COMPETENCY PROFILE

15.8 – Contractor – Ventilation

CONTENTS SUBJECT TO MODIFICATION AT ANY TIME

Régie du bâtiment Québec

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We wish to thank the experts who contributed to work on this subclass (2021):

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Participants do so in a personal capacity and their opinions are not binding on the companies that recommended them.

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Project Manager: Fabian Camionschu

In this document, the masculine form has been used in a non-discriminating fashion, for the sole purpose of ensuring reading ease.

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DEFINITION OF THE SUBCLASS

15.8 – Contractor – Ventilation

This subclass authorizes construction work that is not reserved exclusively for master pipe-mechanics relating to air circulation or distribution systems related to ventilation, exhaust, air compensation and air conditioning.

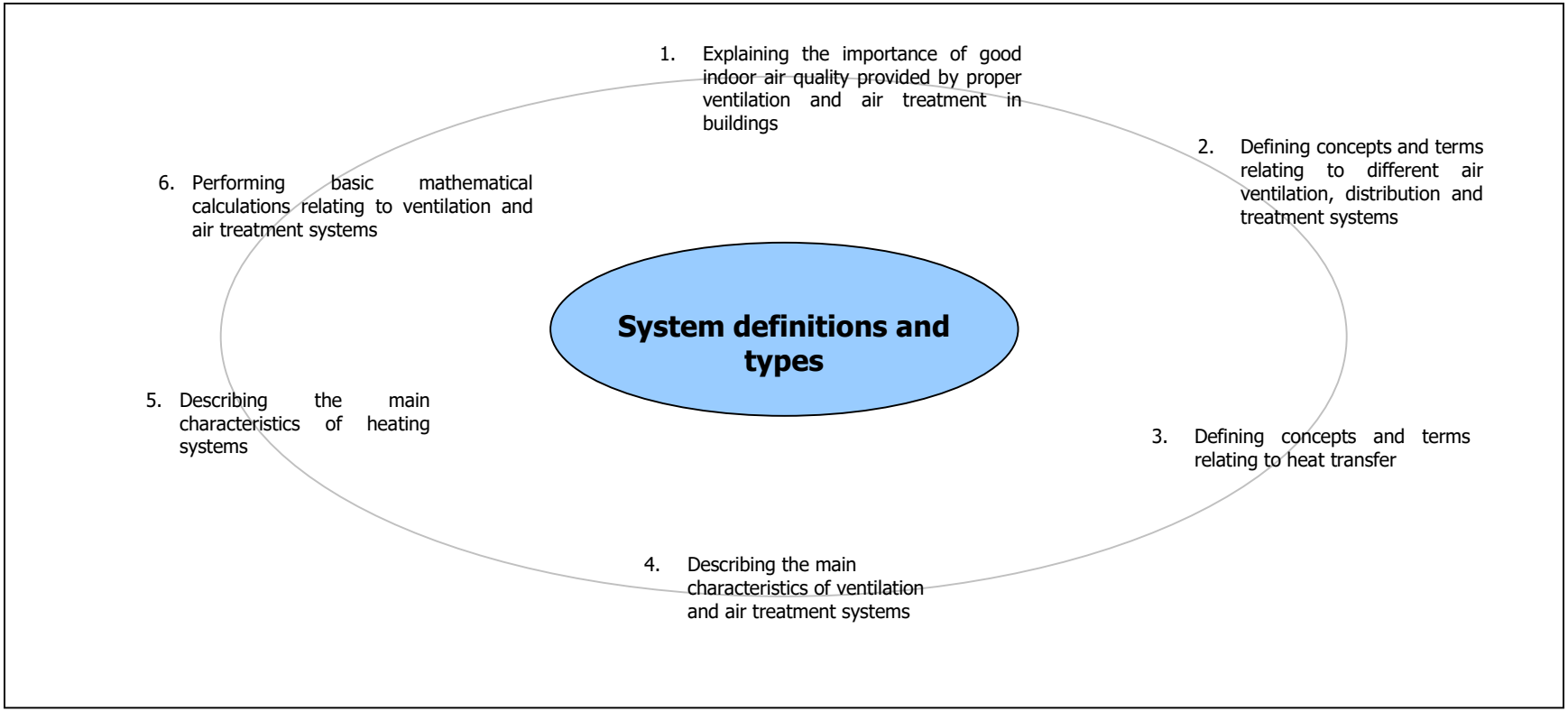
It also authorizes construction work relating to the heating duct systems and the installation of the heating devices of a pulsed air heating system as well as construction work relating to the heating duct systems of a pulsed air heating and air conditioning system.

