Professional qualification of construction contractors

Competency profile

2.3 - Contractor – Groundwater pumping 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.

Content may be amended at any time.

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Introduction

Successful candidates may act as guarantors for construction work included in subclass 2.2 - Contractor – Non-drilled water catchment works.

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

2.3 - Contractor – Groundwater pumping systems

This subclass authorizes construction work that is not the exclusive domain of master pipe mechanics and electrical contractors, and relates to groundwater pumping systems as well as similar or related construction work.

Module 1 – DEFINITIONS AND TYPES OF SYSTEMS

Elements of competency covered in this module:

1. Define and explain concepts and terms related to groundwater pumping systems
2. Describe the characteristics of different groundwater pumping systems

Module 1 – DEFINITIONS AND TYPES OF SYSTEMS

Elements of competency	Skills required
1. Define and explain concepts and terms related to groundwater pumping systems	1.1. Define the concepts of “pumping capacity” and “operating pressure” in connection with a groundwater pumping system
	1.2. Define “water requirement,” “instantaneous flow rate” and “average operating flow rate”
	1.3. Define “pumping curve” and “pumping table”
	1.4. Explain basic hydraulic concepts: “flow velocity” and “friction”
	1.5. Know the characteristics of water
	1.6. Define the different management systems for pumping equipment: concepts of “pumping cycle and time” and “continuous pressure”
	1.7. Define the various parts of a groundwater pumping system: pump, riser, ram, diaphragm tank, etc.
	1.8. Identify the units of measurement associated with groundwater pumping systems: l/min (gal/min); lb/inch² (psi); cv (hp) or W
	1.9. Explain the basic electrical concepts needed to choose the right wiring
2. Describe the characteristics of different groundwater pumping systems	2.1. Understand the working principle of a variable speed pumping system
	2.2. Name the different types of pumps, their characteristics and scope of application: submersible, jet pump
	2.3. Name the types of risers, their characteristics and scope of application
	2.4. Identify pressure management elements, their characteristics and scope of application

Module 2 – LEGISLATIVE, NORMATIVE AND REGULATORY FRAMEWORK

Elements of competency covered in this module:

3. Situate work on groundwater pumping systems in relation to the various codes and standards in force

Module 2 – LEGISLATIVE, NORMATIVE AND REGULATORY FRAMEWORK

Elements of competency	Skills required
3. Situate work on groundwater pumping systems in relation to the various codes and standards in force	3.1. Identify the organizations (and their compliance standards) that affix their marks to groundwater pumping system components to guarantee compliance (BNQ, CSA, NSF)
	3.2. Know the *Groundwater Catchment Regulation* (R.S.Q., c. Q-2, r. 1.3) (purpose, scope)
	3.3. Identify the types of work requiring ministerial approval (*Groundwater Catchment Regulation* (R.S.Q., c. Q-2, r. 1.3, s. 31)
	3.4. Identify the elements of the *Canadian Electrical Code* that concern the connection of the pumping system
	3.5. Identify the elements of the *Plumbing Code* that concern the connection of the pumping system
	3.6. Determine the qualifications required for workers to carry out the work

Module 3 – PLANS AND SPECIFICATIONS

Elements of competency covered in this module:

4. Read and interpret elements of drawings and plans for a pumping system
5. Read and interpret specifications associated with drawings and plans for a pumping system
6. Collect the characteristics of the water catchment work associated with the pumping system (in the case of installations without plans and specifications)

Module 3 – PLANS AND SPECIFICATIONS

Elements of competency	Skills required
4. Read and interpret elements of drawings and plans for a pumping system	4.1. Locate on a plan the various components of a groundwater pumping system
	4.2. Locate, read and interpret the main dimensions and annotations associated with groundwater pumping systems
	4.3. Locate, read and interpret cross-sections and details associated with groundwater pumping systems
	4.4. Read and interpret general notes and tables associated with groundwater pumping systems
5. Read and interpret specifications associated with drawings and plans for a pumping system	5.1. Define the divisions and sections of construction specifications associated with groundwater pumping systems
	5.2. Interpret information relating to plumbing in connection with groundwater pumping systems in specifications (division 22 formerly 15)
	5.3. Interpret information relating to electricity in connection with groundwater pumping systems (connections) in specifications (division 26 formerly 16)
	5.4. Interpret information relating to groundwater pumping systems in specifications (division 33 formerly 11)
6. Collect the characteristics of the water catchment work associated with the pumping system (in the case of installations without plans and specifications)	6.1. Identify the characteristics of the water catchment work and the building to be served that influence the installation of the groundwater pumping system (location, depth, structure capacity, water requirements, total head, electrical capacity, type of plumbing piping, etc.)
	6.2. Establish supply line layout
	6.3. Evaluate friction head losses

Module 4 – STANDARDS AND EXECUTION OF WORK

Elements of competency covered in this module:

7. Plan and organize work in connection with groundwater pumping systems
8. Install groundwater pumping systems
9. Complete the work
10. Repair groundwater pumping systems
11. Ensure health and safety in connection with installation of groundwater pumping systems

Module 4 – STANDARDS AND EXECUTION OF WORK

Elements of competency	Skills required
7. Plan and organize work in connection with groundwater pumping systems	7.1. Determine the factors to consider when installing a pumping system
	7.2. Compare the benefits and costs of different groundwater pumping system components
	7.3. Select the required groundwater pumping system components: pump (and control system), riser, wiring, diaphragm tank
	7.4. Establish supply line layout
	7.5. Order and receive the materials required for the installation of a groundwater pumping system (comply with manufacturer's specifications, etc.)
	7.6. Determine the logical order of execution for groundwater pumping system installation work
8. Install groundwater pumping systems	8.1. Assess whether installation sites and equipment comply with the information initially collected
	8.2. Ensure disinfection of material used throughout the installation
	8.3. Explain the role of the ram and ensure that it is installed according to the required sealing standards
	8.4. Explain the role of the concrete collar and minimize the impact of the installation on its watertightness
	8.5. During excavation, ensure that the trench is dug in accordance with "standards or rules of the art" so that it is safe for workers and adequate to accommodate the power line as well as the water line
	8.6. Explain the role of the diaphragm tank and pressure switch and ensure their proper installation
	8.7. Explain the precautions to be taken when installing the pump and motor

Elements of competency	Skills required
	8.8. Ensure compliance with electrical and plumbing standards
	8.9. Explain when cleaning and disinfection of the catchment work is required
	8.10. Use appropriate backfill material
9. Complete the work	9.1. Ensure proper operation of groundwater pumping system and prime it
	9.2. Manage cuttings
	9.3. Explain to the owner how the system works
	9.4. Inform owners of their regulatory obligations (mound soil, water analysis)
10. Repair groundwater pumping systems	10.1. Diagnose the origin of the problem (premature wear, reduced flow, etc.)
	10.2. Replace defective components where necessary
11. Ensure health and safety in connection with installation of groundwater pumping systems	11.1. Identify the risks associated with the installation of groundwater pumping systems
	11.2. Explain the precautions to be taken when installing a groundwater pumping system: proper trench slope, wearing of gloves, vaccinations, safe use of lifting equipment, etc.