled trades. The Interprovincial Standards Red Seal Program is a partnership between the Government of Canada, the Provinces, the Territories and various stakeholders.

**Sign off**
Signature of the Sponsor of record, or an individual to whom that Sponsor has delegated signing authority, (e.g. Trainer) indicating an Apprentice’s demonstration of competence.

**Skill**
Individual skill described in the Log Book (note: does not mean the larger skill groups referred to in the Log Book as Skill Sets, Training Units, or General Performance Objectives, but the individual skills that make up those groups).

**Skill Sets**
Group of individual skills found in the Log Book (may also be called Training Unit or General Performance Objective).

**Skill Set Completion for Sponsors**
Listing for all skill sets and includes space for sign off by Sponsor of record.

**Supervisor**
An individual who oversees the performance of a task and oversees the actions or work of others.

**Trade Board**
Under the *Ontario College of Trades and Apprenticeship Act, 2009*, the [College of Trades Appointments Council](https://www.ontariocollegeoftrades.ca/Appointments-Council) (COTAC) may appoint a Trade Board for each designated trade, composed of Employee and Employer representatives from the industry. Trade Boards are responsible for advising and making recommendations to the College of Trades Divisional Boards on issues relating to their trade. When there is no appointed trade board for a trade, the respective sector Divisional Board will act as the default Trade Board for the trade.
**Tradespersons Class**
A Class of Membership for individuals who practise in a voluntary trade which may or may not have a Certificate of Qualification examination.

Individuals in this class:
Have been members of the Journeyperson Candidates Class or are not eligible for Journeyperson Candidates Class and have been assessed to have experience and/or qualifications that are equivalent to a Certificate of Apprenticeship in that trade
- Are preparing to write/have no plans to write/have not passed the available Certificate of Qualification exam for their trade(s);
- Can remain in this class indefinitely or until they pass the available Certificate of Qualification exam for their trade(s); and
- Can hold themselves out as tradespersons (they are neither apprentices nor journeypersons).

**Note:** Individuals in the Tradespersons Class are considered Journeypersons for the purpose of determining ratios for that trade.

**Trainer**
A qualified Trainer in a compulsory trade is a Journeyperson with a Certificate of Qualification. In a voluntary trade, a Trainer is an individual who is considered equivalent to a Journeyperson with a Certificate of Qualification.
INSTRUMENTATION AND CONTROL TECHNICIAN

READY TO WRITE YOUR EXAM?

Many of the skilled trades in Ontario have a final certification examination that you must pass to become certified in your trade. Passing the examination gives you the right to join the Journeypersons class of members at the Ontario College of Trades and receive a Certificate of Qualification in your trade.

There are two types of trade certification examinations in Ontario:

1. Provincial (Ontario) examinations - which lead to a Certificate of Qualification.
2. Red Seal examinations – which lead to a Certificate of Qualification with an Interprovincial Red Seal endorsement.

If a trade is designated as Red Seal in Ontario, you will be writing the Red Seal examination. To access the Red Seal preparation guide please visit: red-seal.ca

You will write an Ontario-only examination when your trade is not designated as Red Seal trade in Ontario.

Ontario’s Exam Preparation Guide
collegeoftrades.ca

Basic Examination Details for You to Know

You will have up to four hours to write your examination. If you need more time, you must ask for it when you schedule the examination, not on the day of your examination. You can leave the examination centre if you complete the examination in less than four hours. You need a mark of 70% to pass.

Exam questions are multiple choice with four options from which you must choose the correct answer. Your examination may have between 90 and 150 multiple choice questions.

Scheduling Your Examination

The examination scheduling process is currently outlined in detail on the College of Trades website: collegeoftrades.ca

Remember these 3 basic steps:

1. Confirm your eligibility to write the examination with the College of Trades.
2. Contact Client Services at the College of Trades to pay your examination fee.
3. Contact the local Ministry apprenticeship office to schedule your examination in their examination centre: http://services.findhelp.ca/eo/tcu/appoff
INSTRUCTIONS FOR RECORDING A CHANGE IN SPONSOR

1. Record your first sponsor’s information in Sponsor Record #1 – this would be the sponsor who has signed your initial apprenticeship Training Agreement for this trade.

2. If you do change sponsors prior to completing this apprenticeship, please contact your local Ministry of Advanced Education and Skills Development Apprenticeship Office immediately to update your sponsor record.

3. Please make sure you do record all of the information regarding any additional sponsors of record towards your apprenticeship using the Sponsor Records on the following pages (if applicable).

   You must fill out a CHANGE OF SPONSOR RECORD each time you change your sponsor.
### SPONSOR RECORD #1

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<td>Total hours of training &amp; instruction between dates of employment.</td>
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<td>Skill Sets Completed (e.g. UXXXX)</td>
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As the Sponsor, I hereby confirm that the above information is true and accurate to the best of my knowledge.

Signature: ____________________________ Date: (mm/dd/yy) ___________

The Sponsor is required to sign off and date the skills after the Apprentice has proven competence in those skills. However, if a skill is shaded, it is optional and does not need to be signed off.