In addition, that subclass authorizes construction work relating to the heating and air conditioning devices of a pulsed air system provided that the contractor also holds the appropriate subclass 15.9 or 15.10.

Lastly, it authorizes similar or related construction work.

SYSTEM DEFINITION AND TYPES

ELEMENTS OF COMPETENCE



SYSTEM DEFINITIONS AND TYPES

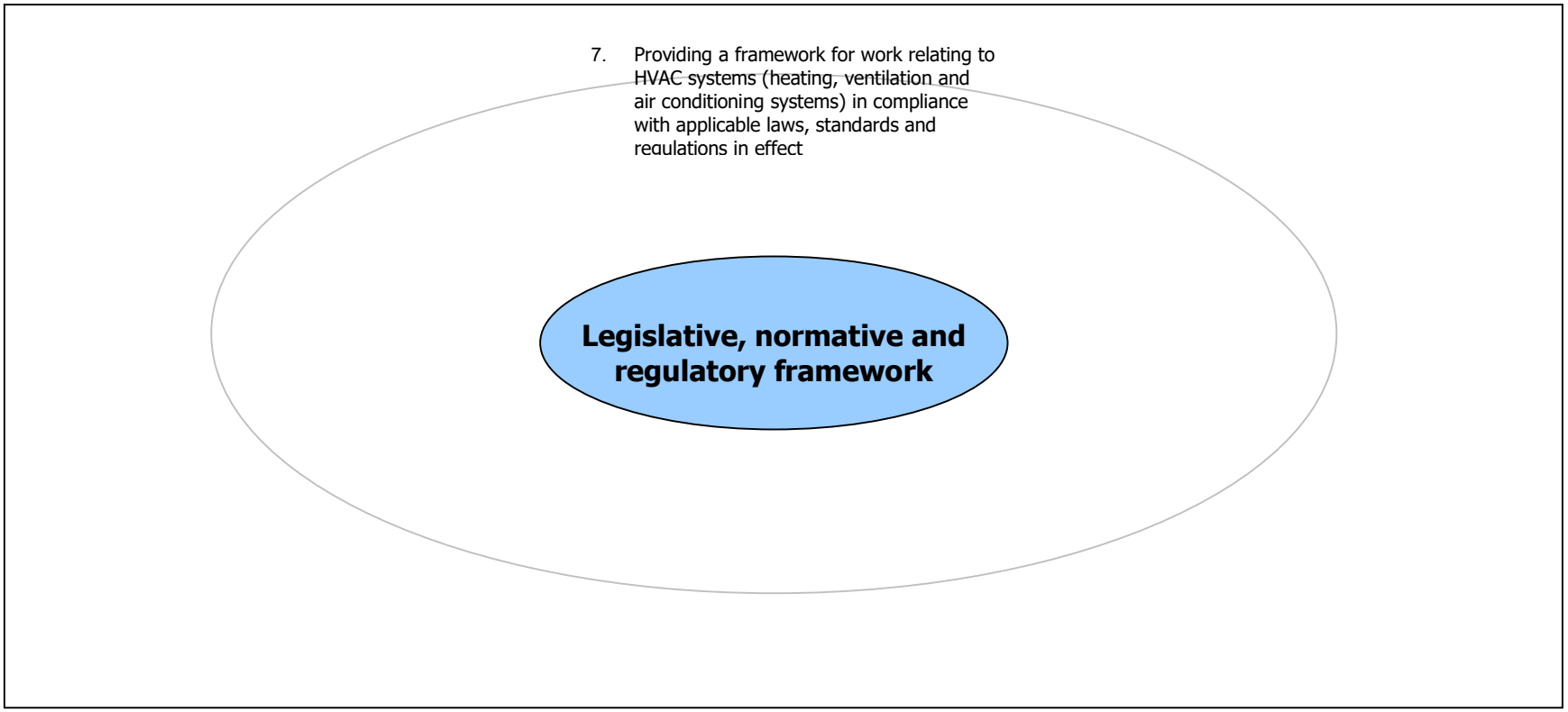
ELEMENTS OF COMPETENCE	MINIMUM SKILLS REQUIRED
1. Explaining the importance of good indoor air quality provided by proper ventilation and air treatment in buildings	1.1. Explaining the concept of comfort and the elements that affect it
	1.2. Explaining the causes, symptoms and effects of poor ventilation on human beings
	1.3. Explaining the chimney effect and the wind effect
	1.4. Explaining the causes, symptoms and effects of poor ventilation on a building
	1.5. Explaining the behaviour of air jet (distribution) in a given space
	1.6. Explaining the behaviour of radon and how it can get into living spaces
2. Defining concepts and terms relating to different air ventilation, distribution and treatment systems	2.1. Distinguishing between the concept of “mechanical ventilation” and “natural ventilation”
	2.2. Identifying measurement units associated with ventilation
	2.3. Defining measurement units relating to the installation of ventilation and air treatment systems
	2.4. Defining the concepts of “minimum fresh airflow”, “exhaust airflow”, “depressurization”, “compensation”, “minimum fresh air capacity”, etc.
	2.5. Defining equipment that can be connected to an air distribution system
	2.6. Defining the components of a ventilation system
	2.7. Defining the types of air relating to ventilation systems (refer to B-149.1)
	2.8. Defining the components of an exhaust system

