

# Atlantic Workforce Partnership

Curriculum Standard

## PLUMBER

Version: 2026

Revised: N/A

Atlantic Apprenticeship



# PLAN OF TRAINING

## Atlantic Apprenticeship Curriculum Standard

### Plumber

December 2025



**Government of Newfoundland and Labrador  
Department of Education and Early Childhood Development  
Apprenticeship and Trades Certification Division**

Approved by:

A handwritten signature in black ink, appearing to read "Lana Harris", is positioned below the "Approved by:" text.

Chairperson, Provincial Apprenticeship and Certification Board

Date: December 15<sup>th</sup>, 2025

# Atlantic Apprenticeship Curriculum Standard

## Plumber

## Preface

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This Atlantic Apprenticeship Curriculum Standard is intended to assist instructional staff in the design and delivery of technical, in-class training in support of the Plumber program.

This document contains all the technical training elements required to complete the Plumber apprenticeship program and has been developed based on the 2023 Red Seal Occupational Standard. The RSOS can be found on the Red Seal website ([www.red-seal.ca](http://www.red-seal.ca)).

Implementation of this AACCS for Apprenticeship training is outlined in the following table.

| Level   | Implementation Effective |
|---------|--------------------------|
| Level 1 | 2026-2027                |
| Level 2 | 2027-2028                |
| Level 3 | 2028-2029                |
| Level 4 | 2029-2030                |

**The above implementation schedule was current at time of printing. Please confirm with Apprenticeship Staff prior to commencing training.**

Granting of credit or permission to challenge level examinations for pre-employment or pre-apprenticeship training for the Plumber trade will be based on the content outlined in this standard. Training providers must contact their provincial apprenticeship authority for more information on the process and requirements for determining eligibility for credit towards an apprenticeship program.

## **Acknowledgements**

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The development of the Atlantic Apprenticeship Curriculum Standard (AACS) is an initiative of the Atlantic Apprenticeship Council's Atlantic Apprenticeship Harmonization Project (AAHP) through the Atlantic Workforce Partnership.

The AAHP was created in 2014 and funded through contributions from Employment and Social Development Canada (ESDC) and the four Atlantic Provinces. In 2023, Phase III of the AAHP concluded and the AAHP transitioned to a maintenance office supported by the four Atlantic Provinces. The Atlantic Apprenticeship Council would like to thank ESDC for the financial support provided to harmonize the 23 trades in Phase I, II and III of the AAHP.

Advisory committees, industry representatives, instructors and apprenticeship staff provided valuable input to the development of the trade AACS in 2015 and updating of the trade AACS in 2024. Without their dedication to quality apprenticeship training, this document could not have been produced. The Atlantic Apprenticeship Council wishes to acknowledge the contributions of the industry and instructional representatives who participated in the development of this document.

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## **User Guide**

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Atlantic Apprenticeship Curriculum Standards (AACS) are developed based on trade specific national occupational standards, such as the Red Seal Occupational Standard (RSOS), and industry consultation. This document represents the minimum content to be delivered as part of the harmonized Atlantic program for the Plumber trade.

The AACSs are deliberately constructed for ease of use and flexibility of structure to adapt to all delivery requirements. They detail units of training, unit outcomes and objectives. They do not impose a delivery model or teaching format.

Jurisdictions and/or training providers will select and develop delivery materials and techniques that accommodate a variety of learning styles and delivery patterns. The AACS does not dictate study materials, textbooks or learning activities to be used in delivery.

The document includes a Level Structure to facilitate mobility for apprentices moving from one jurisdiction to another.

### **Structure**

The content of the AACS is divided into units. Unit codes are used as a means of identification and are not intended to convey the order of delivery. It is at the discretion of the training provider to deliver the content in the required logical sequence of delivery within the level. Jurisdictions are free to deliver units one at a time or concurrently within a level, provided all outcomes are met.

The Learning Outcomes describe what the apprentice should know or be able to do at the end of training. Wording of the Learning Outcomes, “Demonstrate knowledge of...” acknowledges the broad spectrum of ways in which knowledge can be assessed (i.e., practical projects, multiple choice testing, presentations, etc.) by instructional staff within the training.

Summative evaluation will be through a multiple-choice level exam administered through the jurisdictional Apprenticeship Authority.

## **User Guide (continued)**

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The Red Seal Occupational Standard (RSOS) to AACS comparison chart outlines the relation between each RSOS sub-task and the AACS units. RSOS references have also been detailed in each unit to highlight the direct link between the unit and relevant sub-tasks in the RSOS.

In the Level Structure section, the document identifies suggested hours to provide an indication of the time it should take to cover the material in the unit and is provided as a guide only. Adjustments to the suggested hours for each unit may be required to account for rate of apprentice learning, statutory holidays, storm days, registration, and examinations. These suggested hours detailed for each unit will represent both theory and practical training (if relevant) and for consistency will be based on a standard of 30 hours per week of training. The true length of time required to deliver an outcome successfully will depend upon the learning activities and teaching methods used.

There are two types of objectives found in the AACS document: theoretical and practical.

The theoretical objectives represent the material that is to be covered during the technical training to convey the required knowledge to the apprentice.

The practical objectives represent the tasks or skills that have been deemed by the Atlantic Trade Advisory Committee as critical for the apprentices to receive exposure to while attending technical training. For example, exposure could be done through instructor demonstration or individual or group performance of the skill or task. Training providers are encouraged to use practical demonstration and opportunities for hands-on learning whenever possible. Practical objectives are not intended to replace the on-the-job training component of the apprentice's program or to mirror or replace the logbook skills that are to be taught and evaluated in the workplace.

Detailed content for each objective has not been developed. Where detail is required for clarity, content has been provided. The AACS should be used in conjunction with the national standard for the trade – the Red Seal Occupational Standard (RSOS).



## **Glossary of Terms**

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These definitions are intended as a guide to how language is used in the document.

|                       |                                                                                                        |
|-----------------------|--------------------------------------------------------------------------------------------------------|
| <b>Adjust</b>         | To put in good working order; regulate; bring to a proper state or position.                           |
| <b>Application</b>    | The use to which something is put and/or the circumstance in which an individual would use it.         |
| <b>Characteristic</b> | A feature that helps to identify, tell apart or describe recognizably, a distinguishing mark or trait. |
| <b>Component</b>      | A part that can be separated from or attached to a system, a segment or unit.                          |
| <b>Define</b>         | To state the meaning of (a word, phrase, etc.).                                                        |
| <b>Describe</b>       | To give a verbal account of; talk about in detail.                                                     |
| <b>Explain</b>        | To make plain or clear; illustrate; rationalize.                                                       |
| <b>Identify</b>       | To point out or name objectives or types.                                                              |
| <b>Interpret</b>      | To translate information from observation, charts, tables, graphs, and written material.               |
| <b>Maintain</b>       | To keep in a condition of good repair or efficiency.                                                   |
| <b>Method</b>         | A means or manner of doing something that has procedures attached to it.                               |
| <b>Operate</b>        | How an object works; to control or direct the functioning of.                                          |
| <b>Procedure</b>      | A prescribed series of steps taken to accomplish an end.                                               |
| <b>Purpose</b>        | The reason for which something exists or is done, made or used.                                        |

## **Glossary of Terms (continued)**

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|                  |                                                                                                                                  |
|------------------|----------------------------------------------------------------------------------------------------------------------------------|
| <b>Service</b>   | Routine inspection and replacement of worn or deteriorating parts.                                                               |
|                  | An act or business function provided to a customer in the course of an individual's profession (e.g., haircut).                  |
| <b>Technique</b> | Within a procedure, the manner in which technical skills are applied.                                                            |
| <b>Test</b>      | v. To subject to a procedure that ascertains effectiveness, value, proper function, or other quality.                            |
|                  | n. A way of examining something to determine its characteristics or properties, or to determine whether it is working correctly. |

## Essential Skills / Skills for Success

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Through extensive research, the Government of Canada and other national and international agencies have identified and validated key essential skills for the workplace. These skills are used in nearly every job and at different levels of complexity. They provide the foundation for learning all other skills and enable people to evolve with their jobs and adapt to workplace change. In response to the evolving labour market and changing skill needs, in 2021 the Government of Canada launched a new **Skills for Success** model. (QR code #1) or web link below.

<https://www.canada.ca/en/services/jobs/training/initiatives/skills-success/new-model.html>

The Employment and Social Development Canada (ESDC) website provides information about the Skills for Success, including:

- a brief description of the skill;
- why the skill is important;
- tools to help you improve on each of the skills; and
- videos to help you improve on each of the skills.

This information can be found at: (QR code #2) or web link below.

<https://www.jobbank.gc.ca/essentialskills>

Skills for Success training tools can be found at: (QR code #3) or web link below.

<https://www.canada.ca/en/services/jobs/training/initiatives/skills-success/tools.html>

The development and improvement of these Skills for Success is inherent throughout the apprenticeship training program as apprentices work towards achieving journey person status.



#1 The new Skills for Success model – Canada.ca



#2 Explore careers by essential skills – Job Bank



#3 Assessment and training tools – Canada.ca

## Level Structure

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### Level 1 – 8 Weeks

| Unit Code | Unit Title                                 | Suggested Hours | Page Number |
|-----------|--------------------------------------------|-----------------|-------------|
| PLB-100   | Safety                                     | 15              | 24          |
| PLB-105   | Tools and Equipment                        | 15              | 28          |
| PLB-110   | Access Equipment                           | 6               | 30          |
| PLB-115   | Rigging, Hoisting, Lifting and Positioning | 18              | 32          |
| PLB-120   | Welding, Fuel Brazing and Cutting          | 12              | 35          |
| PLB-125   | Plastic Piping                             | 24              | 38          |
| PLB-130   | Copper Tube, Tubing and Pipe               | 24              | 42          |
| PLB-135   | Steel Piping                               | 24              | 46          |
| PLB-140   | Cast Iron Piping                           | 15              | 49          |
| PLB-145   | Drainage, Waste and Venting Systems I      | 42              | 52          |
| PLB-150   | Drawings I                                 | 27              | 55          |
| PLB-160   | Residential Potable Water Distribution     | 12              | 57          |
| MENT-700  | Mentoring I                                | 6               | 59          |

### Level 2 – 7 Weeks

| Unit Code | Unit Title                                    | Suggested Hours | Page Number |
|-----------|-----------------------------------------------|-----------------|-------------|
| PLB-200   | Piping Valves                                 | 12              | 62          |
| PLB-205   | Specialized Piping                            | 9               | 64          |
| PLB-210   | Plumbing Fixtures, Appliances and Accessories | 30              | 68          |
| PLB-215   | Hot Water Storage Tanks and Heaters           | 24              | 71          |
| PLB-220   | Drawings II                                   | 30              | 73          |
| PLB-225   | Drainage, Waste and Venting Systems II        | 42              | 75          |
| PLB-230   | Hydronic Systems I                            | 63              | 79          |

## Level Structure (continued)

### Level 3 – 7 Weeks

| Unit Code | Unit Title                                                 | Suggested Hours | Page Number |
|-----------|------------------------------------------------------------|-----------------|-------------|
| PLB-300   | Hydronic Systems II                                        | 30              | 86          |
| PLB-305   | Water Service                                              | 12              | 90          |
| PLB-310   | Small Building Potable Water Distribution                  | 36              | 93          |
| PLB-315   | Commercial Drainage Systems                                | 18              | 97          |
| PLB-320   | Commercial Venting Systems                                 | 24              | 100         |
| PLB-325   | Storm and Combination Drainage Systems (Sewers)            | 24              | 102         |
| PLB-330   | Irrigation Systems                                         | 3               | 105         |
| PLB-335   | Commercial/Institutional Plumbing Fixtures and Accessories | 18              | 107         |
| PLB-340   | Compressed Air Systems                                     | 9               | 109         |
| PLB-350   | Hydronic System Controls                                   | 12              | 112         |
| PLB-355   | Green Technology                                           | 18              | 114         |
| PLB-360   | Basic Electricity                                          | 6               | 116         |

### Level 4 – 8 Weeks

| Unit Code | Unit Title                            | Suggested Hours | Page Number |
|-----------|---------------------------------------|-----------------|-------------|
| PLB-400   | Gas Piping Systems                    | 48              | 118         |
| PLB-405   | Medical Gas Systems                   | 12              | 120         |
| PLB-410   | Low Pressure Steam Systems            | 30              | 123         |
| PLB-415   | Private Sewage Treatment Systems      | 12              | 126         |
| PLB-420   | Public Sewage Treatment Systems       | 6               | 129         |
| PLB-425   | Cross Connection Control              | 30              | 132         |
| PLB-430   | Pressure Systems (Rural Water Supply) | 36              | 134         |
| PLB-435   | Water Treatment Systems               | 18              | 138         |
| PLB-440   | Process Piping Systems                | 6               | 141         |
| MENT-701  | Mentoring II                          | 6               | 144         |
| PLB-445   | Job Planning and Trade Documentation  | 6               | 145         |
| PLB-455   | Program Review                        | 30              | 147         |

## 2023 RSOS Sub-Task to AACS Unit Comparison

| RSOS Sub-Task                                    |                                                                | AACS Unit |                                               |
|--------------------------------------------------|----------------------------------------------------------------|-----------|-----------------------------------------------|
| Task 1 – Performs safety-related functions.      |                                                                |           |                                               |
| 1.01                                             | Maintains Safe work environment.                               | PLB-100   | Safety                                        |
| 1.02                                             | Uses personal protective equipment (PPE) and safety equipment. | PLB-100   | Safety                                        |
| 1.03                                             | Performs lock-out and tag-out (LOTO) procedures.               | PLB-100   | Safety                                        |
| Task 2 – Uses and maintains tools and equipment. |                                                                |           |                                               |
| 2.01                                             | Uses common tools and equipment.                               | PLB-105   | Tools and Equipment                           |
| 2.02                                             | Uses access equipment.                                         | PLB-110   | Access Equipment                              |
| 2.03                                             | Uses rigging, hoisting, lifting and positioning equipment.     | PLB-115   | Rigging, Hoisting, Lifting and Positioning    |
| 2.04                                             | Rigs load for cranes.                                          | PLB-115   | Rigging, Hoisting, Lifting and Positioning    |
| 2.05                                             | Uses welding equipment.                                        | PLB-120   | Welding, Fuel Brazing and Cutting             |
| 2.06                                             | Uses soldering and brazing equipment.                          | PLB-120   | Welding, Fuel Brazing and Cutting             |
| Task 3 – Organizes work.                         |                                                                |           |                                               |
| 3.01                                             | Organizes project tasks and procedures.                        | PLB-150   | Drawings I                                    |
|                                                  |                                                                | PLB-220   | Drawings II                                   |
|                                                  |                                                                | PLB-445   | Job Planning and Trade Documentation          |
| 3.02                                             | Organizes materials and supplies.                              | PLB-150   | Drawings I                                    |
|                                                  |                                                                | PLB-220   | Drawings II                                   |
|                                                  |                                                                | PLB-445   | Job Planning and Trade Documentation          |
| 3.03                                             | Uses documentation.                                            | PLB-100   | Safety                                        |
|                                                  |                                                                | PLB-150   | Drawings I                                    |
|                                                  |                                                                | PLB-360   | Basic Electricity                             |
|                                                  |                                                                | PLB-445   | Job Planning and Trade Documentation          |
| Task 4 – Routine trade activities.               |                                                                |           |                                               |
| 4.01                                             | Plans layout for piping systems.                               | PLB-145   | Drainage, Waste and Venting Systems I         |
|                                                  |                                                                | PLB-150   | Drawings I                                    |
|                                                  |                                                                | PLB-210   | Plumbing Fixtures, Appliances and Accessories |
|                                                  |                                                                | PLB-215   | Hot Water Storage Tanks and Heaters           |

| RSOS Sub-Task |                                           | AACS Unit |                                                 |
|---------------|-------------------------------------------|-----------|-------------------------------------------------|
|               |                                           | PLB-220   | Drawings II                                     |
|               |                                           | PLB-225   | Drainage, Waste and Venting Systems II          |
|               |                                           | PLB-305   | Water Service                                   |
|               |                                           | PLB-310   | Small Building Potable Water Distribution       |
|               |                                           | PLB-315   | Commercial Drainage Systems                     |
|               |                                           | PLB-325   | Storm and Combination Drainage Systems (Sewers) |
| 4.02          | Calculates tube, tubing and pipe lengths. | PLB-125   | Plastic Piping                                  |
|               |                                           | PLB-130   | Copper Tube, Tubing and Pipe                    |
|               |                                           | PLB-135   | Steel Piping                                    |
|               |                                           | PLB-140   | Cast Iron Piping                                |
|               |                                           | PLB-205   | Specialized Piping                              |
| 4.03          | Installs piping supports.                 | PLB-125   | Plastic Piping                                  |
|               |                                           | PLB-130   | Copper Tube, Tubing and Pipe                    |
|               |                                           | PLB-135   | Steel Piping                                    |
|               |                                           | PLB-140   | Cast Iron Piping                                |
|               |                                           | PLB-205   | Specialized Piping                              |
| 4.04          | Installs piping sleeves.                  | PLB-125   | Plastic Piping                                  |
|               |                                           | PLB-130   | Copper Tube, Tubing and Pipe                    |
|               |                                           | PLB-135   | Steel Piping                                    |
|               |                                           | PLB-140   | Cast Iron Piping                                |
|               |                                           | PLB-205   | Specialized Piping                              |
| 4.05          | Commissions systems.                      | PLB-145   | Drainage, Waste and Venting Systems I           |
|               |                                           | PLB-210   | Plumbing Fixtures, Appliances and Accessories   |
|               |                                           | PLB-215   | Hot Water Storage Tanks and Heaters             |
|               |                                           | PLB-225   | Drainage, Waste and Venting Systems II          |
|               |                                           | PLB-230   | Hydronic Systems I                              |
|               |                                           | PLB-305   | Water Service                                   |
|               |                                           | PLB-310   | Small Building Potable Water Distribution       |
|               |                                           | PLB-315   | Commercial Drainage Systems                     |
|               |                                           | PLB-325   | Storm and Combination Drainage Systems (Sewers) |
|               |                                           | PLB-330   | Irrigation Systems                              |

| RSOS Sub-Task |                                                               | AACS Unit |                                                            |
|---------------|---------------------------------------------------------------|-----------|------------------------------------------------------------|
|               |                                                               | PLB-335   | Commercial/Institutional Plumbing Fixtures and Accessories |
|               |                                                               | PLB-340   | Compressed Air Systems                                     |
|               |                                                               | PLB-350   | Hydronic System Controls                                   |
|               |                                                               | PLB-360   | Basic Electricity                                          |
|               |                                                               | PLB-410   | Low Pressure Steam Systems                                 |
|               |                                                               | PLB-415   | Private Sewage Treatment Systems                           |
|               |                                                               | PLB-420   | Public Sewage Treatment Systems                            |
|               |                                                               | PLB-430   | Pressure Systems (Rural Water Supply)                      |
|               |                                                               | PLB-435   | Water Treatment Systems                                    |
|               |                                                               | PLB-440   | Process Piping Systems                                     |
| 4.06          | Protects piping systems, equipment and structure from damage. | PLB-125   | Plastic Piping                                             |
|               |                                                               | PLB-130   | Copper Tube, Tubing and Pipe                               |
|               |                                                               | PLB-135   | Steel Piping                                               |
|               |                                                               | PLB-140   | Cast Iron Piping                                           |
|               |                                                               | PLB-145   | Drainage, Waste and Venting Systems I                      |
|               |                                                               | PLB-205   | Specialized Piping                                         |
|               |                                                               | PLB-215   | Hot Water Storage Tanks and Heaters                        |
|               |                                                               | PLB-225   | Drainage, Waste and Venting Systems II                     |
|               |                                                               | PLB-230   | Hydronic Systems I                                         |
|               |                                                               | PLB-310   | Small Building Potable Water Distribution                  |
|               |                                                               | PLB-315   | Commercial Drainage Systems                                |
|               |                                                               | PLB-325   | Storm and Combination Drainage Systems (Sewers)            |
|               |                                                               | PLB-330   | Irrigation Systems                                         |
|               |                                                               | PLB-340   | Compressed Air Systems                                     |
|               |                                                               | PLB-350   | Hydronic Systems Controls                                  |
|               |                                                               | PLB-410   | Low Pressure Steam Systems                                 |
|               |                                                               | PLB-415   | Private Sewage Treatment Systems                           |
|               |                                                               | PLB-420   | Public Sewage Treatment Systems                            |
|               |                                                               | PLB-435   | Water Treatment Systems                                    |



