Professional qualification of construction contractors

Competency profile

11.1 – Contractor – Pressurized industrial or institutional piping

Régie du bâtiment Québec

This document was produced with the collaboration of the team of competency assessment advisors (Direction de la qualification) of the Régie du bâtiment du Québec.

In this document, the masculine gender is used without discrimination and solely for the sake of brevity.

Changes to the content may be made at any time.

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Introduction

Successful candidates may act as guarantors for construction work included in subclass 11.1 - Contractor – Pressurized industrial or institutional piping.

This competency profile is based on the scope of application of the *Building Act*, as well as on Section (21-22-23 or 24) of the *Regulation respecting the professional qualification of contractors and owner-builders*.

Subclass definition

11.1 - Contractor – Pressurized industrial or institutional piping

This subclass authorizes construction work that is not exclusively reserved for master pipe-mechanics relating to the installation of pressurized industrial or institutional piping, and similar or related construction work.

Module 1 – DEFINITIONS AND TYPES OF SYSTEMS

Elements of competency covered in this module:

1. Define concepts and terms related to pressure installations
2. Describe the characteristics of different pressure installations

Module 1 – DEFINITIONS AND TYPES OF SYSTEMS

Elements of competency	Skills required
1. Define concepts and terms related to pressure installations	1.1. Define low and high pressure, depending on the product conveyed and its state (liquid, solid, gas)
	1.2. Define pressure installation, pressure equipment and pressure piping
	1.3. Define the different types of pressure vessels: boiler, steam generator, steam kettle, steam booster, expansion tank, drain tank, etc.
	1.4. Define boiler types: superheated water, water tube, heat recovery, fire tube, etc.
	1.5. Define the accessories connected to a pressure installation: fitting, valve, tap, pressure gauge, water level indicator, injector, bursting disk, water column, support and fastening, etc.
	1.6. Define terms relating to joints in pressurized piping: brazing, socket welding, threaded joint, flared joint, compression joint, grooved joint, seismic joint, etc.
	1.7. Define the units of measurement associated with pressure installations: psi, kPa, kW, BTU, ºC, L/s, m^3/m, etc.
2. Describe the characteristics of different pressure installations	2.1. Explain the different types of industrial processes involving pressure installations (conveying, cooking, distillation, sterilization, humidification, etc.)
	2.2. Name the different liquids, gases and solids that can be conveyed by pressurized piping, explain their behaviour in the pipe and the impact on the type of pipe to be installed (propulsion, anchoring, etc.)
	2.3. Distinguish between the operating characteristics of direct and indirect systems

Elements of competency	Skills required
	2.4. Describe the operation of different pressure installations (pump, air, vacuum, steam, etc.) and their impact on piping placement and maintenance
	2.5. Name the characteristics of the materials used for pressurized piping (steel, stainless steel, cast iron, copper, brass, plastic, etc.) and their field of application
	2.6. Describe the different types of pressure installation components and accessories (pressure gauges, etc.), their role and field of application (when one type is used rather than another)

Module 2 – LEGISLATIVE, NORMATIVE AND REGULATORY FRAMEWORK

Elements of competency covered in this module:

3. Situate work on pressure installations in relation to current laws and regulations

Module 2 – LEGISLATIVE, NORMATIVE AND REGULATORY FRAMEWORK

Elements of competency	Skills required
3. Situate work on pressure installations in relation to current laws and regulations	3.1. Identify the organizations (and their compliance standards) that affix their marks to components of industrial pressurized piping installations (ANSI, ASME, ASTM, CSA, ULC, etc.)
	3.2. Describe the scope of application of the *Québec Construction Code, Chapter I: Building* as it relates to work on pressure installations
	3.3. Describe the scope of application of the *Québec Construction Code, Chapter II: Gases* and the scope of application of the *Safety Code, Chapter III: Gases* in relation to work on pressure installations (natural gas)
	3.4. Describe the scope of application of the *Act respecting pressure vessels* (R.S.Q., c. A-20.01), the *Regulation respecting pressure vessels* (R.S.Q. c. A-20.01, r.1.1) on pressure installation work
	3.5. Identify the various standards and specify their scope of application, in the case of work related to pressure installations *(NQ 3650-900, NQ 5710-500, CAN/CSA B-139, CAN/CSA*-B149.*1*)
	3.6. Explain the role of the *Régie du Bâtiment du Québec* with regard to the certification of welding methods, company certification and the qualification process for pressure installation welding

Elements of competency	Skills required
	3.7. Explain the impact of the *Environment Quality Act* (R.S.Q., c. Q-2), the *Regulation respecting hazardous materials* (R.S.Q. c. Q-2, r. 15.2), and the *Regulation respecting the quality of the atmosphere* (R.S.Q. c. Q-2, r.20) in connection with pressure installations
	3.8. Explain the application of the *Workplace Hazardous Materials Information System* (WHMIS) in relation to pressure installations
	3.9. Define the scope of application of the *Québec Construction Code, Chapter III: Plumbing* in relation to work on pressure installations
	3.10. Explain the scope of municipal regulations concerning work on pressure installations