*If you need additional copies of the Sponsor Record, please photocopy as needed or visit [collegeoftrades.ca](http://collegeoftrades.ca) and search Sponsor Record Form.*
## CHANGE OF SPONSOR RECORD #2

### SPONSOR INFORMATION

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*If you need additional copies of the Sponsor Record, please photocopy as needed or visit [collegeoftrades.ca](http://collegeoftrades.ca) and search Sponsor Record Form.*
INSTRUCTIONS FOR APPRENTICESHIP PROGRAM COMPLETION (Appendix A)

Once an Apprentice has completed all the classroom training and on-the-job hours specified for the trade, and has acquired all the mandatory skills included in this Log Book:

1. The Apprentice and the Sponsor complete the Apprentice Completion Form and the Skill Set Completion for Sponsors Form located on the following pages.

2. They sign the forms and submit them to their local Ministry of Advanced Education and Skills Development apprenticeship office. To find the closest office, check the contact information at [http://services.findhelp.ca/eo/tcu/appoff](http://services.findhelp.ca/eo/tcu/appoff) or call the Employment Ontario toll free number at (1-800-387-5656).

3. Since this trade is competency based, all mandatory skills in the Log Book must be signed off. If the Sponsor is completing the Apprentice before the industry recommended training hours are done, Ministry staff may request further information regarding the Apprentice’s on-the-job training. An example of a request would be a letter from the Sponsor confirming the Apprentice worked for some time in the trade before the initial Training Agreement was registered, thereby acquiring some skills beforehand.

If Apprentices are submitting the completion request form and supporting documentation to their local Ministry of Advanced Education and Skills Development apprenticeship office by mail, fax, or email (as a scanned document), they should not include their Log Book; if they are presenting this form in person at the local apprenticeship office, they should bring their Log Book with them.

After Ministry staff verifies all the information in the completion request, they may contact either the Apprentice or the Sponsor for further information or documentation. Once the completion has been confirmed, the Ministry will issue a Certificate of Apprenticeship to the Apprentice.

The Ontario College of Trades will receive notification of this completion, and complete the individual’s membership in the Apprentices class for the trade. If the Apprentice has completed a program in a compulsory trade, the College of Trades will automatically register the Apprentice as a member of the Journeyperson Candidates class so the Apprentice can continue to work legally for one year while preparing for the certification examination. If an apprentice completes their apprenticeship in a voluntary trade and there is no Certificate of Qualification exam, they can apply for membership in the Journeypersons Class at the Ontario College of Trades. If there is a Certificate of Qualification exam, they must write and pass the exam in order to enter the Journeypersons Class at the Ontario College of Trades.

For permission to schedule an exam once completion is confirmed by the Ministry, the individual must first contact the College of Trades Client Services Department at 647-847-3000 or toll free at 1-855-299-0028 to pay the certification examination fee.
# APPRENTICE COMPLETION FORM (Appendix B)

*Please fill out both sides of this form, including the Skill Set Completion for Sponsors (see back of form). Once both sides are completed, submit the form to your local Ministry of Advanced Education and Skills Development apprenticeship office (find contact information at [http://services.findhelp.ca/eo/tcu/appoff](http://services.findhelp.ca/eo/tcu/appoff) or by calling Employment Ontario at (1-800-387-5656).*

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<tr>
<td>Sponsor’s Signing Authority <em>(print name)</em></td>
<td></td>
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<tr>
<td>E-mail Address</td>
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<th><strong>PROGRAM INFORMATION</strong></th>
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<tr>
<td>Trade Name</td>
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<tr>
<td>Number of hours required as per Training Agreement <em>(for hours-based trades only)</em></td>
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<tr>
<td>Hours completed? <em>(documentation attached)</em></td>
<td>Yes ( )  No ( )  Not applicable ( )</td>
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<tr>
<td>Classroom training completed or exempt?</td>
<td>Yes ( )  No ( )  Not applicable ( )</td>
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I hereby confirm that the information submitted on both sides of this form is true and accurate.

X  
Apprentice’s Signature  Date  X  
Signature of Sponsor’s Signing Authority  Date
SKILL SET COMPLETION FOR SPONSORS (Appendix C)

You will find the skill set numbers and titles in the Log Book’s Table of Contents. By signing off each skill set in the table below, you are providing final confirmation, as the Apprentice’s Sponsor, that the Apprentice has demonstrated competency in all the mandatory skills included in the skill set.

