Professional qualification of construction contractors

Competency profile

15.1 – Owner-builder – Pulsed air heating systems

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 15.1 - Owner-builder – Pulsed air heating systems.

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

15.1 - Owner-builder – Pulsed air heating systems

This subclass authorizes construction work reserved exclusively for master pipe-mechanics under the *Master Pipe-Mechanics Act* (CQLR, c. M-4) relating to pulsed air heating systems.

It also authorizes construction work that is not already authorized by the first paragraph and relating to pulsed air heating systems, particularly those relating to propane gas burners and those included in subclass 15.1.1.

In addition, this subclass authorizes construction work relating to pulsed air heating and air conditioning systems. However, work relating to heating and air conditioning devices that are part of such systems may not be carried out unless the contractor also holds the appropriate subclass 15.9 or 15.10.

Lastly, it authorizes related construction work.

Module 1 – DEFINITIONS AND TYPES OF SYSTEMS

Elements of competency covered in this module:

1. Define the units of measurement used in pulsed air heating
2. Define heating and ventilation terms
3. Define terms associated with fluid mechanics
4. Define concepts and terms related to the transmission of heat
5. Perform basic mathematical calculations for heating
6. Describe the main features of pulsed air heating installations

Module 1 – DEFINITIONS AND TYPES OF SYSTEMS

Elements of competency	Skills required
1. Define the units of measurement used in pulsed air heating	1.1. Identify the units of measurement associated with pulsed air heating
	1.2. Convert imperial units into metric units
2. Define heating and ventilation terms	2.1. Define related terms: tube, T, Y, fitting, flange, support, etc.
	2.2. Pressure, hydraulic load, flow, flow rate, etc.
3. Define terms associated with fluid mechanics	3.1. Define the concept of fluid: pressure, hydraulic load, flow, flow rate, etc.
	3.2. Define pressure, relative pressure, absolute pressure, etc.
	3.3. Distinguish between high and low pressure
	3.4. Know the specific units of measurement
4. Define concepts and terms related to the transmission of heat	4.1. Define heat, sensible heat, latent heat and temperature
	4.2. Define thermal resistance
	4.3. Define conduction, convection and radiation
	4.4. Specify the direction of heat exchange
5. Perform basic mathematical calculations for heating	5.1. Perform calculations using trigonometric rules
	5.2. Calculate surface areas
	5.3. Calculate volumes
6. Describe the main features of pulsed air heating installations	6.1. Describe the different types of heating systems
	6.2. Describe the main components of a fuel supply system

Elements of competency	Skills required
	6.3. Describe the main components of the heat generator
	6.4. Describe the main components of the combustion air supply system
	6.5. Describe the main components of the distribution system
	6.6. Describe the main components of the flue gas evacuation system
	6.7. Describe the main components of the control system

Module 2 – LEGISLATIVE, NORMATIVE AND REGULATORY FRAMEWORK

Elements of competency covered in this module:

7. Situate work relating to pulsed air heating installations in relation to various laws and regulations
8. Situate pulsed air heating system installation work in relation to the various codes and standards in force

Module 2 – LEGISLATIVE, NORMATIVE AND REGULATORY FRAMEWORK

Elements of competency	Skills required
7. Situate work relating to pulsed air heating installations in relation to various laws and regulations	7.1. Explain the regulations of the *Building Act* (B-1.1) concerning work relating to pulsed air heating installations
	7.2. Explain the roles and responsibilities of the designer, general contractors and trade contractors regarding compliance with plans, specifications and standards (B-1.1)
	7.3. Explain when the *Regulation respecting energy conservation in new buildings* (R.S.Q., c. E-1.1, r.1) applies to work relating to pulsed air heating installations
	7.4. Explain the provisions of the *Act respecting petroleum products and equipment* (R.S.Q., c. P-29.1) concerning work relating to pulsed air heating installations
	7.5. Determine the licences required for trade contractors and the limits of intervention for the latter
	7.6. Identify the competency cards required for the workforce to carry out work relating to pulsed air heating installations (R.S.Q., c. F-5 and R.S.Q., c. R-20)
8. Situate pulsed air heating system installation work in relation to the various codes and standards in force **Sections 6.2, 9.32, and 9.33 of the *Québec Construction Code, Chapter I: Building***	8.1. Identify the approval bodies that affix their marks to devices
	8.2. Define the parts and sections of the *Québec Construction Code, Chapter I: Building* that apply to pulsed air heating installations
	8.3. Define the parts and sections of the *Québec Construction Code, Chapter II: Gas* that apply to work relating to pulsed air heating installations

Elements of competency	Skills required
	8.4. Defining the parts and sections of the *Safety Code – Chapter III, Gases*, that apply to pulsed air heating installations
	8.5. Identify the various standards applicable to pulsed air heating installations (CSA, ASHRAE and others)
	8.6. Circumscribe the scope of the various standards applying to pulsed air heating installations
	8.7. Describe the links between the various codes and standards specific to work relating to pulsed air heating installations and the *Québec Construction Code* (R.S.Q. c. B-1.1, r.0.01.01) (organizational structure)

Module 3 – READING PLANS AND SPECIFICATIONS

Elements of competency covered in this module:

9. Read and interpret drawings and plans for pulsed air heating installations
10. Read and interpret information relating to pulsed air heating installations in specifications