Module 3 – PLANS AND SPECIFICATIONS

Elements of competency covered in this module:

4. Read and interpret plans and specifications for pressure installations
5. Read and interpret the divisions of specifications relating to pressure installations

Module 3 – PLANS AND SPECIFICATIONS

Elements of competency	Skills required
4. Read and interpret plans and specifications for pressure installations	4.1. List the types of plans used for pressure installations
	4.2. Locate elements relating to pressure installations on a plan
	4.3. Identify and interpret the symbols used for pressure installations
	4.4. Locate, read and interpret the main dimensions and annotations associated with pressure installations
	4.5. Locate, read and interpret cross-sections and details associated with pressure installations
	4.6. Read and interpret general notes and tables associated with pressure installations
	4.7. Measure quantities (pipes and ducts, number of components, etc.)
5. Read and interpret the divisions of specifications relating to pressure installations	5.1. Define the divisions and sections of specifications relating to pressure installations
	5.2. Interpret the general terms of specifications relating to pressure installations
	5.3. Interpret the special terms of specifications relating to pressure installations

Module 4 – STANDARDS AND EXECUTION OF WORK

Elements of competency covered in this module:

6. Plan and organize work in relation to pressure installations
7. Produce an installation diagram
8. Ensure placement of pressure installations
9. Ensure testing and start-up of pressure installations
10. Check, maintain and repair pressure installations
11. Ensure health and safety in relation to pressure installations work

Module 4 – STANDARDS AND EXECUTION OF WORK

Elements of competency	Skills required
6. Plan and organize work in relation to pressure installations	6.1. Determine the logical sequence of execution of work on a pressure installation
	6.2. Order and receive materials required for pressure installations
	6.3. Ensure the filing of the declaration of work and other forms required for work on pressure installations
	6.4. Explain the pressure installation inspection process (with or without quality program)
	6.5. Explain the importance of properly coordinating the interface (common boundaries) between the various disciplines on the site
	6.6. Ensure the various conditions required (power supply, etc.) in the case of work without a designer
7. Produce an installation diagram	7.1. Produce calculations to determine the details of a pressure installation (angles, volumes and capacities of pipes and tanks, pressure loss, thermal energy)
	7.2. Produce layouts and various installation diagrams (isometric, orthogonal)
	7.3. Ensure that installation diagrams comply with standards and/or plans and specifications
8. Ensure placement of pressure installations	8.1. Deliver and move materials and equipment on site
	8.2. Locate the site for the various jobs and adjust the work as required
	8.3. Provide work tools and communicate safe ways of using them (ensure calibration of tools)
	8.4. Make sure workers understand work methods (slinging, etc.) and installation steps
	8.5. Explain methods and requirements for pressurized piping assembly techniques

Elements of competency	Skills required
	8.6. Explain the requirements and methods for installations depending on what they convey (liquid, gas, etc.)
	8.7. Explain installation requirements and methods for different types of buildings and industries (food processing, heavy industry, filtration or purification plants, hospitals, etc.)
	8.8. Resolve technical, coordination and other difficulties as work progresses
	8.9. Ensure quality control during construction
	8.10. Ensure that the integrity of the walls, fire separations and structure is maintained
	8.11. Ensure that work complies with standards, plans and specifications
9. Ensure testing and start-up of pressure installations	9.1. Carry out or assist in the start-up of the pressure installation as required
	9.2. Explain how to perform tests (preheating and post-heating of welded joints, non-destructive and leak testing, hydraulic, static and hydropneumatic testing)
	9.3. Ensure the various pressure and other settings (valve, spring, humidifier, etc.) required
	9.4. Ensure that instruction and maintenance manuals are given to the owner or the owner's representative
10. Check, maintain and repair pressure installations	10.1. Take note of the various information concerning pressure installations (plans, manufacturer, etc.)
	10.2. Diagnose an operating problem on a pressure installation
	10.3. Provide a solution to repair a pressure installation (dismantle, reassemble, adjust parts, etc.)

Elements of competency	Skills required
	10.4. Explain the verification and maintenance methods to be carried out on a pressure installation
	10.5. Explain safe pressurized connection methods
	10.6. Calibrate, maintain, replace and upgrade components as required
	10.7. Produce maintenance and repair reports and submit them to the owner or the owner's representative
11. Ensure health and safety in relation to pressure installations work	11.1. Identify the risks associated with the installation and maintenance of pressure installations (working in confined spaces, lifting equipment, explosion, working at height, asbestos, welding, pressurized products, etc.)
	11.2. Explain the precautions to be taken when installing and maintaining a pressure installation (lock-out, etc.)
	11.3. Explain the precautions to be taken when transporting hazardous and pressurized materials