ELEMENTS OF COMPETENCE	MINIMUM SKILLS REQUIRED
3. Defining concepts and terms relating to heat transfer	3.1. Defining the concepts of total heat, sensible heat and latent heat
	3.2. Defining the concept of thermal resistance
	3.3. Defining the concepts of conduction, convection and radiation
	3.4. Defining the concepts of degree of humidity, condensation and dew point
	3.5. Specifying the direction of the heat exchange
4. Describing the main characteristics of ventilation and air treatment systems	4.1. Naming the characteristics of materials used in ventilation ductwork and their fields of application
	4.2. Describing the types of assembly (joints) of ventilation ductwork and specifying situations for their application
	4.3. Describing types of support systems and specifying situations for their use
	4.4. Explaining different modes relating to ventilation and air treatment systems
	4.5. Describing the different types of exhaust systems and the impact of their operation and influence on the depressurization of the building or the underpinning (radon)
	4.6. Describing the operation of different types of air distribution systems
	4.7. Describing the different types of ventilation and air treatment systems, their operation and effects on cooling and heating systems
	4.8. Describing the fields of application and operation of limit switches on ventilation and air treatment systems
	4.9. Describing ventilation controls and their functions as well as the different control components and accessories of ventilation and air treatment systems
	4.10. Interpreting a ventilation control and connection diagram
	4.11. Describing the characteristics of components of a radon exhaust system
	4.12. Describing the specifics of a cold air distribution system