| RSOS Sub-Task                                         |                                                               | AACS Unit |                                                 |
|-------------------------------------------------------|---------------------------------------------------------------|-----------|-------------------------------------------------|
|                                                       |                                                               | PLB-440   | Process Piping Systems                          |
| 4.07                                                  | Coordinates excavation and backfilling of trenches.           | PLB-305   | Water Service                                   |
|                                                       |                                                               | PLB-310   | Small Building Potable Water Distribution       |
|                                                       |                                                               | PLB-315   | Commercial Drainage Systems                     |
|                                                       |                                                               | PLB-325   | Storm and Combination Drainage Systems (Sewers) |
|                                                       |                                                               | PLB-415   | Private Sewage Treatment Systems                |
|                                                       |                                                               | PLB-420   | Public Sewage Treatment Systems                 |
|                                                       |                                                               | PLB-430   | Pressure Systems (Rural Water Supply)           |
| 4.08                                                  | Installs fire stopping devices and materials.                 | PLB-145   | Drainage, Waste and Venting Systems I           |
|                                                       |                                                               | PLB-225   | Drainage, Waste and Venting Systems II          |
|                                                       |                                                               | PLB-315   | Commercial Drainage Systems                     |
|                                                       |                                                               | PLB-320   | Commercial Venting Systems                      |
|                                                       |                                                               | PLB-325   | Storm and Combination Drainage Systems (Sewers) |
| Task 5 – Uses communication and mentoring techniques. |                                                               |           |                                                 |
| 5.01                                                  | Uses communication techniques.                                | PLB-100   | Safety                                          |
|                                                       |                                                               | MENT-700  | Mentoring I                                     |
|                                                       |                                                               | MENT-701  | Mentoring II                                    |
| 5.02                                                  | Uses mentoring techniques.                                    | MENT-700  | Mentoring I                                     |
|                                                       |                                                               | MENT-701  | Mentoring II                                    |
| Task 6 – Prepares pipe.                               |                                                               |           |                                                 |
| 6.01                                                  | Inspects tube, tubing, pipe and fittings before installation. | PLB-125   | Plastic Piping                                  |
|                                                       |                                                               | PLB-130   | Copper Tube, Tubing and Pipe                    |
|                                                       |                                                               | PLB-135   | Steel Piping                                    |
|                                                       |                                                               | PLB-140   | Cast Iron Piping                                |
|                                                       |                                                               | PLB-205   | Specialized Piping                              |
| 6.02                                                  | Cuts tube, tubing and pipe.                                   | PLB-125   | Plastic Piping                                  |
|                                                       |                                                               | PLB-130   | Copper Tube, Tubing and Pipe                    |
|                                                       |                                                               | PLB-135   | Steel Piping                                    |
|                                                       |                                                               | PLB-140   | Cast Iron Piping                                |
|                                                       |                                                               | PLB-205   | Specialized Piping                              |
| 6.03                                                  | Bends tube, tubing and pipe.                                  | PLB-125   | Plastic Piping                                  |
|                                                       |                                                               | PLB-130   | Copper Tube, Tubing and Pipe                    |
|                                                       |                                                               | PLB-135   | Steel Piping                                    |

| RSOS Sub-Task                                                                          |                                                                 | AACS Unit |                                                 |
|----------------------------------------------------------------------------------------|-----------------------------------------------------------------|-----------|-------------------------------------------------|
|                                                                                        |                                                                 | PLB-205   | Specialized Piping                              |
| 6.04                                                                                   | Prepares tube, tubing and pipe connections.                     | PLB-125   | Plastic Piping                                  |
|                                                                                        |                                                                 | PLB-130   | Copper Tube, Tubing and Pipe                    |
|                                                                                        |                                                                 | PLB-135   | Steel Piping                                    |
|                                                                                        |                                                                 | PLB-140   | Cast Iron Piping                                |
|                                                                                        |                                                                 | PLB-205   | Specialized Piping                              |
| Task 7 – Joins tube, tubing and pipe.                                                  |                                                                 |           |                                                 |
| 7.01                                                                                   | Joins copper tube, tubing and pipe.                             | PLB-130   | Copper Tube, Tubing and Pipe                    |
| 7.02                                                                                   | Joins plastic tube, tubing and pipe.                            | PLB-125   | Plastic Piping                                  |
| 7.03                                                                                   | Joins steel tube, tubing and pipe.                              | PLB-135   | Steel Piping                                    |
| 7.04                                                                                   | Joins cast iron pipe.                                           | PLB-140   | Cast Iron Piping                                |
| 7.05                                                                                   | Joins specialized tube, tubing and pipe.                        | PLB-205   | Specialized Piping                              |
| Task 8 – Installs, tests and services sewers.                                          |                                                                 |           |                                                 |
| 8.01                                                                                   | Plans layout and sizes pipe for sewers.                         | PLB-325   | Storm and Combination Drainage Systems (Sewers) |
| 8.02                                                                                   | Installs maintenance holes and catch basins.                    | PLB-325   | Storm and Combination Drainage Systems (Sewers) |
| 8.03                                                                                   | Installs piping for sewers.                                     | PLB-325   | Storm and Combination Drainage Systems (Sewers) |
| 8.04                                                                                   | Tests maintenance holes, catch basins and piping for sewers.    | PLB-325   | Storm and Combination Drainage Systems (Sewers) |
| 8.05                                                                                   | Services maintenance holes, catch basins and piping for sewers. | PLB-325   | Storm and Combination Drainage Systems (Sewers) |
| Task 9 – Installs, tests and services sewage treatment systems.                        |                                                                 |           |                                                 |
| 9.01                                                                                   | Plans installation of sewage treatment systems.                 | PLB-415   | Private Sewage Treatment Systems                |
|                                                                                        |                                                                 | PLB-420   | Public Sewage Treatment Systems                 |
| 9.02                                                                                   | Installs components for sewage treatment systems.               | PLB-415   | Private Sewage Treatment Systems                |
|                                                                                        |                                                                 | PLB-420   | Public Sewage Treatment Systems                 |
| 9.03                                                                                   | Tests sewage treatment systems.                                 | PLB-415   | Private Sewage Treatment Systems                |
|                                                                                        |                                                                 | PLB-420   | Public Sewage Treatment Systems                 |
| 9.04                                                                                   | Services sewage treatment systems.                              | PLB-415   | Private Sewage Treatment Systems                |
|                                                                                        |                                                                 | PLB-420   | Public Sewage Treatment Systems                 |
| Task 10 – Installs, tests and services interior drainage waste and vent (DWV) systems. |                                                                 |           |                                                 |

| RSOS Sub-Task                                                               |                                                                                                         | AACS Unit |                                        |
|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|-----------|----------------------------------------|
| 10.01                                                                       | Plans layout and sizes piping for interior drainage, waste and vent (DWV) systems.                      | PLB-145   | Drainage, Waste and Venting Systems I  |
|                                                                             |                                                                                                         | PLB-225   | Drainage, Waste and Venting Systems II |
|                                                                             |                                                                                                         | PLB-315   | Commercial Drainage Systems            |
|                                                                             |                                                                                                         | PLB-320   | Commercial Venting Systems             |
| 10.02                                                                       | Installs underground piping and components for interior drainage, waste and vent systems (DWV) systems. | PLB-145   | Drainage, Waste and Venting Systems I  |
|                                                                             |                                                                                                         | PLB-225   | Drainage, Waste and Venting Systems II |
|                                                                             |                                                                                                         | PLB-315   | Commercial Drainage Systems            |
| 10.03                                                                       | Installs above-ground piping and components for interior drainage, waste and vent (DWV) systems.        | PLB-145   | Drainage, Waste and Venting Systems I  |
|                                                                             |                                                                                                         | PLB-225   | Drainage, Waste and Venting Systems II |
|                                                                             |                                                                                                         | PLB-315   | Commercial Drainage Systems            |
|                                                                             |                                                                                                         | PLB-320   | Commercial Venting Systems             |
| 10.04                                                                       | Tests interior drainage, waste and vent (DWV) systems.                                                  | PLB-225   | Drainage, Waste and Venting Systems II |
|                                                                             |                                                                                                         | PLB-315   | Commercial Drainage Systems            |
|                                                                             |                                                                                                         | PLB-320   | Commercial Venting Systems             |
| 10.05                                                                       | Services interior drainage, waste and vent (DWV) systems.                                               | PLB-225   | Drainage, Waste and Venting Systems II |
|                                                                             |                                                                                                         | PLB-315   | Commercial Drainage Systems            |
|                                                                             |                                                                                                         | PLB-320   | Commercial Venting Systems             |
| Task 11 – Installs, tests and services water services.                      |                                                                                                         |           |                                        |
| 11.01                                                                       | Plans layout and sizes piping and components for water service.                                         | PLB-160   | Residential Potable Water Distribution |
|                                                                             |                                                                                                         | PLB-305   | Water Service                          |
| 11.02                                                                       | Installs piping for water service.                                                                      | PLB-160   | Residential Potable Water Distribution |
|                                                                             |                                                                                                         | PLB-305   | Water Service                          |
| 11.03                                                                       | Installs components for water service.                                                                  | PLB-160   | Residential Potable Water Distribution |
|                                                                             |                                                                                                         | PLB-305   | Water Service                          |
| 11.04                                                                       | Tests water service piping and components.                                                              | PLB-305   | Water Service                          |
| 11.05                                                                       | Services water service piping and components.                                                           | PLB-305   | Water Service                          |
| Task 12 – Installs, tests, and services potable water distribution systems. |                                                                                                         |           |                                        |
| 12.01                                                                       |                                                                                                         | PLB-160   | Residential Potable Water Distribution |

| RSOS Sub-Task                                                            |                                                                                      | AACS Unit |                                           |
|--------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------|-------------------------------------------|
|                                                                          | Plans layout and sizes piping and components for potable water distribution systems. | PLB-215   | Hot Water Storage Tanks and Heaters       |
|                                                                          |                                                                                      | PLB-310   | Small Building Potable Water Distribution |
| 12.02                                                                    | Installs piping for potable water distribution systems.                              | PLB-160   | Residential Potable Water Distribution    |
|                                                                          |                                                                                      | PLB-310   | Small Building Potable Water Distribution |
| 12.03                                                                    | Installs components for potable water distribution systems.                          | PLB-160   | Residential Potable Water Distribution    |
|                                                                          |                                                                                      | PLB-215   | Hot Water Storage Tanks and Heaters       |
|                                                                          |                                                                                      | PLB-310   | Small Building Potable Water Distribution |
| 12.04                                                                    | Installs cross connection controls.                                                  | PLB-160   | Residential Potable Water Distribution    |
|                                                                          |                                                                                      | PLB-310   | Small Building Potable Water Distribution |
|                                                                          |                                                                                      | PLB-425   | Cross Connection Control                  |
| 12.05                                                                    | Tests potable water distribution systems.                                            | PLB-215   | Hot Water Storage Tanks and Heaters       |
|                                                                          |                                                                                      | PLB-310   | Small Building Potable Water Distribution |
| 12.06                                                                    | Services potable water distribution systems.                                         | PLB-215   | Hot Water Storage Tanks and Heaters       |
|                                                                          |                                                                                      | PLB-310   | Small Building Potable Water Distribution |
| Task 13 – Installs tests and services private water pressure systems.    |                                                                                      |           |                                           |
| 13.01                                                                    | Plans layout and sizes piping and components for private water pressure systems.     | PLB-430   | Pressure Systems (Rural Water Supply)     |
| 13.02                                                                    | Installs piping for private water pressure systems.                                  | PLB-430   | Pressure Systems (Rural Water Supply)     |
| 13.03                                                                    | Installs components for private water pressure systems.                              | PLB-360   | Basic Electricity                         |
|                                                                          |                                                                                      | PLB-430   | Pressure Systems (Rural Water Supply)     |
| 13.04                                                                    | Tests private water pressure systems.                                                | PLB-430   | Pressure Systems (Rural Water Supply)     |
| 13.05                                                                    | Services private water pressure systems.                                             | PLB-430   | Pressure Systems (Rural Water Supply)     |
| Task 14 – Installs, tests and services plumbing fixtures and appliances. |                                                                                      |           |                                           |

| RSOS Sub-Task                                                                       |                                                                              | AACS Unit |                                                            |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------|-----------|------------------------------------------------------------|
| 14.01                                                                               | Installs fixture supports.                                                   | PLB-210   | Plumbing Fixtures, Appliances and Accessories              |
|                                                                                     |                                                                              | PLB-335   | Commercial/Institutional Plumbing Fixtures and Accessories |
| 14.02                                                                               | Installs plumbing fixtures and appliances.                                   | PLB-210   | Plumbing Fixtures, Appliances and Accessories              |
|                                                                                     |                                                                              | PLB-335   | Commercial/Institutional Plumbing Fixtures and Accessories |
| 14.03                                                                               | Tests plumbing fixtures and appliances.                                      | PLB-210   | Plumbing Fixtures, Appliances and Accessories              |
|                                                                                     |                                                                              | PLB-335   | Commercial/Institutional Plumbing Fixtures and Accessories |
| 14.04                                                                               | Services plumbing fixtures and appliances.                                   | PLB-210   | Plumbing Fixtures, Appliances and Accessories              |
|                                                                                     |                                                                              | PLB-335   | Commercial/Institutional Plumbing Fixtures and Accessories |
| Task 15 – Installs, tests and services water treatment systems.                     |                                                                              |           |                                                            |
| 15.01                                                                               | Sizes water treatment systems.                                               | PLB-435   | Water Treatment Systems                                    |
| 15.02                                                                               | Installs water treatment systems.                                            | PLB-435   | Water Treatment Systems                                    |
| 15.03                                                                               | Tests water treatment systems.                                               | PLB-435   | Water Treatment Systems                                    |
| 15.04                                                                               | Service water treatment systems.                                             | PLB-435   | Water Treatment Systems                                    |
| Task 16 – Installs, tests and services low pressure steam systems (not common core) |                                                                              |           |                                                            |
| 16.01                                                                               | Plans layout and sizes piping and components for low-pressure steam systems. | PLB-410   | Low Pressure Steam Systems                                 |
| 16.02                                                                               | Installs piping and components for low-pressure steam systems.               | PLB-410   | Low Pressure Steam Systems                                 |
| 16.03                                                                               | Tests low-pressure steam systems.                                            | PLB-410   | Low Pressure Steam Systems                                 |
| 16.04                                                                               | Services low-pressure steam systems.                                         | PLB-410   | Low Pressure Steam Systems                                 |
| Task 17 – Installs, tests and services piping and components for hydronic systems.  |                                                                              |           |                                                            |
| 17.01                                                                               | Plans layout and sizes piping and components for hydronic systems.           | PLB-230   | Hydronic Systems I                                         |
| 17.02                                                                               | Installs piping and components for hydronic systems.                         | PLB-230   | Hydronic Systems I                                         |
|                                                                                     |                                                                              | PLB-350   | Hydronic System Controls                                   |
| 17.03                                                                               | Tests hydronic systems.                                                      | PLB-300   | Hydronic Systems II                                        |
|                                                                                     |                                                                              | PLB-350   | Hydronic System Controls                                   |
| 17.04                                                                               | Services hydronic systems.                                                   | PLB-300   | Hydronic Systems II                                        |
|                                                                                     |                                                                              | PLB-350   | Hydronic System Controls                                   |

| RSOS Sub-Task                                                                                   |                                                                                        | AACS Unit |                        |
|-------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|-----------|------------------------|
| Task 18 – Installs, tests and services hydronic heating and cooling equipment.                  |                                                                                        |           |                        |
| 18.01                                                                                           | Installs hydronic heating equipment.                                                   | PLB-230   | Hydronic Systems I     |
| 18.02                                                                                           | Installs hydronic cooling equipment.                                                   | PLB-230   | Hydronic Systems I     |
| 18.03                                                                                           | Tests hydronic heating and cooling equipment.                                          | PLB-300   | Hydronic Systems II    |
| 18.04                                                                                           | Services hydronic heating and cooling equipment.                                       | PLB-300   | Hydronic Systems II    |
| Task 19 – Installs, tests and services process piping systems.                                  |                                                                                        |           |                        |
| 19.01                                                                                           | Plans layout and sizes piping and components for process piping systems.               | PLB-440   | Process Piping Systems |
| 19.02                                                                                           | Installs piping for process piping systems.                                            | PLB-440   | Process Piping Systems |
| 19.03                                                                                           | Installs components for process piping systems.                                        | PLB-440   | Process Piping Systems |
| 19.04                                                                                           | Tests process piping systems.                                                          | PLB-440   | Process Piping Systems |
| 19.05                                                                                           | Services process piping systems.                                                       | PLB-440   | Process Piping Systems |
| Task 20 – Installs, tests and services potable water fire protection systems (not common core). |                                                                                        |           |                        |
| Not included in curriculum standard                                                             |                                                                                        |           |                        |
| Task 21 – Installs, tests and services other specialized systems.                               |                                                                                        |           |                        |
| 21.01                                                                                           | Plans layout and sizes piping, components and equipment for other specialized systems. | PLB-330   | Irrigation Systems     |
|                                                                                                 |                                                                                        | PLB-340   | Compressed Air Systems |
|                                                                                                 |                                                                                        | PLB-355   | Green Technology       |
|                                                                                                 |                                                                                        | PLB-400   | Gas Piping Systems     |
|                                                                                                 |                                                                                        | PLB-405   | Medical Gas Systems    |
| 21.02                                                                                           | Installs piping and components for other specialized systems.                          | PLB-330   | Irrigation Systems     |
|                                                                                                 |                                                                                        | PLB-340   | Compressed Air Systems |
|                                                                                                 |                                                                                        | PLB-355   | Green Technology       |
|                                                                                                 |                                                                                        | PLB-400   | Gas Piping Systems     |
|                                                                                                 |                                                                                        | PLB-405   | Medical Gas Systems    |
| 21.03                                                                                           | Installs equipment for other specialized systems.                                      | PLB-330   | Irrigation Systems     |
|                                                                                                 |                                                                                        | PLB-340   | Compressed Air Systems |
|                                                                                                 |                                                                                        | PLB-355   | Green Technology       |
|                                                                                                 |                                                                                        | PLB-400   | Gas Piping Systems     |
|                                                                                                 |                                                                                        | PLB-405   | Medical Gas Systems    |
| 21.04                                                                                           | Tests other specialized systems.                                                       | PLB-330   | Irrigation Systems     |
|                                                                                                 |                                                                                        | PLB-340   | Compressed Air Systems |
|                                                                                                 |                                                                                        | PLB-355   | Green Technology       |
|                                                                                                 |                                                                                        | PLB-400   | Gas Piping Systems     |
|                                                                                                 |                                                                                        | PLB-405   | Medical Gas Systems    |

| RSOS Sub-Task |                                     | AACS Unit |                        |
|---------------|-------------------------------------|-----------|------------------------|
| 21.05         | Services other specialized systems. | PLB-330   | Irrigation Systems     |
|               |                                     | PLB-340   | Compressed Air Systems |
|               |                                     | PLB-355   | Green Technology       |
|               |                                     | PLB-400   | Gas Piping Systems     |
|               |                                     | PLB-405   | Medical Gas Systems    |





# Level 1

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## **PLB-100**

## **Safety**

### **Learning Outcomes:**

- Demonstrate knowledge of safe work practices and procedures.
- Demonstrate knowledge of regulatory requirements pertaining to workplace safety, PPE and safety equipment.
- Demonstrate knowledge of PPE and safety equipment, their applications, maintenance and procedures for use.
- Demonstrate knowledge of emerging technologies and practices pertaining to safe work practices, PPE & safety equipment.
- Demonstrate knowledge of training and certification requirements for PPE and safety equipment.
- Demonstrate knowledge of regulations, applications and procedures for locking out equipment.
- Demonstrate knowledge of emerging technologies and practices pertaining to LOTO (lock out and tagout) equipment and procedures.
- Demonstrate knowledge of training and certification requirements to LOTO.

### **2023 Red Seal Occupational Standard Reference:**

- 1.01 Maintains safe work environment.
- 1.02 Uses personal protective equipment (PPE) and safety equipment.
- 1.03 Performs lock-out and tag-out (LOTO) procedures.
- 3.03 Uses documentation.
- 5.01 Uses communication techniques.