Module 3 – READING PLANS AND SPECIFICATIONS

Elements of competency	Skills required
9. Read and interpret drawings and plans for pulsed air heating installations	9.1. Locate the various elements of pulsed air heating installations on a drawing
	9.2. Explain the meaning of the main symbols used in drawings and plans for pulsed air heating installations
	9.3. Locate, read and interpret the main dimensions and annotations associated with elements of pulsed air heating installations
	9.4. Locate, read and interpret views and details associated with elements relating to pulsed air heating installations
	9.5. Read and interpret general notes and tables associated with elements of pulsed air heating installations
	9.6. Prepare the quantity survey[1]
10. Read and interpret the divisions of specifications for pulsed air heating installations **(1995 17-division normative specifications with reference to the new 2004 49-division specifications)**	10.1. Define the divisions and sections of construction specifications associated with building mechanicals
	10.2. Interpret information relating to pulsed air heating systems work in the general terms and division 01 of specifications
	10.3. Interpret information relating to storage tanks in specifications (section 13)
	10.4. Interpret information relating to electricity in specifications (section 16)
	10.5. Interpret information relating to fuel piping in specifications (section 15)
	10.6. Interpret information relating to heat generators in specifications

[1] Prepare the survey: Measure a construction project and calculate the quantities of materials required.

Elements of competency	Skills required
	10.7. Interpret information relating to equipment in specifications (section 11)
	10.8. Interpret information relating to special products in specifications (section 15)
	10.9. Interpret information relating to instrumentation, regulation and integrated control in specifications (section 15)

Module 4 – STANDARDS AND EXECUTION OF WORK

Elements of competency covered in this module:

11. Manage the execution of work relating to fuel oil storage
12. Manage the execution of fuel supply piping installation work
13. Manage the execution of heat distribution duct installation work
14. Manage the execution of work relating to supplying air to pulsed air heating installations
15. Manage the execution of specific equipment installation work
16. Manage the execution of work relating to the evacuation of flue gases
17. Perform initial start-up of pulsed air heating system
18. Ensure health and safety on work sites relating to propane installations

Module 4 – STANDARDS AND EXECUTION OF WORK

Elements of competency	Skills required
11. Manage the execution of work relating to fuel oil storage	11.1. Describe the requirements concerning clearance from property lines
	11.2. Describe the requirements concerning clearance from an ignition source
	11.3. Describe the requirements concerning clearance from a building opening
	11.4. Determine support requirements
	11.5. Describe the requirements concerning damage protection
	11.6. Determine the maximum quantity of fuel oil that can be stored depending on the situation
	11.7. Describe the requirements concerning signage
12. Manage the execution of fuel supply piping installation work	12.1. Describe the requirements concerning pressure control depending on the situation
	12.2. Describe the requirements concerning maximum allowed gas pressure inside buildings
	12.3. Explain exhaust requirements for pressure control devices
	12.4. Explain proper landfilling methods
	12.5. Explain the requirements concerning pipe identification
	12.6. Explain the requirements concerning pipe protection
	12.7. Determine the piping materials required depending on the situation
	12.8. Explain the requirements concerning pipe support
	12.9. Determine appropriate pipe jointing and connection methods

Elements of competency	Skills required
	12.10. Explain safe pipe purging methods
	12.11. Perform pipe sizing calculations
	12.12. Ensure the integrity of firewalls during drilling
	12.13. Explain the pressure test procedure depending on the situation
13. Manage the execution of heat distribution duct installation work	13.1. Describe the operation of different types of systems
	13.2. Perform duct sizing calculations
	13.3. Perform fan calculations
	13.4. Explain the requirements concerning duct identification
	13.5. Explain the requirements concerning duct protection
	13.6. Determine the duct materials required depending on the situation
	13.7. Explain the requirements concerning duct support
	13.8. Determine appropriate duct jointing and connection methods
	13.9. Ensure the integrity of firewalls during drilling
	13.10. Ensure the integrity of joists and beams when drilling
	13.11. Explain the test procedure depending on the situation
14. Manage the execution of work relating to supplying air to pulsed air heating installations	14.1. Determine the dimensions of outside air and bypass air supply openings for units under 400,000 BTU/h
	14.2. Determine the dimensions of outside air supply ducts for units under 400,000 BTU/hr

Elements of competency	Skills required
	14.3. Determine the dimensions of outside air and bypass air supply openings for units over 400,000 BTU/h
	14.4. Determine the dimensions of outside air supply ducts for units over 400,000 BTU/h
	14.5. Locate outside air and bypass air supply openings
	14.6. Determine the capacity of a mechanical air supply system
15. Manage the execution of specific equipment installation work	15.1. Calculate heat loss from a building
	15.2. Explain the requirements concerning clearance from combustible materials
	15.3. Explain the requirements concerning roof access
	15.4. Explain the requirements concerning maintenance clearance
	15.5. Explain the requirements concerning furnace installation
16. Manage the execution of work relating to the evacuation of flue gases	16.1. Explain the requirements concerning clearance from combustible materials for connecting ducts
	16.2. Explain the requirements concerning clearance from combustible materials for exhaust ducts
	16.3. Explain flue gas temperature requirements
	16.4. Calculate the dimensions of connecting ducts
	16.5. Calculate the dimensions of exhaust ducts
	16.6. Explain requirements concerning the location of discharge outlets
	16.7. Explain the requirements for using chimney flues

Elements of competency	Skills required
	16.8. Ensure structural integrity
	16.9. Ensure the integrity of firewalls during drilling
17. Perform initial start-up of pulsed air heating system	17.1. Explain the requirements for initial start-up of equipment
	17.2. Explain procedures for initial start-up of units over 1,000,000 BTU/hour
18. Ensure health and safety on work sites relating to propane installations	18.1. Identify the risks of accidents that can occur during work relating to propane installations (welding, gas, electricity, explosion, fire, water, improperly stored equipment, etc.) and how to prevent them
	18.2. Identify procedures for the safe handling of propane
	18.3. Name the requirements for equipment to be used in the event of a gas leak