ELEMENTS OF COMPETENCE	MINIMUM SKILLS REQUIRED
5. Describing the main characteristics of a heating system	5.1. Describing the main components of the ventilation system's hot and cold air generator
	5.2. Describing the specifics of ductwork for hot air distribution systems
	5.3. Explaining the meaning of "system effect"
6. Performing basic mathematical calculations relating to ventilation and air treatment systems	6.1. Applying ventilation-specific formulas
	6.2. Converting units into the two measurement systems
	6.3. Performing calculations using trigonometry rules
	6.4. Calculating area, volume, velocity, flow, pressure, and the chimney effect and wind
	6.5. Performing calculations to determine heat loss
	6.6. Calculating the aeraulic pressure loss using the equivalent length method or specialized software
	6.7. Performing the diversity calculation to establish the depressurization flow rate for the grouping of additional extractors

LEGISLATIVE, NORMATIVE AND REGULATORY FRAMEWORK

ELEMENTS OF COMPETENCE



LEGISLATIVE, NORMATIVE AND REGULATORY FRAMEWORK

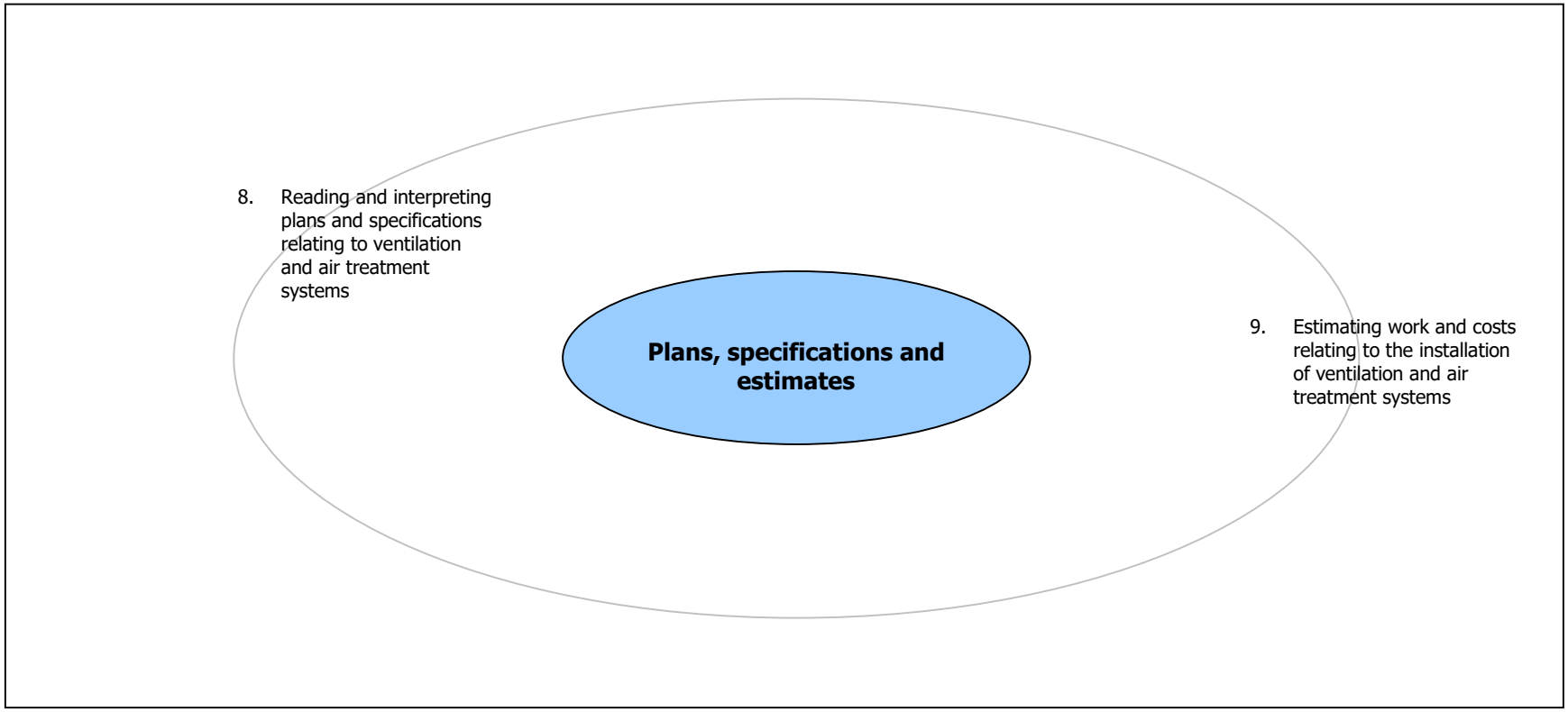
ELEMENTS OF COMPETENCE	MINIMUM SKILLS REQUIRED
7. Providing a framework for work relating to HVAC systems (heating, ventilation and air conditioning systems) in compliance with applicable laws, standards and regulations in effect	7.1. Identifying organizations and their compliance applications by affixing their seals on components of ventilation and air treatment systems and/or their installation
	7.2. Describing the application of *Chapter 1, Building,* of the *Québec Construction Code* as it relates to work on ventilation and air treatment systems (parts 3, 4, 6, 9, 10 and 11)
	7.3. Describing the application of *Chapter III, Plumbing,* of the *Québec Construction Code* as it relates to work on ventilation and air distribution systems
	7.4. Understanding the relationship between the different codes, regulations and standards that apply specifically to work on ventilation and air treatment systems
	7.5. Understanding the organisational structure of the *Québec Construction Code (CQLR c. B -1.1, r.2)*
	7.6. Explaining the field of application of the *CAN/CSA-F326-M – Residential Mechanical Ventilation Systems* standard, as it relates to work on the installation of ventilation systems in dwellings
	7.7. Explaining the fields of application of prevailing standards as they relate to best practices for the installation of ventilation and air treatment systems, including among other the: • *ASHRAE standards and manuals* • *HRAI Digest* • *HVAC Duct Construction Standards (SMACNA)* • *Industrial Ventilation Manual published by the ACGIH* • *NFPA applicable to the work* • *Regulation respecting the quality of the work environment (c. S -2.1, r.11) (CNESST)* • *Chapter VIII, Building, of the Safety Code (NFC)* • *Québec Construction Code, chapter I.1, Energy Efficiency of Buildings* • *Québec Construction Code, chapter I, part 11*