### **Suggested Hours:**

15 Hours

### **Theoretical Objectives:**

1. Define terminology associated with safety equipment and practices.
2. Identify work site hazards and describe safe work practices.
  - i) personal
  - ii) worksite
    - trenching hazards
    - electrical hazards
    - hazardous materials
    - environmental hazards
    - tag-out/lock-out
    - poor housekeeping

- overhead hazards
  - tripping hazards
  - vibration hazards
  - falling hazards
  - confined space hazards
  - hot work hazards
  - silica and asbestos hazards
3. Identify responsibilities regarding site specific safety policies and procedures.
  4. Identify types of PPE and safety equipment and describe their applications, limitations and procedures for use.
    - i) PPE
      - respirators
      - steel toed boots
      - hardhats
      - safety glasses
      - hearing protection
      - gloves
      - face shields
      - protective wristlets
      - fire-retardant clothing
      - high-visibility clothing
    - ii) equipment
      - fire extinguishers
      - first aid kits
      - smoke and fume extractors
      - fall-arrest systems
      - air quality tester
  5. Describe procedures used to inspect, maintain and store PPE and safety equipment.
  6. Identify regulations and safety documentation pertaining to the use of PPE and safety equipment.
  7. Identify training required by jurisdictional codes and regulations, and site-specific regulations.
    - i) lock-out and tag-out regulations
    - ii) jurisdictional safety and health regulations
    - iii) site-specific regulations
  8. Identify equipment used to perform lock-out/tag-out.
    - i) equipment
      - lock and key

- chains and tags
  - lock-out scissor clamps
  - lock-box
9. Identify system components that require lock-out/tag-out.
    - i) components
      - pumps
      - valves
      - electrical
  10. Identify safety regulations pertaining to locking out electrical equipment, piping equipment and piping.
  11. Describe isolation methods, procedures and documentation for locking out/tagging out equipment and piping.
    - i) tag-in and tag-out
    - ii) sign-in and sign-out
    - iii) company-specific policies
    - iv) isolation methods
      - double-block-and-bleed
      - blinding
      - breaker locks
      - opening low point valves
      - checking gauges and switches
      - inspecting sight glasses
      - lock and key
      - chains and tags
      - lock-out scissor clamps
      - lock-box
    - v) documentation
      - lock-out and tag-out permits
      - tool box meeting reports
      - sign-in and sign-out sheets
  12. Describe federal, provincial/territorial, municipal safety and health laws and requirements.
    - i) Workplace Hazardous Material Information System (WHMIS)
    - ii) Transportation of Dangerous Goods (TDG)
  13. Identify jurisdictional mandates that contribute to net zero and carbon neutral commitments.
  14. Identify developing technologies pertaining to less toxic and environmentally friendly products.

15. Describe company or jurisdictional procedures for emergency response.

16. Describe components of professional conduct.

- i) no horseplay or rough housing
- ii) no drug and alcohol use
- iii) no harassment
- iv) appropriate work attire
- v) appropriate use of technology

**Practical Objectives:**

N/A

## **PLB-105                      Tools and Equipment**

### **Learning Outcomes:**

- Demonstrate knowledge of tools and equipment, their applications, maintenance and procedures for use.
- Demonstrate knowledge of emerging technologies and practices pertaining to use of tools and equipment.

### **2023 Red Seal Occupational Standard Reference:**

2.01    Uses common tools and equipment.

### **Suggested Hours:**

15 Hours

### **Theoretical Objectives:**

1.     Define terminology associated with tools and equipment.
2.     Identify hazards and describe safe work practices pertaining to the use of tools and equipment.
  - i)      worn
  - ii)     bent
  - iii)    broken
  - iv)     damaged
  - v)      inoperable
3.     Identify training and certification required by jurisdictions related to the use of tools and equipment.
4.     Identify types of hand tools and describe their applications and procedures for use.
  - i)      pipe wrenches
  - ii)     combination wrenches
  - iii)    levels
  - iv)     hammers
  - v)      hacksaw
  - vi)     screwdriver
  - vii)    chisels
5.     Identify types of power tools and describe their applications and procedures for use.
  - i)      electrical
  - ii)     pneumatic

- iii) hydraulic
- 6. Identify types of measuring tools and equipment and describe their applications and procedures for use.
  - i) measuring tape
  - ii) scale ruler
  - iii) manometer
  - iv) digital measuring devices
- 7. Identify types of powder-actuated tools and describe their applications.
- 8. Identify types of pipe cutting and joining equipment and describe their applications and procedures for use.
- 9. Describe the procedures used to inspect, maintain and store tools and equipment.
- 10. Identify technologies that contribute to efficient use of tools and equipment.

**Practical Objectives:**

- 1. Use tools and equipment according to manufacturers' specifications.

## **PLB-110**

## **Access Equipment**

### **Learning Outcomes:**

- Demonstrate knowledge of ladders, work platforms and motorized aerial work platforms, their characteristics, applications and limitations.
- Demonstrate knowledge of regulatory, training and certification requirements to use access equipment.
- Demonstrate knowledge of emerging technologies pertaining to access equipment.

### **2023 Red Seal Occupational Standard Reference:**

2.02 Uses access equipment.

### **Suggested Hours:**

6 Hours

### **Theoretical Objectives:**

1. Define terminology associated with access equipment.
2. Identify hazards and describe safe work practices pertaining to ladders and aerial work platforms.
3. Identify jurisdictional regulations and site-specific requirements pertaining to ladders and aerial work platforms.
  - i) personnel training/certification
  - ii) equipment certification requirements
  - iii) proper use and limitations of equipment
4. Identify types of ladders and describe their characteristics, applications and limitations.
  - i) step ladders
  - ii) extension ladders
  - iii) platform ladders
5. Identify types of aerial work platforms and describe their characteristics, applications and limitations.
  - i) scaffolds
  - ii) motorized work platforms
6. Identify types of motorized aerial work platforms and describe their characteristics, applications and limitations.
  - i) scissor lifts



- ii) articulated booms
- iii) personnel baskets

7. Describe the procedures used to erect and dismantle ladders and aerial work platforms.
8. Identify emerging technologies that contribute to work efficiency.

**Practical Objectives:**

N/A

## **PLB-115**

## **Rigging, Hoisting, Lifting and Positioning**

### **Learning Outcomes:**

- Demonstrate knowledge of rigging, hoisting, lifting and positioning equipment, their applications, limitations and procedures for use.
- Demonstrate knowledge of calculations required when performing rigging, hoisting, lifting and positioning operations.
- Demonstrate knowledge of inspection, maintenance and storage for rigging, hoisting, lifting and positioning equipment.
- Demonstrate knowledge of regulatory, training and certification requirements for rigging, hoisting, lifting and positioning equipment.

### **2023 Red Seal Occupational Standard Reference:**

- 2.03 Uses rigging, hoisting, lifting and positioning equipment.
- 2.04 Rigs loads for cranes.

### **Suggested Hours:**

18 Hours

### **Theoretical Objectives:**

1. Define terminology associated with rigging, hoisting, lifting and positioning.
2. Identify types of rigging, hoisting, lifting and positioning equipment and accessories and describe their applications and load capacity.
  - i) block and tackle
  - ii) chain blocks
  - iii) come alongs
  - iv) snatch blocks
  - v) pallet jacks
  - vi) tugger (power)
  - vii) winches
  - viii) forklifts
  - ix) grip hoists
  - x) shackles
  - xi) softeners
  - xii) rope/cables/slings
  - xiii) tag line

3. Identify hazards and describe safe work practices pertaining to hoisting, lifting, rigging and positioning.
  - i) blind spots
  - ii) power lines
  - iii) overhead piping
  - iv) live equipment
  - v) site-specific hazards
4. Identify jurisdictional regulations and site requirements pertaining to the lifting of material, equipment and personnel for crane hoisting.
  - i) personnel training/certification
  - ii) equipment certification requirements
  - iii) use and limitations of equipment
5. Identify types of equipment used to secure the lift area.
6. Identify types of knots, hitches and bends and describe their applications and the procedures used to tie and inspect.
  - i) bowline
  - ii) cat's paw
  - iii) clove hitch
  - iv) half hitch
7. Describe the procedures used to ensure a work area is safe for rigging, hoisting, lifting and positioning.
8. Describe the procedures used to rig material/equipment for lifting, hoisting and positioning.
9. Describe procedures used to communicate during rigging, hoisting, lifting and positioning operations.
  - i) using hand signals
  - ii) radio communication and a signaler
10. Describe the procedures used for attaching rigging equipment to a load.
  - i) bolting
  - ii) lashing
  - iii) site specific methods
11. Identify procedures used to calculate load weights and equipment limitations.
  - i) WLL
  - ii) final location of load
12. Describe the sling angle when preparing for hoisting and lifting operation.

13. Describe the correlation of sling angles to sling capacities.
14. Identify the factors to consider when selecting rigging, hoisting, lifting and positioning equipment.
15. Describe the procedures used to inspect, maintain and store rigging, hoisting, lifting and positioning equipment.
  - i) equipment faults
    - rips/tears/cracks/frays/burns
    - bird-caging
    - worn shackles
    - hydraulic oil leaks
    - missing rating tags
    - non-CSA approved equipment

**Practical Objectives:**

1. Tie various knots.
2. Perform hand signals.

## **PLB-120**

## **Welding, Fuel Brazing and Cutting**

### **Learning Outcomes:**

- Demonstrate knowledge of welding equipment, applications and procedures for non-pressure and non-structural welds.
- Demonstrate knowledge of soldering and brazing equipment, applications and procedures.
- Demonstrate knowledge of regulatory, training and certification requirements to use welding equipment.
- Demonstrate knowledge of disarming the work area location within the fire monitoring system.
- Demonstrate knowledge of oxy-fuel equipment, applications and procedures.
- Demonstrate knowledge of emerging technologies and practices pertaining to welding equipment.

### **2023 Red Seal Occupational Standard Reference:**

- 2.05 Uses welding equipment.
- 2.06 Uses soldering and brazing equipment.

### **Suggested Hours:**

12 Hours

### **Theoretical Objectives:**

1. Define terminology associated with welding, fuel brazing and cutting.
2. Identify types of welding, soldering and brazing, and oxy-fuel equipment.
  - i) welding
    - Shielded Metal Arc Welding (SMAW)
    - Gas Tungsten Arc Welding (GTAW)
    - Gas Metal Arc Welding (GMAW)
    - heat fusion welding
    - plasma welding
  - ii) soldering and brazing
    - oxy-fuel and air-fuel torches
    - attachments
      - strikers
      - methylacetylene-propadiene propane [MAPP] gas cylinders
      - torch heads
      - flashback arrestors

- regulators
  - hoses
3. Identify hazards and safety practices pertaining to welding, soldering and brazing, and oxy-fuel cutting.
  4. Describe the procedures used to perform welding, soldering and brazing, and oxy-fuel cutting.
    - i) welding
      - SMAW
      - GTAW
      - GMAW
    - ii) soldering and brazing
      - silver solder
      - flux
      - soft solder
      - brazing rod
      - sand cloth
      - gases
        - nitrogen
        - carbon dioxide
        - oxygen
        - acetylene
        - MAPP
        - propane
        - argon
  5. Identify welding, soldering and brazing, and oxy-fuel consumables.
    - i) welding rods
    - ii) flux
    - iii) grinding discs
    - iv) shielding gases
    - v) fuels
  6. Describe the procedures used to isolate specific areas of fire monitoring systems.
    - i) identify fire hazards
    - ii) alert first responders
  7. Describe the procedures used to flush and purge that are required for soldering and brazing.
    - i) valve isolation
    - ii) monitoring pressures
    - iii) monitoring flow rates

8. Describe the procedures used to inspect, maintain and store welding, soldering and brazing equipment and consumables.
9. Describe the procedures used to inspect, maintain, store and shut down oxy-fuel equipment.

**Practical Objectives:**

1. Perform a brazing operation.
  - i) Equipment setup
  - ii) Braze joints
  - iii) Disassemble equipment

## **PLB-125**

## **Plastic Piping**

### **Learning Outcomes:**

- Demonstrate knowledge of plastic tube, tubing and pipe, and their fittings, accessories, characteristics and applications.
- Demonstrate knowledge of procedures to prepare, measure, cut, bend and join plastic tube, tubing and pipe.
- Demonstrate knowledge of the procedures to calculate plastic pipe and tubing length.
- Demonstrate knowledge of mathematical calculations of plastic pipe and tubing offsets.
- Demonstrate knowledge of training and certification requirements pertaining to plastic tube, tubing and pipe.
- Demonstrate knowledge of regulatory requirements pertaining to joining plastic tube, tubing and pipe.

### **2023 Red Seal Occupational Standard Reference:**

- 4.02 Calculates tube, tubing and pipe lengths.
- 4.03 Installs piping supports.
- 4.04 Installs piping sleeves.
- 4.06 Protects piping systems, equipment and structure from damage.
- 6.01 Inspects tube, tubing, pipe and fittings before installation.
- 6.02 Cuts tube, tubing and pipe.
- 6.03 Bends tube, tubing and pipe.
- 6.04 Prepares tube, tubing and pipe connections.
- 7.02 Joins plastic tube, tubing and pipe.

### **Suggested Hours:**

24 Hours

### **Theoretical Objectives:**

1. Define terminology associated with plastic tube, tubing and pipe.
2. Interpret codes and regulations pertaining to plastic tube, tubing and pipe.
3. Interpret information pertaining to plastic tube, tubing and pipe found on drawings and specifications.
  - i) engineered drawings
  - ii) manufacturers' requirements
  - iii) job specifications
  - iv) shop drawings



4. Identify tools and equipment relating to plastic tube, tubing and pipe and describe their applications and procedures for use.
  - i) crimping tools
  - ii) expanders
  - iii) heat plates and timer
  - iv) cutters
  - v) hot-air tools
  - vi) threading machines
  - vii) chamfer tools
  - viii) reaming tools
  - ix) cut groovers
  - x) torque ratchets
  - xi) electrofusion machines
5. Identify hazards and describe safe work practices pertaining to plastic tube, tubing and pipe.
6. Identify potential environmental and health impacts of joining plastic tube, tubing and pipe, and describe associated prevention measures.
7. Identify plastic tube, tubing and pipe system applications and describe their characteristics and requirements.
8. Identify types of plastic tube, tubing and pipe and describe their properties and characteristics.
  - i) PVC
  - ii) ABS
  - iii) PEX
  - iv) PE
9. Identify fittings used with plastic tube, tubing and pipe and describe their purpose and applications.
10. Identify plastic tube, tubing and pipe accessories and describe their purpose and applications.
  - i) supports
    - anchors
    - guides
    - hangers
  - ii) expansion joints
  - iii) sleeves
  - iv) protection plates

11. Identify the methods used to cut and join plastic tube, tubing and pipe and describe their associated procedures.
  - i) welded
    - solvent welding
    - hot-air welding
    - socket fusion
    - butt fusion
  - ii) threaded
  - iii) tapping
  - iv) flanged
  - v) cut-grooved
  - vi) crimped
  - vii) expanded
  - viii) push-fit
  - ix) compression
  - x) mechanical
  - xi) transition
12. Identify adaptors required for transitions.
  - i) male
  - ii) female
  - iii) mechanical joints
13. Describe the procedures used to install fittings and accessories for plastic tube, tubing and pipe.
14. Describe the identification systems and methods for plastic tube, tubing and pipe.
15. Describe the procedures used to measure plastic tube, tubing and pipe.
16. Describe the procedures used to test, inspect and commission plastic tube, tubing and pipe.
17. Interpret linear expansion and contraction tables in NPC and specifications for plastic tube, tubing and pipe.
18. Describe the systems of measurement for plastic tube, tubing and pipe.
  - i) allowance
  - ii) dimension
  - iii) length
  - iv) wall thickness/schedule
19. Describe calculations to determine tube, tubing and piping measurements for plastic tube, tubing and pipe.

- i) fitting allowances
    - center-to-center
    - end-to-end
    - center to end
    - offsets
      - rolling
      - jumper
      - equal spread
20. Describe the procedures used to calculate offsets using both imperial and metric units for spread offsets for plastic tube, tubing and pipe.
21. Describe the procedures used to calculate offsets in plastic tube, tubing and pipe for various changes in direction.

**Practical Objectives:**

1. Measure, cut, prepare and join plastic piping.

**PLB-130****Copper Tube, Tubing and Pipe****Learning Outcomes:**

- Demonstrate knowledge of copper tube, tubing and pipe, and their fittings, accessories, characteristics and applications.
- Demonstrate knowledge of procedures to prepare, measure, cut, bend and join copper tube, tubing and pipe.
- Demonstrate knowledge of training and certification requirements pertaining to copper tube, tubing and pipe.
- Demonstrate knowledge of regulatory requirements pertaining to joining copper tube, tubing and pipe.
- Demonstrate knowledge of the procedures to calculate, cut and join copper tube, tubing and pipe.
- Demonstrate knowledge of mathematical calculations of copper tube, tubing and pipe offsets.
- Demonstrate knowledge of the procedures used to measure copper tube, tubing and pipe and fitting allowances.
- Demonstrate knowledge of the procedures used to bend copper tube, tubing and pipe.
- Demonstrate knowledge of the techniques for preparing copper tube, tubing and pipe connections.
- Demonstrate knowledge of the procedures used to measure, cut and join copper tube, tubing and pipe.

**2023 Red Seal Occupational Standard Reference:**

- 4.02 Calculates tube, tubing and pipe lengths.
- 4.03 Installs piping supports.
- 4.04 Installs piping sleeves.
- 4.06 Protects piping systems, equipment and structure from damage.
- 6.01 Inspects tube, tubing, pipe and fittings before installation.
- 6.02 Cuts tube, tubing and pipe.
- 6.03 Bends tube, tubing and pipe.
- 6.04 Prepares tube, tubing and pipe connections.
- 7.01 Joins copper tube, tubing and pipe.

**Suggested Hours:**

24 Hours

**Theoretical Objectives:**

1. Define terminology associated with copper tube, tubing and pipe.
2. Identify hazards and describe safe work practices pertaining to copper tube, tubing and pipe.
3. Interpret codes, regulations and standards pertaining to copper tube, tubing and pipe.
4. Interpret information pertaining to copper tube, tubing and pipe found on drawings and specifications.
  - i) engineered drawings
  - ii) manufacturers' requirements
  - iii) job specifications
  - iv) shop drawings
5. Identify adaptors required to join dissimilar materials to prevent galvanic action.
  - i) dielectric unions
6. Identify tools and equipment relating to copper tube, tubing and pipe and describe their applications and procedures for use.
  - i) pipe and tubing cutters
  - ii) flaring tools
  - iii) grooving tools
  - iv) soldering and brazing equipment
  - v) swaging tools
  - vi) press-fit
7. Identify types of copper tube, tubing and pipe and describe their properties and characteristics.
8. Identify fittings used with copper tube, tubing and pipe and describe their purpose and applications.
9. Identify copper tube, tubing and pipe accessories and describe their purpose and applications.
  - i) supports
    - anchors
    - guides
    - hangers
  - ii) expansion joints
  - iii) sleeves
10. Describe the methods used to cut and join copper tube, tubing and pipe and describe their associated procedures.
  - i) press-fit

- ii) soldered
  - iii) brazed
  - iv) grooved
  - v) flanged
  - vi) flared
  - vii) compression
  - viii) swaged
  - ix) corporation
  - x) push-fit
11. Describe the procedures used to install fittings and accessories for copper tube, tubing and pipe.
12. Describe the identification systems and methods for copper tube, tubing and pipe.
13. Describe the procedures used to measure copper tube, tubing and pipe.
14. Describe the procedures used to test, inspect and commission copper tube, tubing and pipe.
15. Describe the procedures used to bend copper tube, tubing and pipe.
- i) types
    - soft
    - semi-soft (partially annealed)
    - rigid
  - ii) distortions
    - kinks
    - ripples
16. Interpret linear expansion and contraction tables in NPC and specifications for copper tube, tubing and pipe.
17. Explain the systems of measurement for copper tube, tubing, pipe and fittings.
- i) allowance
  - ii) dimension
  - iii) length
  - iv) wall thickness/type
18. Describe the procedures used to determine copper tube, tubing and pipe measurements.
- i) fitting allowances
    - center-to-center
    - end-to-end

- center to end
  - ii) offsets
    - rolling
    - jumper
    - equal spread
    - 22.5/45°
19. Describe the calculations used to determine spread offsets using both imperial and metric units for copper tube, tubing and pipe.
20. Describe the calculations used to determine offsets in piping for various changes in direction for copper tube, tubing and pipe.