<table>
<thead>
<tr>
<th>SKILL SET #</th>
<th>SKILL SET TITLE</th>
<th>SIGNING AUTHORITY SIGNATURE</th>
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<tbody>
<tr>
<td>U6551</td>
<td>SAFE WORKING PRACTICES AND PROCEDURES</td>
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<tr>
<td>U6552</td>
<td>OCCUPATIONAL SKILLS</td>
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<tr>
<td>U6553</td>
<td>PROCESS MEASUREMENT AND INDICATING DEVICES</td>
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<tr>
<td>U6554</td>
<td>PROCESS, QUALITY CONTROL AND ENVIRONMENTAL ANALYZERS</td>
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<tr>
<td>U6555</td>
<td>SAFETY AND SECURITY SYSTEMS AND DEVICES</td>
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<td>U6556</td>
<td>ENERGY DELIVERY SYSTEMS</td>
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<tr>
<td>U6557</td>
<td>COMMUNICATION SYSTEMS AND DEVICES</td>
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<td>U6558</td>
<td>FINAL CONTROL DEVICES</td>
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<tr>
<td>U6559</td>
<td>PROCESS CONTROL SYSTEMS</td>
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MINISTRY OF ADVANCED EDUCATION AND SKILLS DEVELOPMENT USE ONLY:

Sponsor verified as most recent sponsor of record: Yes ( ) No ( )
Documentation to support completion of hours attached: Yes ( ) No ( )
Completion of classroom training verified: Yes ( ) No ( )

Staff Name ________________________ Signature _______________________ Date __________
<table>
<thead>
<tr>
<th>Location</th>
<th>Contact</th>
<th>Location</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barrie</td>
<td>705-737-1431</td>
<td>North Bay</td>
<td>200 First Ave West, North Bay, ON</td>
</tr>
<tr>
<td></td>
<td>55 Cedar Pointe Dr Unit 609,</td>
<td></td>
<td>P1B 3B9</td>
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<tr>
<td></td>
<td>Barrie, ON L4N 5R7</td>
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<tr>
<td>Belleville</td>
<td>613-968-5558</td>
<td>Oakville</td>
<td>700 Dorval Dr., Suite 100, Oakville, ON</td>
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<tr>
<td></td>
<td>135 North Front St, Belleville,</td>
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<td>519-756-5197</td>
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<td>505 Park Rd North Suite 201,</td>
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<td>519-354-2766</td>
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<td>Preston Square, 347 Preston,</td>
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<td>613-938-9702</td>
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<td></td>
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<tr>
<td>Dryden</td>
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<td>705-848-4661</td>
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<td>901 Lansdowne St West,</td>
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<td>50 Hillside Dr North, Elliot</td>
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<td>807-274-8634</td>
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<td>St Catharines</td>
<td>Garden City Tower, 301 St Paul</td>
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<td>St East, 10th Fl, St Catharines, ON</td>
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<td>Kapuskasing</td>
<td>705-337-4381</td>
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<td>Kenora</td>
<td>807-468-2879</td>
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<tr>
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<td>Kitchener</td>
<td>519-653-5758</td>
<td>Toronto Central</td>
<td>625 Church St 1st Fl, Toronto, ON</td>
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<tr>
<td>London</td>
<td>519-675-7788</td>
<td>Windsor Central</td>
<td>Roundhouse Centre, 3155 Howard</td>
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<td>1200 Commissioners Rd E,</td>
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<td>Ave 2nd Fl, Ste 200, Windsor,</td>
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<tr>
<td>Mississauga</td>
<td>905-279-7333</td>
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<tr>
<td>(City of)</td>
<td>The Emerald Centre, 10 Kingsbridge Garden Cir Ste 404, Mississauga, ON L5R 3K6</td>
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</tbody>
</table>

For current office listings, please visit: [http://services.findhelp.ca/eo/tcu/appoff](http://services.findhelp.ca/eo/tcu/appoff)
Completing Your Apprenticeship Program

Once your sponsor agrees that your hours are complete and you are competent in the required skills, and you have completed all the levels of classroom training required for your trade:

- Check the Ontario College of Trades Public Register to make sure your Apprentices class membership is still active:  
- Follow the completion instructions on the Completion Form (Appendix A) in the Log Book.
- Answer any questions that MAESD staff may have, and provide any additional completion documentation they may require.
- Once they confirm completion, MAESD will issue you a Certificate of Apprenticeship and notify the Ontario College of Trades of your completion.

After Your Apprenticeship

If you are in a trade with a certification exam, the College of Trades will automatically complete your membership in the Apprentices class and activate your 12-month membership in the Journeyperson Candidates class. This change will be reflected on your account with the College as well as on the College’s Public Register.

Membership in the Journeyperson Candidates class will allow you to continue practicing in a compulsory trade for 12 months while you prepare for and write your exam; if you are in a voluntary trade, it is your automatic approval to challenge the certification exam.

The College will send you a Journeyperson Candidates class welcome letter within 3 weeks of completion that outlines any/all of your future requirements for membership and examination as appropriate (different situations for voluntary and compulsory trades).

If you complete an apprenticeship program for which there is no exam, you can submit an application to become a member of the College’s Journeypersons class on the basis of having earned a Certificate of Apprenticeship in the trade.

Preparing For Your Exam

Find out if your trade has a Certificate of Qualification exam at:

For permission to schedule an exam once completion is confirmed by MAESD, you must first contact the College’s Client Services Department at 647-847-3000 or toll free at 1-855-299-0028 to pay the certification exam fee. Once you have paid, contact your local MAESD Apprenticeship office to book your exam.

Download Ontario College of Trades exam preparation guide at:
www.collegeoftrades.ca/resources/exam-process and/or view the exam preparation guide for Red Seal trades at: www.red-seal.ca/w.2lc.4m.2@-eng.jsp