ELEMENTS OF COMPETENCE	MINIMUM SKILLS REQUIRED
	7.8. Explaining the field of application and particular requirements of *CAN/CSA-Z317.2 – Special Requirements for Heating, Ventilation, and Air Conditioning (HVAC) Systems in Health Care Facilities*
	7.9 Knowledge of requirements relating to the installation of HVAC systems based on the following reference documents: • *ASHRAE standards and manuals* • *CSA-B149.1 – Natural Gas and Propane Installation Code (amended Québec)* • *CSA-B139 – Installation Code for Oil-Burning Equipment* • *CSA-B365 – Installation Code for Solid-Fuel-Burning Appliances and Equipment* • *CSA-F280 – Determining the Required Capacity of Residential Space Heating and Cooling Appliances* • *CAN/CSA-C273.5 Installation of Air-Source Heat Pumps and Air Conditioners* • *Chapter II, Gas, Québec Construction Code* • *Chapter V, Electricity, Québec Construction Code* • *Chapter VIII, Petroleum Equipment Installation, Québec Construction Code*
	7.10. Explaining the field of application of the *NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations*
	7.11. Knowledge of the *Regulation respecting the professional qualification of contractors and owner-builders*, which deals with work related to air distribution and treatment systems, required licences, and intervention limits
	7.12. Explaining the roles and responsibilities of the team of professionals, general contractors and specialized contractors as they relate to compliance with plans, specifications and standards
	7.13. Explaining when the *Building Act* (*chapter B-1.1*) and the *chapter I.1 ENERGY EFFICIENCY OF BUILDINGS of the Construction Code (chapter B-1.1, r. 2)* apply to ventilation and air treatment work
	7.14. Explaining the application of municipal by-laws (noise level, clearance, location, visibility, etc.)
	7.15. Naming the main energy efficiency programs available in Québec