**Practical Objectives:**

1. Measure, cut, prepare and join copper piping.

## **PLB-135**

## **Steel Piping**

### **Learning Outcomes:**

- Demonstrate knowledge of steel tube, tubing and pipe, their fittings, accessories, characteristics and applications.
- Demonstrate knowledge of procedures to prepare, measure, cut, bend and join steel tube, tubing and pipe.
- Demonstrate knowledge of the procedures to calculate steel piping length.
- Demonstrate knowledge of mathematical calculations of steel piping offsets.
- Demonstrate knowledge of training and certification requirements pertaining to steel tube, tubing and pipe.
- Demonstrate knowledge of regulatory requirements pertaining to steel tube, tubing and pipe.
- Demonstrate knowledge of the procedures used to measure steel piping and fitting allowance.
- Demonstrate knowledge of the procedures used to bend steel piping.
- Demonstrate knowledge of the techniques for preparing steel tube, tubing and pipe piping connections.
- Demonstrate knowledge of the procedures used to measure, cut and join steel piping.

### **2023 Red Seal Occupational Standard Reference:**

- 4.02 Calculates tube, tubing and pipe lengths.
- 4.03 Installs piping supports.
- 4.04 Installs piping sleeves.
- 4.06 Protects piping systems, equipment and structure from damage.
- 6.01 Inspects tube, tubing, pipe and fittings before installation.
- 6.02 Cuts tube, tubing and pipe.
- 6.03 Bends tube, tubing and pipe.
- 6.04 Prepares tube, tubing and pipe connections.
- 7.03 Joins steel tube, tubing and pipe.

### **Suggested Hours:**

24 Hours

### **Theoretical Objectives:**

1. Define terminology associated with steel tube, tubing and piping.
2. Identify hazards and describe safe work practices pertaining to steel piping.
3. Interpret codes and regulations pertaining to steel piping.



4. Interpret information pertaining to steel piping found on drawings and specifications.
  - i) engineered drawings
  - ii) manufacturers' requirements
  - iii) job specifications
  - iv) shop drawings
5. Identify the methods used to cut and join steel piping and describe their associated procedures.
  - i) welded
  - ii) threaded
  - iii) flanged
  - iv) cut-grooved
  - v) roll-grooved
  - vi) press-fit
  - vii) mechanical
6. Identify tools and equipment related to steel piping and describe their applications and procedures for use.
  - i) grinders
  - ii) threaders
  - iii) press-fit tools
  - iv) cutters
  - v) cut-groovers
  - vi) roll-groovers
  - vii) wrenches
  - viii) impact drill
7. Identify steel piping systems and describe their characteristics, properties and applications.
  - i) carbon
  - ii) galvanized
  - iii) stainless
8. Identify fittings used with steel piping and describe their purpose and applications.
9. Identify steel piping accessories and describe their purpose and applications.
  - i) supports
    - anchors
    - guides
    - hangers
  - ii) expansion joints
  - iii) sleeves
10. Describe the identification systems and methods used for steel piping.

11. Describe the procedures used to install fittings and accessories for steel piping.
12. Describe the procedures used to measure steel piping.
13. Describe the procedures used to test, inspect and commission steel piping.
14. Describe the procedures used to bend steel piping.
15. Interpret linear expansion and contraction tables in NPC and specifications for steel piping.
16. Describe the systems of measurement for steel piping and fittings.
  - i) allowance
  - ii) dimension
  - iii) length
  - iv) wall thickness/schedule
17. Describe the calculations used to determine steel piping measurements.
  - i) fitting allowances
    - center-to-center
    - end-to-end
    - center to end
    - thread engagement
  - ii) offsets
    - rolling
    - jumper
    - equal spread
    - 22.5/45°
18. Describe the calculations used to determine spread offsets using both imperial and metric units for steel piping.
19. Describe the calculations used to determine offsets for various changes in direction for steel piping.

**Practical Objectives:**

1. Measure, cut, prepare and join steel piping.

## **PLB-140**

## **Cast Iron Piping**

### **Learning Outcomes:**

- Demonstrate knowledge of cast iron piping, and their fittings, accessories, characteristics and applications.
- Demonstrate knowledge of the procedures to calculate cast iron piping length.
- Demonstrate knowledge of mathematical calculations of cast iron piping offsets.
- Demonstrate knowledge of the procedures used to measure cast iron piping and fitting allowance.
- Demonstrate knowledge of regulatory requirements pertaining to cast iron piping.
- Demonstrate knowledge of the techniques for preparing cast iron piping connections.
- Demonstrate knowledge of the procedures used to measure, cut and join cast iron piping.
- Demonstrate knowledge of the procedures used to cut and join cast iron piping.

### **2023 Red Seal Occupational Standard Reference:**

- 4.02 Calculates tube, tubing and pipe lengths.
- 4.03 Installs piping supports.
- 4.04 Installs piping sleeves.
- 4.06 Protects piping systems, equipment and structure from damage.
- 6.01 Inspects tube, tubing, pipe and fittings before installation.
- 6.02 Cuts tube, tubing and pipe.
- 6.04 Prepares tube, tubing and pipe connections.
- 7.04 Joins cast iron pipe.

### **Suggested Hours:**

15 Hours

### **Theoretical Objectives:**

1. Define terminology associated with cast iron piping.
2. Identify hazards and describe safe work practices pertaining to cast iron piping.
3. Interpret codes and regulations pertaining to cast iron piping.
4. Interpret information pertaining to cast iron piping found on drawings and specifications.
  - i) engineered drawings
  - ii) manufacturers' requirements
  - iii) job specifications

- iv) shop drawings
- 5. Identify tools and equipment relating to cast iron piping and describe their applications and procedures for use.
  - i) snap cutters
  - ii) torque nut drivers
  - iii) come alongs
  - iv) ratchets
  - v) sockets
- 6. Identify types of cast iron piping and describe their properties and characteristics.
  - i) soil
  - ii) duriron
  - iii) ductile iron
- 7. Identify fittings used with cast iron piping and describe their purpose and applications.
- 8. Identify cast iron piping accessories and describe their purpose and applications.
  - i) supports
    - anchors
    - hangers
  - ii) sleeves
  - iii) flanges
  - iv) pipe restraints
- 9. Identify the methods used to join cast iron piping and describe their associated procedures.
  - i) mechanical joint clamps
  - ii) hub and spigot
  - iii) oakum and cold caulking compound
  - iv) lead and oakum
  - v) gasket joints
- 10. Describe the procedures used to cut cast iron piping and describe their associated procedures.
- 11. Describe the identification systems and methods for cast iron piping.
- 12. Describe the procedures used to install fittings and accessories for cast iron piping.
- 13. Describe the procedures used to measure cast iron piping.
- 14. Describe the procedures used to test, inspect and commission cast iron piping.

15. Interpret linear expansion and contraction tables in NPC and specifications for cast iron piping.
16. Describe the systems of measurement for cast iron piping and fittings.
  - i) allowance
  - ii) dimension
  - iii) length
  - iv) wall thickness/schedule
17. Describe the calculations used to determine cast iron piping measurements.
  - i) fitting allowances
    - center-to-center
    - end-to-end
    - center to end
  - ii) offsets
    - rolling
    - jumper
    - equal spread
    - 22.5/45°
18. Describe the procedures used to calculate offsets using both imperial and metric units for spread offsets for cast iron piping.
19. Describe the procedures used to calculate offsets in piping for various changes in direction for cast iron piping.

**Practical Objectives:**

1. Measure, cut, prepare and join cast iron piping.

**PLB-145****Drainage, Waste and Venting Systems I****Learning Outcomes:**

- Demonstrate basic knowledge of residential drainage, waste and venting (DWV) systems, equipment and components, their purposes, characteristics, applications and operation.
- Demonstrate basic knowledge of the procedures used to lay out and install underground and above ground piping and components for interior DWV systems.
- Demonstrate basic knowledge of the procedures to install fire stopping devices and materials.
- Demonstrate knowledge of regulatory requirements pertaining to interior DWV systems.

**2023 Red Seal Occupational Standard Reference:**

- 4.01 Plans layout for piping systems.
- 4.05 Commissions systems.
- 4.06 Protects piping systems, equipment and structures from damage.
- 4.08 Installs fire stopping devices and materials.
- 10.01 Plans layout and sizes piping for interior drainage, waste and vent systems.
- 10.02 Installs underground piping and components for interior drainage, waste and vent systems.
- 10.03 Installs above-ground piping and components for interior drainage, waste and vent systems.

**Suggested Hours:**

42 Hours

**Theoretical Objectives:**

1. Define terminology associated with DWV systems.
2. Identify hazards and describe safe work practices pertaining to residential DWV systems.
3. Interpret codes and regulations pertaining to residential DWV systems.
4. Interpret information pertaining to residential DWV systems found on drawings and specifications.
5. Identify tools and equipment relating to residential DWV systems and describe their applications and procedures for use.

6. Identify types of residential DWV systems and explain their purpose and applications.
7. Identify residential DWV systems equipment and components and describe their purpose, operation and applications.
  - i) fittings
  - ii) pipes
  - iii) valves
  - iv) sewage sumps
  - v) sewage lifts
  - vi) interceptors
  - vii) specialty traps
  - viii) trap seal primers
8. Identify types of hangers and supports used to install residential DWV systems and describe their procedures for installation.
9. Identify the factors to consider when installing residential DWV systems components.
  - i) hydraulic load
  - ii) grading
  - iii) code requirements
10. Describe the procedures used to install residential DWV systems in trenches.
  - i) protection
  - ii) support
  - iii) safety considerations
11. Identify components used to protect residential DWV systems, and buildings and describe their installation procedures.
  - i) expansion joints
  - ii) protection plates
  - iii) insulation
12. Identify fire stopping devices and materials and describe their purpose and application.
13. Describe the procedures to install fire stopping devices and materials.
14. Identify the backflow protection devices used in residential DWV systems.
  - i) backwater valves
  - ii) gate valves
  - iii) check valves
15. Identify residential storm system components and describe their purpose and applications.

16. Identify the factors to consider when sizing residential DWV systems components.
  - i) hydraulic load
  - ii) code requirements
  - iii) grading
17. Describe the procedures used to determine hydraulic load on sanitary residential drainage, waste and vent systems.

**Practical Objectives:**

N/A



## **PLB-150**

## **Drawings I**

### **Learning Outcomes:**

- Demonstrate knowledge of drawings and specifications.
- Demonstrate knowledge of various piping and component layouts and their applications.
- Demonstrate knowledge of layout tools and equipment.
- Demonstrate knowledge of emerging technologies and practices pertaining to laying out piping systems.

### **2023 Red Seal Occupational Standard Reference:**

- 3.01 Organizes project tasks and procedures.
- 3.02 Organizes materials and supplies.
- 3.03 Uses documentation.
- 4.01 Plans layout for piping systems.

### **Suggested Hours:**

27 Hours

### **Theoretical Objectives:**

1. Define terminology associated with drawings, sketches and specifications.
2. Describe metric and imperial systems of measurement and the procedures used to perform conversions.
3. Identify the types of drawings and specifications and describe their application and procedure for use.
  - i) engineered drawings
  - ii) manufacturers' requirements
  - iii) job specifications
  - iv) standards
  - v) shop drawings and sketches
4. Identify types of symbols and blueprint lines, used on drawings, sketches and specifications, and describe their characteristics and applications.
5. Identify drawing views and describe their applications.
  - i) plan
  - ii) section
  - iii) detail

- iv) elevation
  - v) cross section
  - vi) orthographic
  - vii) pictorial
    - perspective
    - oblique
    - isometric
6. Describe the use of scales.
7. Interpret blueprints, specification documentation and job site instructions.
8. Describe the procedures used for the care, handling and storage of drawings, sketches and specifications.
9. Identify various piping systems, equipment and applications on drawings, sketches and specifications.
- i) appliances
  - ii) fixtures
  - iii) control devices
10. Describe types of layout tools and equipment and their procedures for use.
- i) builder levels
  - ii) levels
  - iii) tape measures
  - iv) lasers
  - v) marking tools
  - vi) scale ruler
  - vii) Philadelphia /stadia rod

**Practical Objectives:**

N/A

## **PLB-160**

## **Residential Potable Water Distribution**

### **Learning Outcomes:**

- Demonstrate basic knowledge of potable water distribution systems and components, their characteristics, applications and operation.
- Demonstrate basic knowledge of procedures to size piping and components for potable water distribution systems.
- Demonstrate basic knowledge of the procedures used to install potable water distribution systems.

### **2023 Red Seal Occupational Standard Reference:**

- 11.01 Plans layout and sizes piping and components for water service.
- 11.02 Installs piping for water service.
- 11.03 Installs components for water service.
- 12.01 Plans layout and sizes piping and components for potable water distribution systems.
- 12.02 Installs piping for potable water distribution systems.
- 12.03 Installs components for potable water distribution systems.
- 12.04 Installs cross connection controls.

### **Suggested Hours:**

12 Hours

### **Theoretical Objectives:**

1. Interpret codes and regulations pertaining to water service and water distribution systems.
  - i) simplified method for residential water lines
2. Interpret information pertaining to potable water distribution and water service systems found on drawings and specifications.
3. Describe back siphonage and back pressure and their causes.
4. Describe water hammer, its causes and methods of prevention or control.
5. Identify hazards and describe safe work practices pertaining to water distribution and water service servicing.
6. Identify the factors to consider in determining depth for water service piping.

7. Identify tools and equipment relating to water distribution and water service systems and describe their applications and procedures for use.
  - i) wrenches
  - ii) pipe cutters
  - iii) excavation equipment
  - iv) soldering and brazing equipment
  - v) levels
  - vi) freeze machine
  - vii) expanders
  - viii) crimpers
8. Identify potable water distribution systems and components and describe their characteristics and applications.
9. Identify types of water service and potable water distribution piping, equipment and components and describe their characteristics and applications.
  - i) public
  - ii) private
10. Identify testing equipment for potable water distribution and water service systems.
11. Describe the procedures used to protect potable water distribution and water service system piping, equipment and components.
  - i) freeze protection
  - ii) electrolysis
  - iii) water hammer
12. Describe the procedures used to size potable water lines for residential potable water distribution systems.
  - i) simplified method

**Practical Objectives:**

N/A

## **MENT-700            Mentoring I**

### **Learning Outcomes:**

- Demonstrate knowledge of effective communication practices as a learner.
- Demonstrate knowledge of strategies for learning skills in the workplace.

### **2023 Red Seal Occupational Standard Reference:**

- 5.01 Uses communication techniques.
- 5.02 Uses mentoring techniques.

### **Suggested Hours:**

6 Hours

### **Learning Objectives:**

1. Describe the importance of one's own individual experiences.
2. Identify behaviours that demonstrate positive learning experiences.
3. Identify the benefits of workplace mentoring for the apprentice, mentor and employer.
4. Identify the partners involved in apprenticeship training.
5. Describe the shared responsibilities for workplace learning in apprenticeship.
6. Identify different learning needs and strategies to address challenges or barriers in the workplace.
  - i) learning disabilities
  - ii) language
  - iii) underrepresentation
7. Identify the components that create a positive and inclusive workplace culture.
  - i) workplace characteristics
  - ii) individual behaviours
8. Identify various learning styles and determine one's own learning preferences.

9. Explain how learning preferences impact learning new skills.
10. Identify different learning strategies to meet individual learning needs.
11. Describe the importance of adapting to a variety of teaching and learning methods in the workplace.
12. Identify techniques for effective communication as a learner.
  - i) verbal and non-verbal
  - ii) active listening
13. Identify and describe personal responsibilities and attitudes that contribute to on-the-job success.
  - i) self advocating
  - ii) asking questions
  - iii) accepting constructive feedback
  - iv) working safely
  - v) employing time management techniques and being punctual

**Practical Objectives:**

N/A

## Level 2

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## **PLB-200**

## **Piping Valves**

### **Learning Outcomes:**

- Demonstrate knowledge of piping valves, their applications and operation.
- Demonstrate knowledge of the procedures used to install, maintain, repair, test and troubleshoot piping valves.

### **2023 Red Seal Occupational Standard Reference:**

Valves are embedded throughout entire RSOS and are addressed as applied concepts and taught in context throughout applicable units in the AACS.

### **Suggested Hours:**

12 Hours

### **Theoretical Objectives:**

1. Define terminology associated with piping valves.
2. Identify hazards and describe safe work practices pertaining to piping valves.
3. Interpret codes, regulations and standards pertaining to piping valves.
4. Interpret information found on drawings and specifications pertaining to piping valves.
5. Identify tools and equipment relating to piping valves and describe their applications and procedures for use.
6. Identify types of piping valves and describe their characteristics, operation and applications.
  - i) gate
  - ii) globe
  - iii) ball
  - iv) plug
  - v) butterfly
  - vi) check
  - vii) relief
  - viii) pressure reducing
  - ix) float operated
  - x) diaphragm
  - xi) mixing



7. Identify types of valve actuators and describe their purpose.
  - i) electric
  - ii) pneumatic
  - iii) manual
  - iv) thermal expansion
8. Explain piping valve rating systems.
  - i) pressure
  - ii) temperature
  - iii) application
9. Identify the methods used to join piping valves and describe their associated procedures.
10. Identify the factors to consider when installing piping valves.
  - i) position
  - ii) location
  - iii) accessibility
  - iv) identification
11. Describe the procedures used to maintain and repair piping valves.
  - i) disassembly/reassembly
  - ii) replacement of parts
  - iii) re-packing
  - iv) tools
12. Describe the procedures used to install, test and troubleshoot piping valves.
13. Identify emerging technologies pertaining to piping valves and components.

**Practical Objectives:**

N/A

## **PLB-205**

## **Specialized Piping**

### **Learning Outcomes:**

- Demonstrate knowledge of specialized piping, fittings and accessories.
- Demonstrate knowledge of mathematical calculations of specialized piping offsets.
- Demonstrate knowledge of the procedures to size, measure, cut, bend and join specialized piping.
- Demonstrate knowledge of the procedures used to measure specialized piping and fitting allowances.
- Demonstrate knowledge of the techniques to prepare specialized piping connections.

### **2023 Red Seal Occupational Standard Reference:**

- 4.02 Calculates tube, tubing and pipe lengths.
- 4.03 Installs piping supports.
- 4.04 Installs piping sleeves.
- 4.06 Protects piping systems, equipment and structure from damage.
- 6.01 Inspects tube, tubing, pipe and fittings before installation.
- 6.02 Cuts tube, tubing and pipe.
- 6.03 Bends tube, tubing and pipe.
- 6.04 Prepares tube, tubing and pipe connections.
- 7.05 Joins specialized tube, tubing and pipe.

### **Suggested Hours:**

9 Hours

### **Theoretical Objectives:**

1. Define terminology associated with specialized piping.
2. Identify types of specialized tube, tubing and pipe and their properties, purpose, applications and characteristics.
  - i) glass
  - ii) concrete
  - iii) fiberglass
  - iv) stainless steel
  - v) brass
  - vi) acid resistant plastics
3. Describe and identify types of historical piping.
  - i) asbestos-cement

- ii) lead
  - iii) clay
  - iv) bituminized fibre
4. Identify hazards and describe safe work practices pertaining to specialized tube, tubing and pipe.
  5. Interpret codes, standards and regulations pertaining to specialized tube, tubing and pipe.
  6. Interpret information pertaining to specialized tube, tubing and pipe found on drawings and specifications.
    - i) engineered drawings
    - ii) manufacturers' requirements
    - iii) job specifications
    - iv) shop drawings
  7. Identify fittings used with specialized tube, tubing and pipe, and describe their characteristics and applications.
  8. Identify the methods used to join specialized tube, tubing and pipe and describe their associated procedures.
    - i) compression joints
    - ii) mechanical joint clamps
    - iii) welded
    - iv) threaded
    - v) flanged
    - vi) cut-grooved
    - vii) roll-grooved
    - viii) press-fit
    - ix) heat fusion welding
    - x) solvent welding
    - xi) push-fit
    - xii) transition
    - xiii) brazing
    - xiv) soldering
    - xv) flaring
    - xvi) swaged
    - xvii) corporation
  9. Describe the procedures used to install specialized tube, tubing and pipe fittings and accessories.
    - i) supports
      - anchors

- guides
    - hangers
  - ii) expansion joints
  - iii) sleeves
10. Describe the procedures used to inspect, test and commission specialized tube, tubing and pipe.
  11. Describe the procedures used to cut specialized tube, tubing and pipe.
  12. Describe the procedures used to bend specialized tube, tubing and pipe.
  13. Interpret linear expansion and contraction tables in NPC and specifications for specialized tube, tubing and pipe.
  14. Identify the systems of measurement for specialized tube, tubing and pipe.
    - i) allowance
    - ii) dimension
    - iii) length
    - iv) wall thickness/schedule
  15. Describe the measurement calculations for specialized tube, tubing and pipe.
    - i) fitting allowances
      - centre-to-centre
      - end-to-end
      - centre to end
    - ii) offsets
      - rolling
      - jumper
      - equal spread
      - 22.5/45°
  16. Describe the procedures used to measure specialized tube, tubing and pipe.
  17. Identify offsets using both imperial and metric units for spread offsets in specialized tube, tubing and pipe.
  18. Identify offsets for various changes in direction for specialized tube, tubing and pipe.

**Practical Objectives:**

N/A

## **PLB-210**

## **Plumbing Fixtures, Appliances and Accessories**

### **Learning Outcomes:**

- Demonstrate knowledge of plumbing fixtures, supports, appliances and accessories, their applications and operation.
- Demonstrate knowledge of regulatory requirements to install plumbing fixtures, supports, appliances and accessories.
- Demonstrate knowledge of the procedures used to install plumbing fixtures, supports, appliances and accessories.
- Demonstrate knowledge of procedures used for testing plumbing fixtures and appliances.
- Demonstrate knowledge of the procedures used to maintain plumbing fixtures and appliances.
- Demonstrate knowledge of emerging technologies and practices pertaining to installing plumbing fixtures, supports, appliances and accessories.

### **2023 Red Seal Occupational Standard Reference:**

- 4.01 Plans layout for piping systems.
- 4.05 Commissions systems.
- 14.01 Installs fixture supports.
- 14.02 Installs plumbing fixtures and appliances.
- 14.03 Tests plumbing fixtures and appliances.
- 14.04 Services plumbing fixtures and appliances.

### **Suggested Hours:**

30 Hours

### **Theoretical Objectives:**

1. Define terminology associated with plumbing fixtures, appliances and accessories.
2. Interpret information pertaining to plumbing fixtures, supports, and accessories found on drawings and specifications.
3. Interpret codes and regulations pertaining to plumbing fixtures, appliances, supports and accessories.
4. Identify types of plumbing fixtures and appliances and describe their characteristics and applications.
  - i) fixtures
    - showers/tubs

- water closets
  - lavatories
  - urinals
  - sinks
  - bidets
  - ii) appliances
    - water heaters
    - coffee machines
    - ice makers
    - dishwashers
    - sanitizers
  - iii) supports
    - brackets
    - carriers
    - wood backing
    - legs
5. Identify trim and accessories for plumbing fixtures and appliances and describe their characteristics and applications.
- i) chrome traps
    - offset p.o.
    - barrier free
  - ii) shower heads
  - iii) grab bars
  - iv) cover plates
6. Identify agencies that approve fixtures, appliances and accessories that are accepted by the Authority Having Jurisdiction (AHJ).
- i) National Plumbing Code (NPC)
  - ii) Underwriters Laboratories of Canada (ULC)
  - iii) Canadian Standards Association (CSA)
  - iv) National Building Code (NBC)
7. Identify and describe hazards and safe work practices pertaining to plumbing fixtures, supports and appliances.
8. Identify tools and equipment relating to plumbing fixtures, appliances and accessories and describe their applications and procedures for use.
- i) drills
  - ii) torpedo levels
  - iii) chop saws
  - iv) wrenches
  - v) thermometers

- vi) multimeters
- vii) pressure meters

9. Describe the procedures used to test plumbing fixtures and appliances.
10. Describe the procedures used to install plumbing fixtures, supports and accessories.
11. Describe the procedures used to troubleshoot and diagnose problems with plumbing fixtures and appliances.
12. Describe the procedures used to repair, maintain and replace plumbing fixtures and appliances.
13. Identify emerging technologies pertaining to fixtures, supports, appliances and accessories.

**Practical Objectives:**

N/A



**PLB-215****Hot Water Storage Tanks and Heaters****Learning Outcomes:**

- Demonstrate knowledge of hot water storage tanks and heaters, their components, applications and operation.
- Demonstrate knowledge of the procedures used to install, maintain, repair, test and troubleshoot hot water storage tanks and heaters.
- Demonstrate knowledge of emerging technologies and practices pertaining to hot water storage tanks and heaters.

**2023 Red Seal Occupational Standard Reference:**

- 4.01 Plans layout for piping systems.
- 4.05 Commissions systems.
- 4.06 Protects piping systems, equipment and structure from damage.
- 12.01 Plans layout and sizes piping and components for potable water distribution systems.
- 12.03 Installs components for potable water distribution systems.
- 12.05 Tests potable water distribution systems.
- 12.06 Services potable water distribution systems.

**Suggested Hours:**

24 Hours

**Theoretical Objectives:**

1. Define terminology associated with hot water storage tanks and heaters.
2. Identify hazards and describe safe work practices pertaining to hot water storage tanks and heaters.
3. Interpret codes and regulations pertaining to hot water storage tanks and heaters.
4. Interpret information pertaining to hot water storage tanks and heaters found on drawings and specifications.
5. Identify tools and equipment relating to hot water storage tanks and heaters and describe their applications and procedures for use.
6. Identify types of hot water storage tanks and describe their characteristics and applications.

7. Identify hot water storage tank components and accessories and describe their purpose and operation.
8. Identify types of water heaters and describe their characteristics and applications.
  - i) direct
  - ii) indirect
9. Identify heat sources for water heaters and describe their characteristics and applications.
  - i) oil
  - ii) gas
  - iii) electric
  - iv) solar
  - v) solid fuel
10. Identify water heater components and describe their purpose and operation.
11. Identify the factors to consider for sizing hot water storage tanks and heaters, their components and equipment.
12. Describe the procedures used to size hot water storage tanks and heaters, their components and equipment.
13. Describe the procedures used to install and protect hot water tanks and their components.
14. Describe the procedures used to maintain and repair hot water tanks and their components.
15. Describe the procedures used to test and troubleshoot hot water tanks and their components.
16. Describe the procedures used to install water heaters and their components.
17. Identify emerging technologies pertaining to water heaters and their components.
  - i) hybrid water heater

**Practical Objectives:**

N/A

## **PLB-220**

## **Drawings II**

### **Learning Outcomes:**

- Demonstrate knowledge of drawings and specifications.
- Demonstrate knowledge of various piping and equipment layouts and applications.
- Demonstrate knowledge of layout tools and equipment.

### **2023 Red Seal Occupational Standard Reference:**

- 3.01 Organizes project tasks and procedures.
- 3.02 Organizes materials and supplies.
- 4.01 Plans layout for piping systems.

### **Suggested Hours:**

30 Hours

### **Theoretical Objectives:**

1. Define terminology associated with drawings, sketches and specifications.
2. Interpret types of metric and imperial systems of measurement and describe the procedures used to perform conversions.
3. Interpret types of drawings and specifications and describe their applications and procedures for use.
  - i) engineered drawings
  - ii) manufacturers' requirements
  - iii) job specifications
  - iv) standards
  - v) shop drawings and sketches
4. Interpret types of symbols used on drawings, sketches and specifications and describe their characteristics and applications.
5. Interpret drawing views and describe their applications.
  - i) plan
  - ii) section
  - iii) detail
  - iv) elevation
  - v) cross section
  - vi) orthographic
  - vii) pictorial

- perspective
  - oblique
  - isometric
6. Describe the use of scales.
  7. Interpret blueprints, specifications and job site instructions.
  8. Describe the procedures used for the care, handling and storage of drawings, sketches and specifications.
  9. Identify equipment used for various piping systems on drawings and specifications.
  10. Interpret the requirements of various piping systems and applications.
    - i) appliances
    - ii) fixtures
    - iii) control devices

**Practical Objectives:**

1. Use layout tools and equipment.
  - i) builders' levels
  - ii) levels
  - iii) lasers
  - iv) Philadelphia /stadia rods
  - v) scale ruler

**PLB-225****Drainage, Waste and Venting Systems II****Learning Outcomes:**

- Demonstrate knowledge of residential drainage, waste and venting (DWV) systems, equipment and components and their purposes, characteristics, applications and operations.
- Demonstrate knowledge of the procedures used to determine and transfer grade and elevation measurements for residential drainage, waste and venting systems.
- Demonstrate knowledge of the procedures used to plan layout, size, and install residential drainage, waste and venting systems.
- Demonstrate knowledge of testing equipment and procedures used for testing interior residential drainage, waste and venting systems.
- Demonstrate knowledge of the procedures used to service residential interior drainage, waste and venting systems.
- Demonstrate knowledge of the procedures to install fire stopping devices and materials.
- Demonstrate knowledge of emerging technologies and practices pertaining to interior DWV systems.

**2023 Red Seal Occupational Standard Reference:**

- 4.01 Plans layout for piping systems.
- 4.05 Commissions systems.
- 4.06 Protects piping systems, equipment and structure from damage.
- 4.08 Installs fire stopping devices and materials.
- 10.01 Plans layout and sizes piping for interior drainage, waste and vent systems.
- 10.02 Installs underground piping and components for interior drainage, waste and vent systems.
- 10.03 Installs above-ground piping and components for interior drainage, waste and vent (DWV) systems.
- 10.04 Tests interior drainage, waste and vent systems.
- 10.05 Services interior drainage, waste and vent systems.

**Suggested Hours:**

42 Hours

**Theoretical Objectives:**

1. Define terminology associated with draining, waste and venting systems.
2. Identify hazards and describe safe work practices pertaining to residential DWV systems.

3. Interpret codes and regulations pertaining to residential DWV systems.
4. Interpret information pertaining to residential DWV systems found on drawings and specifications.
5. Identify the factors to consider when sizing residential DWV system components.
  - i) hydraulic load
  - ii) code requirements
6. Identify tools and equipment relating to residential DWV systems and describe their applications and procedures for use.
  - i) tampers
  - ii) jackhammers
  - iii) levels
  - iv) excavation equipment
  - v) torches
  - vi) tubing cutters
  - vii) hand and power saws
  - viii) testing equipment
    - inflatable test balls
    - mechanical test plugs
    - gauges
    - smoke generating machines
    - air compressor
7. Identify types of residential venting systems and describe their characteristics and applications.
  - i) stack vent
  - ii) individual vent
  - iii) branch vent
  - iv) dual vent
  - v) vent header
  - vi) continuous vent
  - vii) wet vent
  - viii) air admittance valve
8. Identify and describe fire stopping devices and materials and describe their purpose and application for residential DWV systems.
9. Identify the methods of backflow protection used in residential DWV systems.
  - i) backwater valves
  - ii) gate valves
  - iii) check valves

10. Identify interior residential DWV system equipment and components and describe their purpose, operation and applications.
  - i) piping
  - ii) traps
  - iii) cleanouts
  - iv) joints and connections
  - v) floor drains
  - vi) sumps
  - vii) trap seal primer
  - viii) compression seals
  - ix) interceptors
11. Identify the grade and elevation for piping in residential DWV systems.
12. Identify the factors to consider when installing residential DWV system components.
  - i) safety considerations
  - ii) support
  - iii) protection
13. Identify types of hangers and supports used for residential DWV systems and describe their procedures for installation.
14. Describe the procedures used to install and protect residential DWV systems and buildings.
15. Describe the procedures used to determine hydraulic load on sanitary residential DWV systems.
16. Describe the procedures used to grade piping for residential DWV systems.
17. Identify interior residential DWV system testing equipment.
18. Describe the procedures to test and commission interior residential DWV systems.
  - i) smoke test
  - ii) ball test
  - iii) hydrostatic test
  - iv) pneumatic test
19. Describe faults and conditions requiring service to interior residential DWV systems.
  - i) leaks
  - ii) inadequate grade
  - iii) wear
  - iv) noise
  - v) corrosion

- vi) blockage
  - vii) sewer gas
20. Describe the procedures used to troubleshoot and service interior residential DWV system components.
21. Identify required documentation pertaining to servicing interior residential DWV systems.
- i) service reports
  - ii) maintenance reports
22. Identify emerging technologies that reduce environmental impacts.

**Practical Objectives:**

N/A



## **PLB-230**

## **Hydronic Systems I**

### **Learning Outcomes:**

- Demonstrate knowledge of the principles of hydronic heating and cooling generating system operation.
- Demonstrate knowledge of regulatory, training and certification requirements pertaining to hydronic systems.
- Demonstrate knowledge of hydronic systems, piping and components, their characteristics, applications and operation.
- Demonstrate knowledge of factors that impact the design of hydronic systems.
- Demonstrate knowledge of fluid fundamentals, their characteristics and applications.
- Demonstrate knowledge of sizing and installing pipe and components for hydronic systems.
- Demonstrate knowledge of hydronic cooling and heating sources and their operation.
- Demonstrate knowledge of principles of heat transfer.
- Demonstrate knowledge of the procedures used to install hydronic transfer units, their applications and operation.

### **2023 Red Seal Occupational Standard Reference:**

- 4.05 Commissions systems.
- 4.06 Protects piping systems, equipment and structure from damage.
- 17.01 Plans layout and sizes piping and components for hydronic systems.
- 17.02 Installs piping and components for hydronic systems.
- 18.01 Installs hydronic heating equipment.
- 18.02 Installs hydronic cooling equipment.

### **Suggested hours:**

63 Hours

### **Theoretical Objectives:**

1. Define terminology associated with hydronic heating and cooling generating systems.
2. Identify tools and equipment relating to hydronic heating and cooling generating systems and describe their applications and procedures for use.
3. Identify hazards and describe safe work practices pertaining to hydronic heating and cooling generating systems.
4. Describe procedures for lock-out and tag-out of hydronic heating and cooling generating systems.

5. Identify and interpret codes, manufacturers' specifications, drawings and regulations pertaining to hydronic heating and cooling generating systems.
6. Identify types of hydronic cooling and heating systems and describe their characteristics and operation.
  - i) systems
    - high/low pressure
    - high/low temperature
  - ii) heating sources
    - high/low mass boilers
    - bio-mass boilers
    - heat pumps
  - iii) cooling sources
    - heat pumps
    - cooling towers
    - fluid coolers
    - chillers
7. Identify sources of energy used by hydronic heating and cooling systems.
  - i) oil
  - ii) gas
  - iii) solid fuel
  - iv) geothermal
  - v) solar
  - vi) electricity
8. Describe the principles of heat transfer.
  - i) radiation
  - ii) conduction
  - iii) convection
9. Identify hydronic heating and cooling generating system components and describe their purpose and operation.
  - i) valves
  - ii) PRV and cross connection devices
  - iii) flanges
  - iv) unions
  - v) blanks
  - vi) pot feeders
  - vii) air removal devices
    - manual vents
    - automatic vents
    - scoops
    - separators

- scrubbers
  - viii) boiler trim
    - low water cutoffs
    - safety relief devices
    - flow switches
    - operating controls
    - expansion tanks
    - heat exchangers
    - circulating pumps
    - mixing components
    - circulators
    - gauges and thermometers
    - dirt elimination devices
10. Identify fluids and additives used in hydronic heating and cooling generating systems and describe their characteristics and applications.
- i) fluids
    - water
    - chemical
    - air and brine solutions
    - glycol
  - ii) additives
    - treatment chemicals
    - rust inhibitors
    - methyl hydrate
11. Describe the effects of fluid viscosity through temperature range.
12. Identify volumetric coefficient differences between various fluids.
13. Describe laminar and turbulent flow.
14. Describe how velocity affects flow characteristics.
15. Identify how piping design strategies affect pipe sizing.
- i) one pipe
    - venturi tee
    - series loop
  - ii) two pipe
    - reverse return
    - direct return
  - iii) three pipe
  - iv) four pipe
    - indirect

- v) primary/secondary
  - vi) injection
16. Identify and describe expansion devices, their purpose and operation.
    - i) bladder
    - ii) diaphragm tank
    - iii) conventional air cushion
    - iv) open tank
  17. Identify zoning and control strategies and how they impact piping.
  18. Identify hydronic system controls and describe their purpose and operation.
  19. Describe the procedures used to install and protect piping and components for hydronic heating and cooling generating systems.
  20. Describe the types of auxiliary equipment used with hydronic heating and cooling generating systems.
    - i) indirect fired hot water tanks
    - ii) heat exchangers
    - iii) make-up tanks
  21. Describe procedures for selecting and sizing auxiliary equipment.
  22. Describe point of no pressure change and the importance of its location within the piping system.
  23. Describe the variables that impact pipe and tubing in hydronic heating and cooling generating systems and their associated calculations.
    - i) thermal expansion, thermal contraction
    - ii) weight
    - iii) friction loss
    - iv) turbulence
    - v) galvanic action
  24. Describe the effects trapped air has on a hydronic system and the procedures used to correct it.
  25. Identify heat transfer units and describe their characteristics and operation.
  26. Describe procedures for sizing heat transfer units.
  27. Describe the procedures used to install, protect, set and adjust hydronic transfer units.
    - i) protection

- vibration isolation
- insulating
- installation of cover plates

28. Identify types of hydronic transfer units, their components and describe their purpose and operation.
- i) fan coil units
  - ii) radiators
  - iii) radiant panels
  - iv) unit heaters
  - v) termination heat pumps
29. Describe the procedures used to join hydronic transfer units to the system.
- i) threading
  - ii) soldering
  - iii) grooving
  - iv) welding
  - v) press fit
  - vi) crimped fit
  - vii) expansion fit
  - viii) solvent
  - ix) mechanical

**Practical Objectives:**

1. Calculate linear and volumetric expansion.
2. Perform a heat loss calculation.
3. Install and diagnose heating/cooling components and sources.



# Level 3

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## **PLB-300**

## **Hydronic Systems II**

### **Learning Outcomes:**

- Demonstrate knowledge of the principles of hydronic system operation.
- Demonstrate knowledge of procedures used for testing and servicing piping and components for hydronic systems.
- Demonstrate knowledge of testing and servicing hydronic heating and cooling sources and their operation.
- Demonstrate knowledge of testing and servicing procedures for hydronic system transfer units and equipment.
- Demonstrate knowledge of interpreting manufacturers' data pertaining to hydronic systems.
- Demonstrate knowledge of documenting the service for hydronic heating and cooling generating systems and associated piping and components.
- Demonstrate knowledge of emerging technologies and practices pertaining to hydronic systems.

### **2023 Red Seal Occupational Standard Reference:**

- 17.03 Tests hydronic systems.
- 17.04 Services hydronic systems.
- 18.03 Tests hydronic heating and cooling equipment.
- 18.04 Services hydronic heating and cooling equipment.

### **Suggested Hours:**

30 Hours

### **Theoretical Objectives:**

1. Identify tools and equipment used to test and service hydronic heating and cooling generating systems.
  - i) thermal scanner
  - ii) combustion analysis equipment
  - iii) control modules
  - iv) scopes
  - v) gauges
2. Interpret drawings, specifications, manufacturers' data and equipment manuals pertaining to hydronic heating and cooling generating systems and services.



3. Identify required documentation pertaining to servicing hydronic heating and cooling generating systems.
  - i) service reports
  - ii) maintenance reports
  - iii) building logbooks
4. Identify hazards and describe safe work practices pertaining to testing and servicing of hydronic heating and cooling generating systems.
  - i) high temperature
  - ii) high pressure
  - iii) cross-contamination
  - iv) electrical
  - v) spillage
5. Describe the importance of completing a sensory inspection.
  - i) visual
  - ii) auditory
  - iii) tactile testing
6. Describe procedures for lock-out and tag-out of hydronic heating and cooling generating systems.
7. Describe the function of operation and safety controls.
  - i) electronic
  - ii) mechanical
8. Identify system conditions requiring servicing in hydronic heating and cooling generating systems.
  - i) wear
  - ii) noise
  - iii) leaks
  - iv) corrosion
  - v) cracks
  - vi) inadequate flow
  - vii) air lock
  - viii) no heat
  - ix) no cooling
  - x) adverse effects of low return temperature
  - xi) manufacturers' defects
  - xii) blockage
9. Identify isolation strategies when testing and servicing hydronic heating and cooling generating systems.
  - i) sensitive equipment

- safety valves
  - air vents
  - gauges
10. Describe procedures used to test and diagnose problems with hydronic heating and cooling generating equipment and associated piping and components.
- i) tests
    - hydrostatic
    - pneumatic
    - pH
    - TDS
    - glycol strength
    - return temperature
  - ii) components
    - valves
    - air removal devices
    - circulators
    - gauges and thermometers
    - heat transfer units
    - dirt elimination devices
11. Interpret performance data and specifications pertaining to servicing hydronic system transfer unit equipment and components.
- i) documentation
  - ii) system requirements
12. Describe the procedures used to test and service hydronic system transfer units.
13. Describe the procedures to disassemble the system problem areas, replace or repair faulty components and reassemble.
14. Describe procedures for reinstating system to operating condition and verifying repair.
15. Describe a program of scheduled service for hydronic heating and cooling generating equipment and associated piping and components.
16. Identify emerging technologies pertaining to hydronic systems and describe their characteristics and applications.
- i) net zero and carbon neutral commitments
  - ii) variable frequency drives (VFDs)
  - iii) heat and cooling recovery
  - iv) building automation technologies

**Practical Objectives:**

N/A

## **PLB-305**

## **Water Service**

### **Learning Outcomes:**

- Demonstrate knowledge of water service piping, equipment, components, and their applications and operations.
- Demonstrate knowledge of regulatory, training and certification requirements pertaining to installation of water service components.
- Demonstrate knowledge of the procedures used to size and install water service equipment and components.
- Demonstrate knowledge of procedures used for testing and maintaining water service equipment, piping and components.
- Demonstrate knowledge of emerging technologies and practices pertaining to installation of water service components.