ELEMENTS OF COMPETENCE	MINIMUM SKILLS REQUIRED
	7.16. Explaining how the *Radon - Reduction Guide for Canadians (Health Canada)* applies to work on underpinning depressurization systems
	7.17. Explaining problems related to the quality of outdoor air

PLANS, SPECIFICATIONS AND ESTIMATES

ELEMENTS OF COMPETENCE



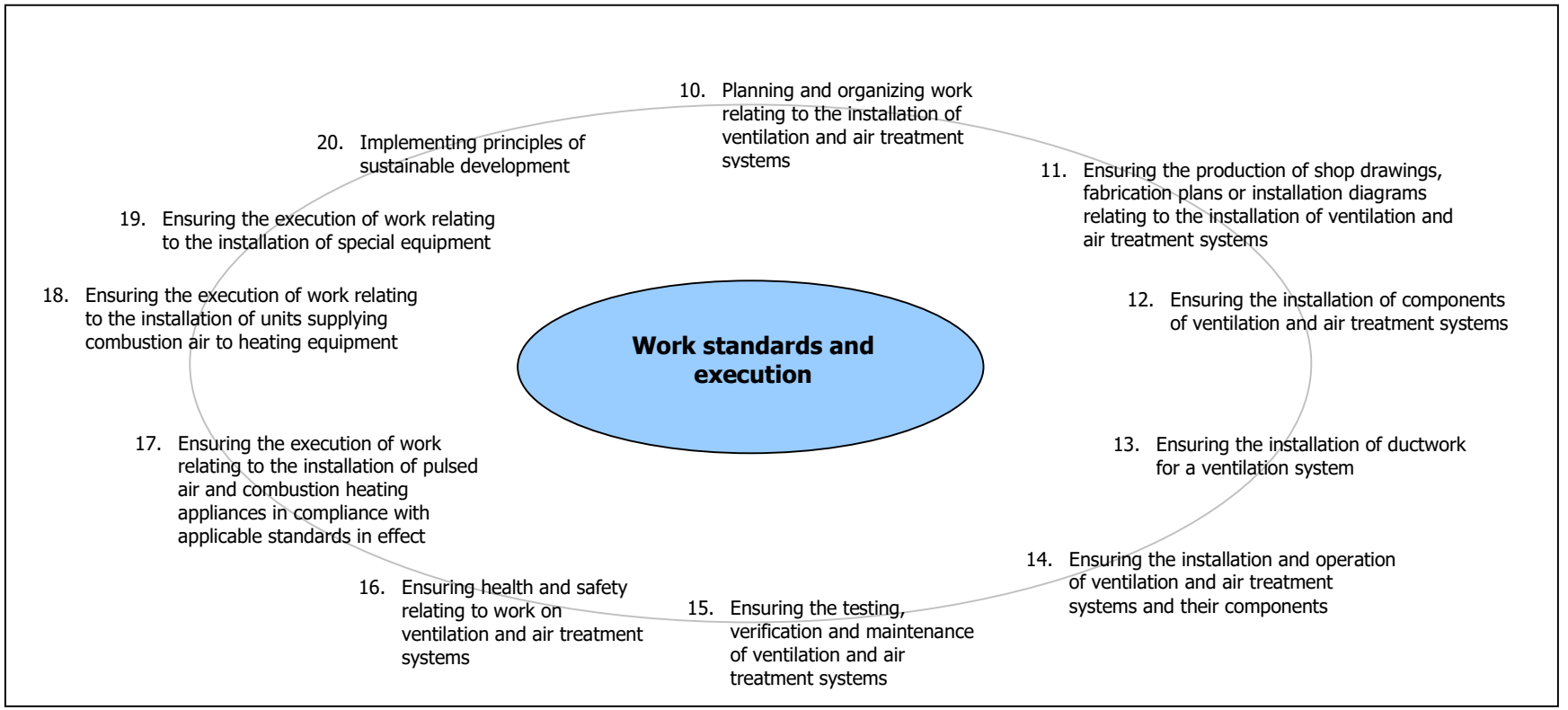
PLANS, SPECIFICATIONS AND ESTIMATES

ELEMENTS OF COMPETENCE	MINIMUM SKILLS REQUIRED
8. Reading and interpreting plans and specifications relating to ventilation and air treatment systems	8.1. Listing the types of plans issued for a project's various stages
	8.2. Interpreting, on a plan, elements related to the installation of ventilation and air treatment systems
	8.3. Referring to plans and specifications for the work of the different specialties involved in a construction project, to ensure effective coordination between stakeholders and the different fields of expertise
	8.4. Locating, on a plan, the different elements of ventilation and air treatment systems
	8.5. Determining whether or not seismic system requirements apply
	8.6. Using plans and specifications, interpreting information dealing with the different responsibilities related to work on ventilation and air treatment systems
	8.7. Understanding the structure of a quote
	8.8. Reading and interpreting, on plans and specifications, information relating to equipment
	8.9. Identifying locations where fire and/or smoke dampers are to be installed
9. Estimating work and costs relating to the installation of ventilation and air treatment systems	9.1. Evaluating the capacity of an existing ventilation and air treatment system
	9.2. Diagnosing the capacity of an existing ventilation and air treatment system
	9.3. Proposing a solution for correcting the capacity of an existing ventilation and air treatment system
	9.4. Performing the calculations needed to determine the characteristics of equipment that is part of a ventilation and air treatment system
	9.5. Calculating ductwork size based on applications and locations

ELEMENTS OF COMPETENCE	MINIMUM SKILLS REQUIRED
	9.6. Selecting equipment and materials in keeping with calculations and regulations
	9.7. Selecting equipment and materials in keeping with specific requirements and uses