### **2023 Red Seal Occupational Standard Reference:**

- 4.01 Plans layout for piping systems.
- 4.05 Commissions systems.
- 4.07 Coordinates excavation and backfilling of trenches.
- 11.01 Plans layout and sizes piping and components for water services.
- 11.02 Installs piping for water services.
- 11.03 Installs components for water service.
- 11.04 Tests water service piping and components.
- 11.05 Services water service piping and components.

### **Suggested Hours:**

12 Hours

### **Theoretical Objectives:**

1. Define terminology associated with water service.
2. Interpret codes and regulations pertaining to water service in residential and industrial/commercial/institutional (ICI) applications.
3. Interpret information pertaining to water service found on drawings and specifications.
  - i) total number of fixture units
  - ii) developed length of pipe
  - iii) most remote outlet
  - iv) difference in elevation
  - v) available system pressure
  - vi) flow velocity

4. Identify hazards and describe safe work practices pertaining to servicing a water service.
5. Identify factors to consider in determining depth for water service piping.
6. Identify factors to consider in sizing piping for water service.
  - i) number of fixture units
  - ii) developed length of pipe
  - iii) most remote outlet
  - iv) difference in elevation
  - v) available system pressure
  - vi) flow velocity
7. Identify tools and equipment relating to water service systems and describe their applications and procedures for use.
8. Identify types of water service and describe their characteristics and applications.
  - i) rural
  - ii) residential
  - iii) commercial
  - iv) industrial
9. Identify types of water service piping, equipment and components and describe their characteristics and applications.
  - i) corporation main stop
  - ii) expansion loop
  - iii) curb stop
  - iv) piping and fittings
  - v) main shut-off
10. Describe procedures used to determine piping size requirements for water service based on peak flow demand.
11. Describe procedures used to maintain and protect water service piping, equipment and components.
  - i) frost box installation
  - ii) backfilling
  - iii) shoring
  - iv) heat tracing
  - v) insulating
  - vi) supporting
12. Describe procedures used to determine elevation, friction loss, velocity and required pressure for water service.

13. Describe procedures used to lay out and install water service piping, equipment and components.
14. Describe procedures used to test water service piping, equipment and components.
15. Identify emerging technologies pertaining to installing, testing and servicing water service components.
  - i) re-lining water services
  - ii) inspecting and locating equipment
  - iii) infrared leak detection equipment

**Practical Objectives:**

N/A

## **PLB-310**

## **Small Building Potable Water Distribution**

### **Learning Outcomes:**

- Demonstrate knowledge of procedures used to determine elevation, friction loss and required pressure for potable water distribution systems.
- Demonstrate knowledge of potable water distribution system and components, their applications and operation.
- Demonstrate knowledge of volumetric expansion calculations.
- Demonstrate knowledge of cross-connection control devices and methods.
- Demonstrate knowledge of the procedures used to test and service potable water distribution systems.
- Demonstrate knowledge of emerging technologies and practices pertaining to potable water distribution systems.

### **2023 Red Seal Occupational Standard Reference:**

- 4.01 Plans layout for piping systems.
- 4.05 Commissions systems.
- 4.06 Protects piping systems, equipment and structure from damage.
- 4.07 Coordinates excavation and backfilling of trenches.
- 12.01 Plans layout and sizes piping and components for potable water distribution systems.
- 12.02 Installs piping for potable water distribution systems.
- 12.03 Installs components for potable water distribution systems.
- 12.04 Installs cross connection controls.
- 12.05 Tests potable water distribution systems.
- 12.06 Services potable water distribution systems.

### **Suggested Hours:**

36 Hours

### **Theoretical Objectives:**

1. Interpret codes and regulations pertaining to potable water distribution systems and testing.
2. Interpret information pertaining to potable water distribution systems and components found on drawings and specifications.
3. Describe back siphonage and back pressure and their causes.
4. Describe water hammer, its causes and methods of prevention or control.

5. Identify potable water distribution systems, equipment, piping, supports and components and describe their characteristics and applications.
  - i) systems
    - public
    - private
  - ii) piping
  - iii) fittings
  - iv) expansion joints
  - v) valves
    - pressure reducing
    - tempering
    - isolation
    - check
  - vi) shock arrestors
  - vii) recirculating lines and pumps
  - viii) fire stopping
  - ix) cross-connection control devices
  - x) thermal expansion devices
  - xi) pressure tanks
  - xii) water treatment equipment
  - xiii) supports
6. Identify locations for potable water distribution components.
7. Identify hazards and describe safe work practices pertaining to potable water distribution systems.
8. Identify the factors to consider when sizing piping and equipment for potable water distribution systems.
  - i) total number of fixture units
  - ii) developed length of pipe
  - iii) most remote outlet
  - iv) difference in elevation
  - v) velocity
  - vi) available system pressure
  - vii) individual fixture characteristics
  - viii) type of pipe
  - ix) friction loss
  - x) code requirements



9. Identify tools and equipment relating to potable water distribution systems and describe characteristics and applications.
  - i) wrenches
  - ii) freeze packs
  - iii) pipe cutters
  - iv) soldering and brazing equipment
  - v) crimping tools
  - vi) solvents
  - vii) expansion tools
  - viii) compression tools
  - ix) rigging and hoisting equipment
10. Identify levels of hazard related to cross-connection control devices and methods.
  - i) minor
  - ii) moderate
  - iii) severe
11. Identify types of cross-connection control devices and methods.
  - i) reduced pressure principal backflow (RP)
  - ii) double check valve assembly
  - iii) pressure vacuum breaker
  - iv) atmospheric vacuum breaker
  - v) dual check valve
  - vi) air break
  - vii) air gap
12. Identify components of potable water distribution systems that require testing.
13. Identify testing equipment for potable water distribution systems.
  - i) gauges
  - ii) pumps
  - iii) air compressors
14. Describe the procedures used to size potable water distribution systems and components.
  - i) small building method
  - ii) simplified method
15. Describe the procedures used to rough-in and lay out potable water distribution systems and components.
16. Describe the procedures used to install potable water distribution systems components.

17. Describe the procedures used to protect potable water distribution systems and components.
  - i) recirculation pump
  - ii) frost box
  - iii) heat tracing
  - iv) insulation
  - v) expansion joints
18. Identify faults in potable water distribution systems.
  - i) ruptures
  - ii) leaks
  - iii) manufacturers' imperfections
  - iv) undersizing
19. Describe the procedures used to test and service potable water distribution systems and components.
20. Describe the procedure to perform volumetric calculations.
21. Identify emerging technologies pertaining to installing potable water distribution systems.
  - i) drain water heat recovery units
  - ii) alternative water heating systems
    - solar
    - geothermal

**Practical Objectives:**

N/A

## **PLB-315**

## **Commercial Drainage Systems**

### **Learning Outcomes:**

- Demonstrate knowledge of commercial sanitary drainage systems, their components, applications and operation.
- Demonstrate knowledge of troubleshooting, testing, servicing and repair equipment.
- Demonstrate knowledge of regulatory requirements pertaining to commercial sanitary drainage systems.
- Demonstrate knowledge of the procedures used to determine and transfer grade and elevation measurements for commercial sanitary drainage systems.
- Demonstrate knowledge of the procedures used to lay out and install piping for commercial sanitary drainage systems.
- Demonstrate knowledge of the procedures used to troubleshoot, test, service and repair commercial sanitary drainage systems.
- Demonstrate knowledge of emerging technologies and practices pertaining to commercial sanitary drainage systems.

### **2023 Red Seal Occupational Standard Reference:**

- 4.01 Plans layout for piping systems.
- 4.05 Commissions systems.
- 4.06 Protects piping systems, equipment and structure from damage.
- 4.07 Coordinates excavation and backfilling of trenches.
- 4.08 Installs fire stopping devices and materials.
- 10.01 Plans layout and sizes piping for interior drainage, waste and vent systems.
- 10.02 Installs underground piping and components for interior drainage, waste and vent systems.
- 10.03 Installs above-ground piping and components for interior drainage, waste and vent systems.
- 10.04 Tests interior drainage, waste and vent systems.
- 10.05 Services interior drainage, waste and vent systems.

### **Suggested Hours:**

18 Hours

### **Theoretical Objectives:**

1. Define terminology associated with commercial drainage systems.
2. Interpret codes and regulations pertaining to commercial sanitary drainage systems.

3. Interpret information pertaining to commercial sanitary drainage systems found on drawings and specifications.
4. Describe the purpose of commercial sanitary drainage systems.
5. Identify hazards and describe safe work practices pertaining to commercial sanitary drainage systems.
  - i) trenching
  - ii) confined spaces
  - iii) pinch points
  - iv) hoists
  - v) air quality
  - vi) heights
6. Identify equipment and components for commercial sanitary drainage systems and describe their characteristics and applications.
  - i) piping
  - ii) fixtures
  - iii) drains
  - iv) traps
  - v) cleanouts
  - vi) joints and connections
  - vii) backwater valves
  - viii) fire stopping
  - ix) sewage sumps
  - x) macerating toilet systems
  - xi) expansion joints
  - xii) sump pumps
7. Identify testing equipment for commercial sanitary drainage systems and describe their characteristics and applications.
8. Identify piping for commercial sanitary drainage systems.
9. Identify potential problems with commercial sanitary drainage systems.
10. Identify the factors to consider when installing, servicing and sizing commercial sanitary drainage systems.
11. Identify the methods of protection from backflow used in commercial sanitary drainage systems.
12. Identify the types of commercial sanitary drainage systems and describe their characteristics and applications.

13. Identify tools and equipment relating to commercial sanitary drainage systems and describe their characteristics and procedures for use.
14. Identify types of hangers and supports used to install commercial sanitary drainage systems.
15. Identify and describe the procedures used to protect commercial sanitary drainage systems.
  - i) insulating
  - ii) supporting
  - iii) backfilling
  - iv) fire stopping
  - v) expansion joints
16. Describe the procedures used to size commercial sanitary drainage systems.
17. Describe the procedures used to grade piping and calculate elevations for commercial sanitary drainage systems.
18. Describe the procedures used to install commercial sanitary drainage systems.
19. Describe the procedures used to install hangers and supports commercial sanitary drainage systems.
20. Describe the procedures used to service and repair commercial sanitary drainage systems.
21. Describe the procedures used to rough-in piping for commercial sanitary drainage systems.
22. Describe the procedures used to test and troubleshoot commercial sanitary drainage systems.
23. Identify emerging technologies and practices pertaining to commercial sanitary drainage systems.

**Practical Objectives:**

N/A

## **PLB-320**

## **Commercial Venting Systems**

### **Learning Outcomes:**

- Demonstrate knowledge of commercial venting systems, their components, applications and operation.
- Demonstrate knowledge of regulatory requirements pertaining to commercial venting systems.
- Demonstrate knowledge of the procedures used to determine and transfer grade and elevation measurements for commercial venting systems.
- Demonstrate knowledge of equipment and procedures used for testing commercial venting systems.
- Demonstrate knowledge of the procedures used to service commercial venting systems.
- Demonstrate knowledge of emerging technologies and practices pertaining to commercial venting systems.

### **2023 Red Seal Occupational Standard Reference:**

- 4.08 Installs fire stopping devices and materials.
- 10.01 Plans layout and sizes piping for interior drainage, waste and vent systems.
- 10.03 Installs above-ground piping and components for interior drainage, waste and vent systems.
- 10.04 Tests interior drainage, waste and vent systems.
- 10.05 Services interior drainage, waste and vent systems.

### **Suggested Hours:**

24 Hours

### **Theoretical Objectives:**

1. Define terminology associated with commercial venting systems.
2. Interpret codes and regulations pertaining to commercial venting systems.
3. Interpret information pertaining to commercial venting systems found on drawings and specifications.
4. Describe the purpose of commercial venting systems.
5. Identify hazards and describe safe work practices pertaining to commercial venting systems.
6. Identify tools and equipment relating to commercial venting systems and describe their applications and procedures for use.

7. Identify types of commercial venting systems and describe their characteristics and applications.
  - i) stack vent
  - ii) vent stack
  - iii) individual vent
  - iv) branch vent
  - v) dual vent
  - vi) vent header
  - vii) continuous vent
  - viii) wet vent
  - ix) relief vent
  - x) circuit vent
  - xi) yoke vent
  - xii) offset relief vent
  - xiii) additional circuit vent
8. Identify commercial venting system equipment and components and describe their characteristics and applications.
  - i) piping
  - ii) fixtures
  - iii) traps
  - iv) cleanouts
  - v) joints and connections
  - vi) fire stopping
  - vii) air admittance valve
9. Describe the procedures used to size commercial venting systems.
10. Describe the procedures used to install commercial venting systems.
11. Describe the procedures used to install hangers and supports for commercial venting systems.
12. Describe the procedures used to protect commercial venting systems.
13. Describe the procedures used to test and service commercial venting systems components.
14. Identify emerging technologies and practices pertaining to commercial venting systems.

**Practical Objectives:**

N/A

**PLB-325****Storm and Combination Drainage Systems (Sewers)****Learning Outcomes:**

- Demonstrate knowledge of storm and combination drainage systems, their components, applications and operation.
- Demonstrate knowledge of training, certification and regulatory requirements pertaining to storm and combination drainage systems.
- Demonstrate knowledge of equipment and procedures used for testing storm and combination drainage systems.
- Demonstrate knowledge of the procedures used to determine and transfer grade and elevation measurements for storm and combination drainage systems.
- Demonstrate knowledge of the procedures used to lay out and install piping for storm and combination drainage systems.
- Demonstrate knowledge of the procedures used to service, repair and troubleshoot storm and combination drainage systems.
- Demonstrate knowledge of emerging technologies and practices pertaining to storm and combination drainage systems.

**2023 Red Seal Occupational Standard Reference:**

- 4.01 Plans layout for piping systems.
- 4.05 Commissions systems.
- 4.06 Protects piping systems, equipment and structure from damage.
- 4.07 Coordinates excavation and backfilling of trenches.
- 4.08 Installs fire stopping devices and materials.
- 8.01 Plans layout and Sizes pipe for sewers.
- 8.02 Installs maintenance holes and catch basins.
- 8.03 Installs piping for sewers.
- 8.04 Tests maintenance holes, catch basins and piping for sewers.
- 8.05 Services maintenance holes, catch basins and piping for sewers.

**Suggested Hours:**

24 Hours

**Theoretical Objectives:**

1. Define terminology associated with storm and combination drainage systems (sewers).
2. Interpret codes and regulations pertaining to storm and combination drainage systems.
3. Interpret information pertaining to storm and combination drainage systems found on drawings and specifications.



4. Describe the purpose and function of storm and combination drainage systems.
5. Identify hazards and describe safe work practices pertaining to storm and combination drainage systems.
6. Identify equipment and components for storm and combination drainage systems and describe their characteristics and applications.
  - i) piping
  - ii) roof drains
  - iii) area drains
  - iv) fire stopping
  - v) expansion joints
  - vi) storm water management devices
  - vii) backwater valves (only in combination applications)
  - viii) insulation
7. Identify testing equipment for storm and combination drainage systems and describe their characteristics and applications.
8. Identify piping for storm and combination drainage systems.
9. Identify potential problems with storm and combination drainage systems.
10. Identify the factors to consider when sizing, installing and servicing storm and combination drainage systems.
11. Identify the methods of protection from backflow used in storm and combination drainage systems.
12. Describe the procedures used to size storm and combination drainage systems.
13. Identify the types of storm and combination drainage systems and describe their characteristics and applications.
14. Identify tools and equipment relating to storm and combination drainage systems and describe their characteristics and procedures for use.
15. Identify types of hangers and supports used to install storm and combination drainage systems.
16. Describe the procedures used to protect storm and combination drainage systems.
  - i) insulating
  - ii) supporting
  - iii) identification

iv) mechanical specifications

17. Identify and describe the procedures used to determine hydraulic load on storm and combination drainage systems.
18. Describe the procedures used to grade piping and calculate elevations for storm and combination drainage systems.
19. Describe the procedures used to install storm and combination drainage systems, hangers and supports.
20. Describe the procedures used to service and repair storm and combination drainage systems.
21. Describe the procedures used to rough in piping for storm and combination drainage systems.
22. Describe the procedures used to test and troubleshoot storm and combination drainage systems.
23. Identify emerging technologies and practices pertaining to storm and combination drainage systems.

**Practical Objectives:**

N/A

## **PLB-330**

## **Irrigation Systems**

### **Learning Outcomes:**

- Demonstrate knowledge of piping for irrigation systems, their applications and operation.
- Demonstrate knowledge of training, certification and regulatory requirements pertaining to irrigations systems.
- Demonstrate knowledge of the procedures used to install piping for irrigation systems.
- Demonstrate knowledge of equipment and components for irrigation systems and their applications and operation.
- Demonstrate knowledge of procedures used to test and service irrigation systems.
- Demonstrate knowledge of emerging technologies and practices pertaining to irrigation systems.

### **2023 Red Seal Occupational Standard Reference:**

- 4.05 Commissions systems.
- 4.06 Protects piping systems, equipment and structure from damage.
- 21.01 Plans layout and sizes piping, components and equipment for other specialized systems.
- 21.02 Installs piping and components for other specialized systems.
- 21.03 Installs equipment for other specialized systems.
- 21.04 Tests other specialized systems.
- 21.05 Services other specialized systems.

### **Suggested Hours:**

3 Hours

### **Theoretical Objectives:**

1. Define terminology associated with equipment and components for irrigation systems.
2. Interpret codes and regulations pertaining to piping, equipment and components and servicing of irrigation systems.
3. Interpret information pertaining to irrigation systems, equipment and components found on drawing and specifications.
4. Identify equipment and components of irrigation systems and describe their characteristics and applications.
  - i) piping
  - ii) valves

- iii) sprinkler heads
  - iv) timers
  - v) pumps
  - vi) cross connection control devices
5. Identify the procedures used for handling, storage and transportation of equipment and components for irrigation systems.
  6. Identify hazards and describe safe work practices pertaining to equipment and components of irrigation systems.
  7. Identify potential problems with irrigation systems.
  8. Identify testing equipment for irrigation systems and describe their applications and procedures for use.
  9. Identify the factors to consider for determining pipe sizing in irrigation systems.
  10. Identify tools and equipment for installing and servicing irrigation systems and describe their applications and procedures for use.
  11. Identify types of piping for irrigation systems and describe their properties, characteristics and applications.
    - i) residential
    - ii) commercial
  12. Identify types of potential damage for irrigation systems.
  13. Describe the procedures used to install, test and service piping, equipment and components of irrigation systems.
  14. Identify emerging technologies and practices pertaining to irrigation systems.

**Practical Objectives:**

N/A

## **PLB-335      Commercial/Institutional Plumbing Fixtures and Accessories**

### **Learning Outcomes:**

- Demonstrate knowledge of commercial/institutional plumbing fixtures, supports and accessories, their applications and operation.
- Demonstrate knowledge of regulatory requirements to install, test and service commercial/institutional plumbing fixtures, supports and accessories.
- Demonstrate knowledge of the procedures used to install commercial/institutional plumbing fixtures, supports and accessories.
- Demonstrate knowledge of procedures used for testing commercial/institutional plumbing fixtures and appliances.
- Demonstrate knowledge of the procedures used to maintain commercial/institutional plumbing fixtures and appliances.
- Demonstrate knowledge of emerging technologies and practices pertaining to commercial/institutional plumbing fixtures, supports and accessories.