	9.8. Calculating the quantities of materials (pipes and ducts, number of components, etc.) required
	9.9. Ensuring that the proposed work complies with applicable codes and standards
	9.10. Understanding the concepts of nominal and actual capacity

WORK STANDARDS AND EXECUTION

ELEMENTS OF COMPETENCE



WORK STANDARDS AND EXECUTION

ELEMENTS OF COMPETENCE	MINIMUM SKILLS REQUIRED
10. Planning and organizing work relating to the installation of ventilation and air treatment systems	10.1. Scheduling activities related to work on ventilation and air treatment systems
	10.2. Ordering and receiving equipment and materials required for work on ventilation and air treatment systems
	10.3. Assuming responsibilities inherent to one's field of expertise as they relate to construction work on the project
	10.4. Ensuring efficient coordination between stakeholders in various fields of expertise
11. Ensuring the production of shop drawings, fabrication plans or installation diagrams relating to the installation of ventilation and air treatment systems	11.1. Establishing the quantities, sizes and locations of the various components and accessories of ventilation and air treatment systems
	11.2. Communicating the information required for the production of shop drawings, fabrication plans or installation diagrams and providing them in proper form
	11.3. Transferring all elements of the ventilation and air treatment systems to the architectural and structural plans
	11.4. Producing diagrams for the installation of ventilation and air treatment systems on architectural and structural plans
	11.5. Ensuring that shop drawings, fabrication plans and installation diagrams comply with applicable codes, standards and regulations in effect
	11.6. Having installation diagrams approved by the owner or his authorized representative
12. Ensuring the production of components of ventilation and air treatment systems	12.1. Identifying and marking locations where ducts and equipment are to be installed and specifying the means for securing them
	12.2. Installing ducts and securing them taking into account the project's specific conditions (suspension, vibration, seismic standards, etc.)