### **2023 Red Seal Occupational Standard Reference:**

- 4.05    Commissions systems.
- 14.01   Installs fixture supports.
- 14.02   Installs plumbing fixtures and appliances.
- 14.03   Tests plumbing fixtures and appliances.
- 14.04   Services plumbing fixtures and appliances.

### **Suggested Hours:**

18 Hours

### **Theoretical Objectives:**

1.      Define terminology associated with commercial/institutional plumbing fixtures and accessories.
2.      Identify commercial/institutional plumbing fixtures, appliances and accessories and describe their characteristics and applications.
3.      Identify agencies that approve fixtures, appliances and accessories that are accepted by the Authority Having Jurisdiction (AHJ).
  - i)      National Plumbing Code (NPC)
  - ii)     Underwriters Laboratories of Canada (ULC)
  - iii)    Canadian Standards Association (CSA)
  - iv)     National Building Code (NBC)

4. Interpret codes and regulations pertaining to commercial/institutional plumbing fixtures, appliances and supports.
5. Interpret codes and jurisdictional requirements pertaining to barrier-free design.
6. Identify tools and equipment relating to commercial/institutional plumbing fixtures and appliances and describe their applications and procedures for use.
7. Identify trim and accessories for commercial/institutional plumbing fixtures and appliances and describe their characteristics and applications.
8. Identify types of commercial/institutional plumbing fixtures and appliances and describe their characteristics and applications.
9. Identify types of supports for commercial/institutional plumbing fixtures and appliances and describe their characteristics and applications.
10. Interpret information pertaining to commercial/institutional plumbing fixtures, appliances, and supports found on drawings and specifications.
11. Identify hazards and describe safe work practices pertaining to installation of commercial/institutional plumbing fixtures and appliances, their supports and accessories.
12. Describe the procedures used to install, test, and service commercial/institutional plumbing fixtures and appliances.
13. Describe the procedures used to maintain, repair and replace commercial /institutional plumbing fixtures and appliances.
14. Identify emerging technologies and practices pertaining to commercial/institutional plumbing fixtures, supports and accessories.

**Practical Objectives:**

N/A

## **PLB-340**

## **Compressed Air Systems**

### **Learning Outcomes:**

- Demonstrate knowledge of piping for compressed air systems, their applications and operation.
- Demonstrate knowledge of training, certification and regulatory requirements pertaining to compressed air systems.
- Demonstrate knowledge of procedures used to install piping, equipment and components of compressed air systems.
- Demonstrate knowledge of equipment and components for compressed air systems and their applications and operation.
- Demonstrate knowledge of procedures used to test and service compressed air systems.
- Demonstrate knowledge of emerging technologies and practices pertaining to compressed air systems.

### **2023 Red Seal Occupational Standard Reference:**

- 4.05 Commissions systems.
- 4.06 Protects piping systems, equipment and structure from damage.
- 21.01 Plans layout and sizes piping, components and equipment for other specialized systems.
- 21.02 Installs piping and components for other specialized systems.
- 21.03 Installs equipment for other specialized systems.
- 21.04 Tests other specialized systems.
- 21.05 Services other specialized systems.

### **Suggested Hours:**

9 Hours

### **Theoretical Objectives:**

1. Define terminology associated with equipment and components for compressed air systems.
2. Interpret codes and regulations pertaining to equipment, components and servicing of compressed air systems.
  - i) National Plumbing Code (NPC)
  - ii) Canadian Standards Association (CSA) B149
  - iii) American Society of Mechanical Engineers (ASME)
  - iv) manufacturers' certification requirements

3. Interpret information pertaining to compressed air systems, equipment and components found on drawing and specifications.
  - i) engineered drawings
  - ii) manufacturers' requirements
  - iii) system requirements
  - iv) job specifications
  - v) shop drawings
4. Identify types of compressed air systems and describe their characteristics and applications.
  - i) instrument
  - ii) utility
  - iii) process
  - iv) make up/breathable
5. Identify equipment and components of compressed air systems and describe their characteristics and applications.
  - i) compressors
  - ii) piping
  - iii) valves
  - iv) controls
  - v) supports
  - vi) receivers/tanks
  - vii) flex connectors
  - viii) auto drains
6. Describe the procedures used for handling, storage and transportation of equipment and components for compressed air systems.
7. Identify hazards and describe safe work practices pertaining to equipment and components of compressed air systems.
8. Describe the methods of air treatment in compressed air systems.
  - i) filters
  - ii) driers
  - iii) after-coolers
  - iv) de-icers
9. Identify potential problems with compressed air systems.
10. Identify testing equipment for compressed air systems and describe their applications.
11. Identify the factors to consider for determining pipe sizing in compressed air systems.



12. Identify tools and equipment used to install and service compressed air systems and describe their applications and procedures for use.
13. Identify types of piping for compressed air systems and describe their properties, characteristics and applications.
14. Describe the procedures used to install, test and service compressed air systems and their equipment and components.
15. Identify emerging technologies and practices pertaining to compressed air systems.

**Practical Objectives:**

N/A

## **PLB-350**

## **Hydronic System Controls**

### **Learning Outcomes:**

- Demonstrate knowledge of hydronic system control components and accessories, their applications and operation.
- Demonstrate knowledge of regulatory, training and certification requirements pertaining to hydronic systems.
- Demonstrate knowledge of hydronic system controls, related equipment and components, and their applications and operation.
- Demonstrate knowledge of the procedures used to install hydronic system controls.
- Demonstrate knowledge of testing hydronic system controls their procedures and equipment.
- Demonstrate knowledge of the procedures used to service hydronic system controls.
- Demonstrate knowledge of emerging technologies and practices pertaining to hydronic systems.

### **2023 Red Seal Occupational Standard Reference:**

- 4.05 Commissions systems.
- 4.06 Protects piping systems, equipment and structure from damage.
- 17.02 Installs piping and components for hydronic systems.
- 17.03 Tests hydronic systems.
- 17.04 Services hydronic systems.

### **Suggested Hours:**

12 Hours

### **Theoretical Objectives:**

1. Define terminology associated with hydronic system controls.
2. Interpret information pertaining to hydronic system controls found on drawings and specifications.
3. Identify hazards and describe safe work practices pertaining to hydronic system controls.
4. Interpret codes and regulations pertaining to hydronic system controls.
5. Identify tools and equipment relating to hydronic system controls and describe their applications and procedures for use.

6. Identify hydronic system controls, components and accessories and describe their applications and operation.
  - i) control modules
  - ii) thermostats
  - iii) sensors
  - iv) safety devices
7. Describe the procedures used to install, set and adjust hydronic system control components and accessories.
8. Describe the procedures used to protect hydronic system control components.
9. Identify system conditions requiring servicing in hydronic system controls.
10. Describe the procedures used to test and service hydronic system controls.
11. Interpret performance data and specifications pertaining to servicing hydronic system controls.
12. identify emerging technologies pertaining to hydronic systems and describe their characteristics and applications.
  - i) net zero and carbon neutral commitments
  - ii) variable frequency drives (VFDs)
  - iii) heat and cooling recovery
  - iv) building automation technologies

**Practical Objectives:**

N/A

## **PLB-355**

## **Green Technology**

### **Learning Outcomes:**

- Demonstrate knowledge of piping for green technology systems, their applications and operation.
- Demonstrate knowledge of the procedures used to install piping for green technology systems.
- Demonstrate knowledge of equipment and components for green technology systems and their applications and operation.
- Demonstrate knowledge of the procedures used to install, test and service green technology systems and their equipment and components.

### **2023 Red Seal Occupational Standard Reference:**

- 21.01 Plans layout and sizes piping, components and equipment for other specialized systems.
- 21.02 Installs piping and components for other specialized systems.
- 21.03 Installs equipment for other specialized systems.
- 21.04 Tests other specialized systems.
- 21.05 Services other specialized systems.

### **Suggested Hours:**

18 Hours

### **Theoretical Objectives:**

1. Define terminology associated with equipment and components for green technology systems.
2. Interpret codes and regulations pertaining to piping, equipment, components and servicing of green technology systems.
3. Identify hazards and describe safe work practices pertaining to equipment and components of green technology systems.
4. Identify tools and equipment for installing, testing and servicing of green technology systems and piping and describe their applications and procedures for use.
5. Identify the factors to consider for determining pipe sizing in green technology systems.
6. Identify types of green technology systems.
  - i) geothermal

- vertical loop
    - horizontal loop
  - ii) solar
    - active/passive
    - panels
  - iii) wind
    - turbines
  - iv) rainwater collection
7. Identify equipment and components of green technology systems and describe their characteristics and applications.
  8. Describe the procedures used for handling, storage and transportation of equipment and components for green technology systems.
  9. Identify potential problems with green technology systems.
  10. Identify testing equipment for green technology systems and describe their applications and procedures for use.
  11. Identify types of piping for green technology systems and describe their properties, characteristics and applications.
  12. Describe the procedures used to install, test and service piping, equipment and components of green technology systems.

**Practical Objectives:**

N/A

## **PLB-360**

## **Basic Electricity**

### **Learning Outcomes:**

- Demonstrate knowledge of the basic concepts of electricity.

### **2023 Red Seal Occupational Standard Reference:**

- 3.03 Uses documentation.
- 4.05 Commissions systems.
- 13.03 Installs components for private water pressure systems.

### **Suggested Hours:**

6 Hours

### **Theoretical Objectives:**

1. Define terminology associated with electricity as related to the trade.
2. Identify hazards and describe safe work practices pertaining to electricity.
3. Interpret electrical related information found on drawings and specifications.
4. Identify tools and equipment used to test electrical circuits and describe their applications and procedures for use.
5. Describe Ohm's law, its applications and associated calculations.
6. Identify types of current and describe their characteristics and applications.
  - i) direct current (DC)
  - ii) alternating current (AC)
7. Identify types of electrical circuits and describe their characteristics and operation.
  - i) series
  - ii) parallel
8. Identify types of related electrical equipment and components and describe their characteristics, operation and applications.

### **Practical Objectives:**

1. Use a multimeter.

# Level 4

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## **PLB-400**

## **Gas Piping Systems**

### **Learning Outcomes:**

- Demonstrate knowledge of piping for gas fuel systems, their applications and operation.
- Demonstrate knowledge of training, certification and regulatory requirements pertaining to gas fuel systems.
- Demonstrate knowledge of the procedures used to install piping, equipment and components for gas fuel systems.
- Demonstrate knowledge of equipment and components for gas fuel systems and their applications and operation.
- Demonstrate knowledge of procedures used to test and service gas fuel systems.
- Demonstrate knowledge of emerging technologies and practices pertaining to gas fuel systems.

### **2023 Red Seal Occupational Standard Reference:**

- 21.01 Plans layout and sizes piping, components and equipment for other specialized systems.
- 21.02 Installs piping and components for other specialized systems.
- 21.03 Installs equipment for other specialized systems.
- 21.04 Tests other specialized systems.
- 21.05 Services other specialized systems.

### **Suggested Hours:**

48 Hours

### **Theoretical Objectives:**

1. Define terminology associated with equipment and components for gas fuel systems.
2. Interpret codes and regulations pertaining to equipment piping and components of gas fuel systems.
  - i) National Plumbing Code (NPC)
  - ii) Underwriters Laboratories of Canada (ULC)
  - iii) Canadian Standards Association (CSA)
  - iv) CSA B149 (Natural Gas and Propane Installation Code)
  - v) American Society of Mechanical Engineers (ASME)
3. Interpret information pertaining to gas fuel systems, equipment and components found on drawing and specifications.
4. Identify types of gas fuel systems and describe their applications and operation.



- i) natural gas
  - ii) propane
5. Identify equipment and components of gas fuel systems and describe their characteristics and applications.
  6. Describe the procedures used for handling, storage and transportation of equipment and components for gas fuel systems.
  7. Identify hazards and describe safe work practices pertaining to equipment and components of gas fuel systems.
  8. Identify potential problems with gas fuel systems.
  9. Identify the factors to consider for determining pipe sizing in gas fuel systems.
  10. Identify the tools and equipment used to install, test and service gas fuel systems equipment, piping and components.
  11. Identify types of piping for gas fuel systems and describe their properties, characteristics and applications.
  12. Describe the procedures used to install, test and service piping equipment and components of gas fuel systems.
  13. Identify emerging technologies and practices pertaining to gas fuel systems.

**Practical Objectives:**

N/A

## **PLB-405**

## **Medical Gas Systems**

### **Learning Outcomes:**

- Demonstrate knowledge of piping for medical gas systems, their applications and operation.
- Demonstrate knowledge of training, certification and regulatory requirements pertaining to medical gas systems.
- Demonstrate knowledge of procedures used to install, test and service piping, equipment and components for medical gas systems.
- Demonstrate knowledge of equipment and components for medical gas systems and their applications and operation.
- Demonstrate knowledge of emerging technologies and practices pertaining to medical gas systems.

### **2023 Red Seal Occupational Standard Reference:**

- 21.01 Plans layout and sizes piping, components and equipment for other specialized systems.
- 21.02 Installs piping and components for other specialized systems.
- 21.03 Installs equipment for other specialized systems.
- 21.04 Tests other specialized systems.
- 21.05 Services other specialized systems.

### **Suggested Hours:**

12 Hours

### **Theoretical Objectives:**

1. Define terminology associated with equipment and components for medical gas systems.
2. Interpret codes and regulations pertaining to piping, equipment and components for medical gas systems.
  - i) Canadian Standards Association (CSA) Z305
  - ii) Diameter Index Safety System (DISS)
  - iii) pin indexing system
3. Interpret information pertaining to medical gas systems, equipment and components found on drawing and specifications.
  - i) engineered drawings
  - ii) manufacturers requirements
  - iii) system requirements

- iv) job specifications
  - v) shop drawings
  - vi) standards
4. Identify types of medical gases and describe their characteristics.
    - i) oxygen
    - ii) nitrogen
    - iii) nitrous oxide
    - iv) medical air
    - v) vacuum
  5. Identify equipment and components of medical gas systems and describe their characteristics and applications.
  6. Describe the procedures used for handling, storage and transportation of medical gas systems equipment and components.
  7. Identify hazards and describe safe work practices pertaining to equipment and components of medical gas systems.
  8. Identify potential problems with medical gas systems.
  9. Identify testing equipment for medical gas systems and describe their applications and procedures for use.
    - i) inflatable test ball
    - ii) test plugs
    - iii) mandrels
    - iv) compressors
    - v) hydrostatic pumps
  10. Identify tools and equipment for installing and servicing piping of medical gas systems and describe their applications and procedures for use.
    - i) vacuum pumps
    - ii) medical air compressors
    - iii) piping
    - iv) valves
    - v) alarms
    - vi) sensors
  11. Identify types of piping for medical gas systems and describe their properties, characteristics and applications.
  12. Describe the procedures used to install, test and service medical gas systems.

13. Identify emerging technologies and practices pertaining to medical gas systems.

**Practical Objectives:**

N/A

## **PLB-410**

## **Low Pressure Steam Systems**

### **Learning Outcomes:**

- Demonstrate knowledge of low-pressure steam system operation.
- Demonstrate knowledge of regulatory and training requirements pertaining to low-pressure steam systems.
- Demonstrate knowledge of the principles of low-pressure steam system operation.
- Demonstrate knowledge of sizing pipe and components for low pressure steam systems.
- Demonstrate knowledge of installing pipe and components for low pressure steam systems.
- Demonstrate knowledge of procedures to size, install, test and service piping and components for low pressure steam systems.

### **2023 Red Seal Occupational Standard Reference:**

- 4.05 Commissions systems.
- 4.06 Protects piping systems, equipment and structure from damage.
- 16.01 Plans layout and sizes piping and components for low-pressure steam systems.
- 16.02 Installs piping and components for low-pressure steam systems.
- 16.03 Tests low-pressure steam systems.
- 16.04 Services low-pressure steam systems.

### **Suggested Hours:**

30 Hours

### **Theoretical Objectives:**

1. Define terminology associated with low-pressure steam systems.
2. Identify hazards and describe safe work practices pertaining to low-pressure steam systems.
3. Interpret codes and regulations related to low pressure steam systems.
4. Interpret drawings, specifications and equipment manuals required for system service.
5. Interpret drawings and determine the path for piping providing allowance for interferences, grade, insulation and fire stopping.
6. Identify types of piping and components and describe their characteristics and applications.
  - i) traps

- ii) strainers
  - iii) drip legs
  - iv) valves
  - v) heat transfer equipment
  - vi) low water cut-off
  - vii) converters and exchangers
  - viii) gauges
  - ix) pig tail
  - x) controls
  - xi) backflow preventer
7. Identify the tools and equipment used to install, test and service low pressure steam systems.
  8. Describe procedures for lock-out and tag-out of low-pressure steam systems.
  9. Identify the pipe and joining methods for low-pressure steam systems.
  10. Describe the purpose of steam traps, drip legs and condensate pumps.
  11. Identify isolation strategies for low-pressure steam systems.
  12. Identify required documentation pertaining to servicing low-pressure steam systems.
    - i) service reports
    - ii) maintenance reports
    - iii) building logbooks
  13. Identify inspection requirements for low-pressure steam piping and components.
  14. Identify procedures for monitoring the system for performance deficiencies.
  15. Identify potential problems with piping and components.
  16. Describe a program of scheduled service.
  17. Describe the procedures used to install, test and service piping and components.
  18. Describe the purpose and procedure for documenting pipe heat numbers according to the authority having jurisdiction (AHJ) and quality control procedures.
  19. Identify where provisions for expansion are required.
  20. Identify emerging technologies pertaining to boiler efficiency in low-pressure steam systems.

- i) energy saving components
- ii) insulation practices

**Practical Objectives:**

1. Perform linear expansion calculations.
2. Perform heat transfer calculations to determine load.
  - i) domestic water heating
  - ii) space heating
  - iii) cooling

## **PLB-415**

## **Private Sewage Treatment Systems**

### **Learning Outcomes:**

- Demonstrate knowledge of private sewage treatment systems, their components, applications and operation.
- Demonstrate knowledge of regulatory, training and certification requirements pertaining to private sewage treatment systems.
- Demonstrate knowledge of the procedures used to plan, install, maintain, repair and troubleshoot private sewage treatment systems.
- Demonstrate knowledge of testing equipment and procedures used for testing private sewage treatment systems.
- Demonstrate knowledge of emerging technologies and practices pertaining to private sewage treatment systems.

### **2023 Red Seal Occupational Standard Reference:**

- 4.05 Commissions systems.
- 4.06 Protects piping systems, equipment and structure from damage.
- 4.07 Coordinates excavation and back filling of trenches.
- 9.01 Plans installation of sewage treatment systems.
- 9.02 Installs components for sewage treatment systems.
- 9.03 Tests sewage treatment systems.
- 9.04 Services sewage treatment systems.

### **Suggested Hours:**

12 Hours

### **Theoretical Objectives:**

1. Define terminology associated with private sewage treatment systems.
2. Interpret codes and regulations pertaining to private sewage treatment systems.
3. Interpret information pertaining to private sewage treatment systems found on drawings and specifications.
4. Identify hazards and describe safe work practices pertaining to private sewage treatment systems.
  - i) health hazards
  - ii) environmental hazards
  - iii) access
  - iv) confined space



5. Identify private sewage treatment systems components and describe their purpose and applications.
6. Identify private sewage treatment systems testing equipment.
7. Identify the factors to consider when planning and installing private sewage treatment systems.
  - i) location
    - system position
    - clearances
    - relation to water table
    - sensitive areas
  - ii) soil conditions/properties
    - percolation test
    - soil assessment
    - limiting layer
  - iii) available space
  - iv) expected daily volume
8. Identify the factors to consider when servicing private sewage treatment systems and the conditions requiring repair.
9. Identify the factors to consider when sizing private sewage treatment systems.
10. Identify tools and equipment relating to private sewage treatment systems and describe their applications and procedures for use.
  - i) rigging
  - ii) hoisting and lifting
  - iii) excavation
11. Identify types of private sewage treatment systems and describe their characteristics and applications.
12. Describe the procedures used to fill out service documentation related to maintenance and repair of private sewage treatment systems.
13. Describe the procedures used to determine grade and elevation for piping and components of private sewage treatment systems.
14. Describe the procedures used to install, protect, maintain, test and repair private sewage treatment systems.
16. Describe the procedures used to size private sewage treatment system components.

17. Identify emerging technologies pertaining to private sewage treatment systems.

**Practical Objectives:**

N/A

## **PLB-420**

## **Public Sewage Treatment Systems**

### **Learning Outcomes:**

- Demonstrate knowledge of public sewage treatment systems, their components, applications and operation.
- Demonstrate knowledge of regulatory, training and certification requirements pertaining to public sewage treatment systems.
- Demonstrate knowledge of the procedures used to install, maintain, repair and troubleshoot public sewage treatment systems.
- Demonstrate knowledge of testing equipment and procedures used for testing public sewage treatment systems.
- Demonstrate knowledge of emerging technologies and practices pertaining to public sewage treatment systems.

### **2023 Red Seal Occupational Standard Reference:**

- 4.05 Commissions systems.
- 4.06 Protects piping systems, equipment and structure from damage.
- 4.07 Coordinates excavation and back filling of trenches.
- 9.01 Plans installation of sewage treatment systems.
- 9.02 Installs components for sewage treatment systems.
- 9.03 Tests sewage treatment systems.
- 9.04 Services sewage treatment systems.

### **Suggested Hours:**

6 Hours

### **Theoretical Objectives:**

1. Define terminology associated with public sewage treatment systems.
2. Interpret codes and regulations pertaining to public sewage treatment systems.
3. Interpret information pertaining to public sewage treatment systems found on drawings and specifications.
4. Identify hazards and describe safe work practices pertaining to public sewage treatment systems.
  - i) health hazards
  - ii) environmental hazards
  - iii) access
  - iv) confined space

5. Identify public sewage treatment systems components and describe their purpose and applications.
  - i) sewage pumps
  - ii) receiving tanks
  - iii) interceptors
  - iv) sewage sump
  - v) piping connections
  - vi) drains
  - vii) strainers
  - viii) lift stations
  - ix) vents
  - x) piping
6. Identify public sewage treatment systems testing equipment.
7. Identify the factors to consider when planning and installing public sewage treatment systems.
8. Identify the factors to consider when servicing public sewage treatment systems.
9. Identify the factors to consider when sizing public sewage treatment systems.
10. Identify tools and equipment relating to public sewage treatment systems and describe their applications and procedures for use.
11. Identify types of public sewage treatment systems and describe their characteristics and applications.
  - i) municipal sewage systems
  - ii) waste water treatment plants
  - iii) corrosive waste systems
  - iv) indirect waste systems
12. Describe the procedures used to fill out service documentation related to maintenance and repair of public sewage treatment system.
13. Describe the procedures used to determine grade and elevation for piping and components of public sewage treatment systems.
14. Describe the procedures used to install, protect, test and service public sewage treatment systems.
15. Describe the procedures used to size public sewage treatment system components.
16. Identify emerging technologies pertaining to public sewage treatment systems.

**Practical Objectives:**

N/A

**PLB-425****Cross Connection Control****Learning Outcomes:**

- Demonstrate knowledge of cross connection control devices and methods, their applications and operation.
- Demonstrate knowledge of regulatory, training and certification requirements pertaining to cross connection controls.
- Demonstrate knowledge of the procedures used to install cross-connection control devices.

**2023 Red Seal Occupational Standard:**

12.04 Installs cross-connection controls.

**Suggested Hours:**

30 Hours

**Theoretical Objectives:**

1. Define terminology associated with cross connection control devices.
2. Identify types of cross connection control devices and methods and describe their characteristics, operation and applications.
  - i) reduced pressure principle (RP)
  - ii) double check valve assembly
  - iii) pressure vacuum breaker
  - iv) dual check valve
  - v) air brake
  - vi) air gap
  - vii) atmospheric vacuum breaker
3. Identify levels of hazard related to cross connection control devices and methods.
  - i) minor
  - ii) moderate
  - iii) severe
4. Identify tools and equipment relating to cross connection control devices and describe their applications and procedures for use.
5. Describe back siphonage and back pressure and their causes.

6. Interpret information pertaining to cross connection control devices and methods found on drawings, specifications and authority having jurisdiction (AHJ).
7. Interpret codes and regulations pertaining to cross connection control.
  - i) training and certification requirements
  - ii) National Plumbing Code (NPC)
  - iii) Canadian Standards Association B64
  - iv) American Water Works Association (AWWA)
8. Describe the procedures used to install cross connection control devices and methods.

**Practical Objectives:**

N/A

## **PLB-430**

## **Pressure Systems (Rural Water Supply)**

### **Learning Outcomes:**

- Demonstrate knowledge of installing pumps for pressure systems and their application and operation.
- Demonstrate knowledge of regulatory requirements pertaining to private water pressure systems.
- Demonstrate knowledge of testing pressure systems, their procedures and equipment.
- Demonstrate knowledge of the basic concepts of electricity.
- Demonstrate knowledge of the procedures used to service pressure systems.
- Demonstrate knowledge of types of pressure systems, related equipment and components, their applications and operation.
- Demonstrate knowledge of the procedures used to install pressure system piping, equipment and components.
- Demonstrate knowledge of emerging technologies and practices pertaining to private water pressure systems.

### **2023 Red Seal Occupational Standard:**

- 4.05 Commissions systems.
- 4.07 Coordinates excavation and backfilling of trenches.
- 13.01 Plans layout and sizes piping and components for private water pressure systems.
- 13.02 Installs piping for private water pressure systems.
- 13.03 Installs components for private water pressure systems.
- 13.04 Tests private water pressure systems.
- 13.05 Services private water pressure systems.

### **Suggested Hours:**

36 Hours

### **Theoretical Objectives:**

1. Define terminology associated with pressure systems.
2. Interpret codes and regulations pertaining to pressure systems.
3. Interpret information pertaining to pressure systems found on drawings and specifications.
4. Interpret performance data and manufacturers' specifications pertaining to servicing pressure systems.



5. Explain the characteristics and applications of electricity related to pumps and controls.
6. Identify pressure system equipment and components and describe their purpose, operation and applications.
  - i) piping
  - ii) connections
  - iii) valves
  - iv) controls
  - v) tanks
    - galvanized
    - diaphragm
    - bladder
    - floated
    - in-line
  - vi) adapters
  - vii) arresters
  - viii) cable guards
  - ix) clamps
  - x) pitless adapters
  - xi) traps
    - mechanical
    - thermostatic
    - thermodynamic
  - xii) pumps
    - variable displacement pumps
    - positive displacement pumps
  - xiii) heat transfer equipment
7. Identify testing equipment used for pressure system.
8. Identify the water source factors to consider for sizing pressure system components and equipment.
  - i) drawdown
  - ii) yield
  - iii) depth
9. Identify tools and equipment relating to pressure systems and describe their applications and procedures for use.
  - i) pumps
  - ii) pressure tanks
  - iii) controls
  - iv) wrenches
  - v) soldering and brazing equipment

- vi) cutters
  - vii) nut drivers
10. Identify tools and equipment used to test electrical circuits and describe their applications and procedures for use.
  11. Identify types of pressure systems, related equipment and components and describe their characteristics and applications.
    - i) shallow well
    - ii) deep well
    - iii) dug
    - iv) bored
    - v) driven
    - vi) drilled
    - vii) boosted system
  12. Identify types of pumps and describe their characteristics and applications.
    - i) submersible
    - ii) jet
    - iii) booster
    - iv) piston
  13. Describe the procedures used to size pressure system components and equipment.
  14. Describe the procedures used to install pressure system piping, equipment and components.
    - i) safety considerations
    - ii) supporting
    - iii) pumps
    - iv) pressure tanks
    - v) pressure reducing valve
  15. Describe the procedures used to protect piping for pressure systems.
    - i) backfilling
    - ii) insulating
    - iii) sleeving
    - iv) heat tracing
  16. Describe the procedures used to test and service pressure system equipment and components.
  17. Identify emerging technologies and practices pertaining to private water pressure systems.

**Practical Objectives:**

1. Install water pumps including related components and controls.

## **PLB-435**

## **Water Treatment Systems**

### **Learning Outcomes:**

- Demonstrate knowledge of water treatment systems, their components, applications and operation.
- Demonstrate knowledge of training and certification requirements for testing water quality.
- Demonstrate knowledge of procedures to plan layout and size piping and equipment for water treatment systems.
- Demonstrate knowledge of emerging technologies and practices pertaining to water treatment systems.

### **2023 Red Seal Occupational Standard Reference:**

- 4.05 Commissions systems.
- 4.06 Protects piping systems, equipment and structure from damage.
- 15.01 Sizes water treatment systems.
- 15.02 Installs water treatment systems.
- 15.03 Tests water treatment systems.
- 15.04 Service water treatment systems.

### **Suggested Hours:**

18 Hours

### **Theoretical Objectives:**

1. Define terminology associated with water treatment systems.
2. Interpret information pertaining to water treatment systems found on drawings and specifications.
3. Interpret codes and regulations pertaining to water treatment equipment.
4. Interpret results of water tests to determine water treatment requirements.
5. Identify tools and equipment relating to water treatment systems and describe their applications and procedures for use.
  - i) wrenches
  - ii) tubing cutters
  - iii) soldering and brazing equipment
6. Identify types of water quality problems and describe their characteristics and causes.

- i) hardness
  - ii) minerals
  - iii) contamination/pollution
  - iv) pH
  - v) taste/odor
  - vi) turbidity
7. Identify methods of water treatment and describe their characteristics and applications.
- i) filters
  - ii) softeners
  - iii) purifiers
  - iv) chemical feeders
  - v) sterilizers
  - vi) reverse osmosis
  - vii) de-ionizers
  - viii) neutralizers
  - ix) distillers
8. Identify water treatment equipment and components and describe their characteristics, applications and operation.
9. Identify hazards and describe safe work practices pertaining to water treatment equipment.
10. Identify testing equipment for water treatment systems.
- i) pH kits
  - ii) mineral kits
11. Identify tools and equipment relating to water treatment systems and describe their applications and procedures for use.
- i) brine tanks
  - ii) cylinders
  - iii) UV treatment bulbs
12. Describe the procedures used to test, troubleshoot, maintain and repair water treatment systems and components.
- i) faults
    - leaks
    - inadequate operation
    - cracks
  - ii) repair
    - wear
    - noise

- leaks
    - corrosion
    - contamination
    - blockage
    - loss of pressure
  - iii) documentation
    - service reports
    - maintenance reports
13. Describe the procedures used to install and protect water treatment systems and components.
  14. Describe the sequence of installation of multiple water treatment systems and its importance.
  15. Describe the backflow prevention equipment used to protect the potable water system from water treatment equipment.
  16. Describe the procedures used to size water treatment systems and components.
  17. Identify emerging technologies pertaining to water treatment systems.

**Practical Objectives:**

1. Test a water sample.

## **PLB-440**

## **Process Piping Systems**

### **Learning Outcomes:**

- Demonstrate knowledge of process piping systems, their applications and operation.
- Demonstrate knowledge of procedures to plan layout and size piping for process piping systems.
- Demonstrate knowledge of regulatory, training and certification requirements pertaining to process piping systems.
- Demonstrate knowledge of the procedures used to store, handle and install piping, equipment and components for process piping systems.
- Demonstrate knowledge of types of process piping systems, equipment and components and their applications and operation.
- Demonstrate knowledge of the procedures used to test and service process piping systems.
- Demonstrate knowledge of emerging technologies and practices pertaining to process piping systems.

### **2023 Red Seal Occupational Standard Reference:**

- 4.05 Commissions systems.
- 4.06 Protects piping systems, equipment and structure from damage.
- 19.01 Plans layout and sizes piping and components for process piping systems.
- 19.02 Installs piping for process piping systems.
- 19.03 Installs components for process piping systems.
- 19.04 Tests process piping systems.
- 19.05 Services process piping systems.

### **Suggested Hours:**

6 Hours

### **Theoretical Objectives:**

1. Define terminology associated with process piping equipment and components.
2. Interpret codes, specifications and regulations pertaining to process piping equipment, piping and components.
  - i) National Plumbing Code (NPC)
  - ii) Canadian Standards Association (CSA)
  - iii) Canadian Food and Drugs Act (CFDA)
  - iv) American Society of Mechanical Engineers (ASME)
  - v) engineered drawings

- vi) manufacturers' requirements
  - vii) system requirements
  - viii) job specifications
  - ix) show drawings
  - x) standards
3. Interpret information found in specifications for process piping equipment and components and servicing.
  4. Identify tools and equipment pertaining to process piping systems and describe their applications and procedures for use.
    - i) threading equipment
    - ii) cutters
    - iii) torches
    - iv) grooving equipment
    - v) flaring tools
    - vi) welding equipment
  5. Identify testing equipment relating to process piping systems and describe their application.
    - i) inflatable test balls
    - ii) test plugs
    - iii) compressors
  6. Identify potential problems and faults with process piping systems.
    - i) cracks
    - ii) corrosion
    - iii) inadequate flow
    - iv) poor workmanship
  7. Identify hazards and describe safe work practices pertaining to process piping equipment and components.
  8. Identify proper handling, storage and transportation of process piping equipment and components.
  9. Identify process piping equipment and components and describe their purpose and operation.
    - i) flexible connectors
    - ii) vibration isolators
    - iii) expansion joints
  10. Identify types of process piping systems and describe their properties, characteristics and applications.



- i) food processing
    - food grade
    - non-food grade
  - ii) reverse-osmosis
  - iii) high purity water
  - iv) water treatment plant
  - v) waste water treatment plant
  - vi) non-potable water
    - reclaim
11. Describe the procedures used to install and protect piping for process piping systems.
- i) installing guards
  - ii) installing anchor points
  - iii) installing expansion joints
12. Describe the procedures used to test, troubleshoot and service process piping systems and their equipment and components.
13. Identify emerging technologies and practices pertaining to process piping systems.
- i) net zero and carbon neutral commitments
  - ii) Reduction of environmental impacts

**Practical Objectives:**

N/A

## **MENT-701            Mentoring II**

### **Learning Outcomes:**

- Demonstrate knowledge of effective communication practices as a mentor.
- Demonstrate knowledge of strategies for teaching workplace skills.

### **2023 Red Seal Occupational Standard Reference:**

- 5.01 Uses communication techniques.
- 5.02 Uses mentoring techniques.

### **Suggested Hours:**

6 Hours

### **Theoretical Objectives:**

1. Identify the different roles played by a workplace mentor.
2. Identify strategies to create a supportive learning environment.
3. Identify techniques for effective communication as a mentor.
  - i) constructive feedback
  - ii) active listening
  - iii) leading meetings and one-on-one sessions
4. Describe the steps in teaching a skill.
  - i) identifying the point of lesson
  - ii) linking the lesson
  - iii) demonstrating the skill
  - iv) providing practice
  - v) giving feedback
  - vi) assessing skill and progress
5. Identify strategies to assist in teaching a skill while meeting individual learning needs.
  - i) principles of instruction
  - ii) coaching skills
6. Explain how to adjust a lesson for various situations.

### **Practical Objectives:**

N/A

**PLB-445****Job Planning and Trade Documentation****Learning Outcomes:**

- Demonstrate knowledge of the procedures used to plan and organize work.
- Demonstrate knowledge of project costs and efficient trade practices.
- Demonstrate knowledge of job specific technology.
- Demonstrate knowledge of technical documents and documentation, their characteristics and applications.
- Demonstrate knowledge of procedures used to organize and maintain materials.

**2023 Red Seal Occupational Standard:**

- 3.01 Organizes project tasks and procedures.
- 3.02 Organizes materials and supplies.
- 3.03 Uses documentation.

**Suggested Hours:**

6 Hours

**Theoretical Objectives:**

1. Define terminology associated with job planning and trade documentation.
2. Identify and describe the procedures to use digital devices to plan and organize tasks and schedules.
3. Identify sources of information relevant to work planning and organizing materials and supplies.
  - i) documentation
  - ii) drawings
  - iii) related professionals
  - iv) clients
  - v) scheduling
  - vi) estimating
4. Identify work methods and planning to maximize practices that are most efficient while maintaining commitment to safety.
5. Describe calculations for determining material and labour requirements.
6. Describe considerations for determining material and supply requirements.

7. Describe procedures to organize and maintain inventory.
8. Describe the procedures used to plan work.

**Practical Objectives:**

N/A

**Learning Outcomes:**

- Demonstrate knowledge of the Red Seal Occupational Standard and its relationship to the Red Seal Examination.
- Demonstrate knowledge of overall comprehension of the trade in preparation for the Red Seal Examination.

**2023 Red Seal Occupational Standard Reference:**

Entire Red Seal Occupational Standard (RSOS).

**Suggested Hours:**

30 Hours

**Theoretical Objectives:**

1. Define terminology associated with an RSOS.
  - i) blocks
  - ii) tasks
  - iii) sub-tasks
2. Explain how an RSOS is developed and the link it has with the Red Seal Examination.
  - i) development
  - ii) validation
  - iii) block and task weighting
  - iv) examination breakdown (pie-chart)
3. Identify Red Seal products and describe their use for preparing for the Red Seal Examination.
  - i) Red Seal website
  - ii) examination preparation guide
  - iii) sample questions
  - iv) examination counselling sheets
4. Explain the relationship between the RSOS and the AACS.
5. Review common occupational skills for the Plumber trade as identified in the RSOS.
  - i) safety-related functions
  - ii) tools and equipment
  - iii) organizes work
  - iv) routine trade activities

- v) communication and mentoring
- 6. Review process to prepare and assemble tube, tubing and pipe for the Plumber trade as identified in the RSOS.
  - i) pipe
  - ii) joins tube, tubing and pipe
- 7. Review process to install, test and service sewers, sewage treatment systems and DWV systems for the Plumber trade as identified in the RSOS.
  - i) sewers
  - ii) sewage
  - iii) interior DWV systems
- 8. Review process to install, test and service water service and distribution systems for the Plumber trade as identified in the RSOS.
  - i) water service
  - ii) potable water distribution systems
  - iii) pressure systems
- 9. Review process to install, test and service fixtures, appliances and water treatment systems for the Plumber trade as identified in the RSOS.
  - i) fixtures and appliances
  - ii) water treatment equipment
- 10. Review process to install, test and service low pressure steam and hydronic systems for the Plumber trade as identified in the RSOS.
  - i) low pressure steam systems
  - ii) hydronic heating and cooling piping systems
  - iii) hydronic heating and cooling generating systems
  - iv) hydronic system controls and transfer units
- 11. Review process to install, test and service fire protection systems for the Plumber trade as identified in the RSOS.
  - i) flow through fire protection systems
  - ii) standpipe
- 12. Review process to install, test and service specialized systems for the Plumber trade as identified in the RSOS.
  - i) specialized systems
  - ii) process piping systems

**Practical Objectives:**

N/A

## Feedback and Revisions

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This AACCS will be amended periodically; comments or suggestions for improvements should be directed to:

**New Brunswick:**

Skilled Trades NB  
Post-Secondary Education, Training and  
Labour  
470 York St. PO Box 6000  
Fredericton, NB E3B 5H1  
Tel: 506-453-2260  
Toll Free in NB: 1-855-453-2260  
[www.gnb.ca](http://www.gnb.ca)

**Prince Edward Island:**

Apprenticeship, Training and Certification  
Workforce, Advanced Learning and  
Population  
176 Great George St., PO Box 2000  
Charlottetown, PE C1A 7N8  
Tel: 902-368-4460  
[www.apprenticeship.pe.ca](http://www.apprenticeship.pe.ca)

**Newfoundland and Labrador:**

Apprenticeship and Trades Certification  
Confederation Bldg., West Block  
Prince Philip Dr., PO Box 8700  
St. John's, NL A1B 4J6  
Toll Free: 1-877-771-3737  
[www.gov.nl.ca/atcd](http://www.gov.nl.ca/atcd)

**Nova Scotia:**

Nova Scotia Apprenticeship Agency  
1256 Barrington St.  
Halifax, NS B3J 1Y6  
Tel: 902-424-5651  
Toll Free in NS: 1-800-494-5651  
[www.nsapprenticeship.ca](http://www.nsapprenticeship.ca)

Any comments or suggestions received will be reviewed and considered to determine the course of action required. If the changes are deemed to be minor, they will be held for implementation during the next review cycle. If immediate change is deemed appropriate and approved by the Atlantic Trade Advisory Committee, it will result in a revision to this version of the AACCS and will be detailed in the following section.

### Version Changes

| Revision Date | Section      | Description of Change                               |
|---------------|--------------|-----------------------------------------------------|
| 2026          | All sections | Update to align with national occupational standard |
|               |              |                                                     |