ELEMENTS OF COMPETENCE	MINIMUM SKILLS REQUIRED
	12.3. Preventing air leakage by sealing duct joints and connectors
	12.4. Ensuring work complies with standards, plans and specifications
	12.5. Marking the locations for the installation of the system's elements
	12.6. Ensuring that maintenance work is safe for workers
	12.7. Ensuring the continuity of grounds on both sides of non-conductive elements of a metal duct system (flexible fittings, etc.) allowing contractors in the appropriate category to provide proper grounding
	12.8. Explaining the components' installation methods and requirements based on different uses and building types
	12.9. Explaining fire protection requirements related to building ventilation
	12.10. Ensuring the integrity of the structure
	12.11. Ensuring the presence and proper location of identification plates
	12.12. Ensuring that the units' bases or supports are adequate and compliant
	12.13. Ensuring that work is carried out in accordance with the different fields of expertise
	12.14. Ensuring the installation of ductwork while preserving the depressurization of the underpinning (radon)
	12.15. Explaining the installation requirements of fresh air intake units
	12.16. Understanding the concept of operating pressure and particularities specific to the construction of distribution networks
	12.17. Mastering the special ventilation requirements of high-rise buildings

ELEMENTS OF COMPETENCE	MINIMUM SKILLS REQUIRED
13. Ensuring the installation of ductwork for a ventilation system	13.1. Explaining requirements relating to the fabrication and installation of ductwork, based on the combustibility of materials
	13.2. Explaining requirements and methods relating to the insulation of ductwork and the installation of vapour barriers
	13.3. Explaining requirements related to the protection of ductwork against damage (corrosion, etc.)
	13.4. Ensuring compliance with the building's non-combustibility regulations
	13.5. Ensuring a lack of condensation on air distribution ducts
14. Ensuring the installation and operation of ventilation and air treatment systems and their components	14.1. Ensuring the installation of units
	14.2. Installing air exhaust equipment while ensuring compliance with clearances from gas stoves
	14.3. Installing compensation equipment to counter depressurization
	14.4. Installing the wiring and components of the control system, except for the heating system's electrical connections
	14.5. Connecting ductwork to the system's components
	14.6. Ensuring the installation of finishing components
	14.7. Explaining installation requirements relating to fresh air intake units
	14.8. Installing fire and/or smoke dampers so as to preserve the firestop integrity of the architectural elements crossed by air ducts

ELEMENTS OF COMPETENCE	MINIMUM SKILLS REQUIRED
15. Ensuring the testing, verification and maintenance of ventilation and air treatment systems	15.1. Explaining testing requirements relating to ventilation and air treatment systems
	15.2. Establishing procedures for the start-up of ventilation systems
	15.3. Explaining procedures and requirements for the balancing and leak testing of ventilation and air treatment systems
	15.4. Providing the owner or his authorized representative with all documents relating to the operation and maintenance of ventilation and air treatment systems
	15.5. Explaining the operation and maintenance of the ventilation and air treatment systems to the owner, his authorized representative and/or the end-user
	15.6. Ensuring the maintenance and, if required, the replacement of defective components, equipment and accessories
	15.7. Providing the owner or his authorized representative with a maintenance or repair report
	15.8. Starting up the ventilation and air treatment systems
16. Ensuring health and safety relating to work on ventilation and air treatment systems	16.1. Listing risks related to the installation and maintenance of HVAC systems
	16.2. Explaining precautions required when carrying out installation and/or maintenance work on HVAC systems
	16.3. Explaining requirements related to the safe movement of components of HVAC systems and equipment
17. Ensuring the execution of work relating to the installation of pulsed air and combustion heating appliances in compliance with applicable standards in effect	17.1. Explaining requirements in terms of accessibility and physical clearance from combustible materials, when installing and maintaining appliances
	17.2. Explaining requirements relating to physical clearance, accessibility and the rooftop installation of pulsed air heating appliances and equipment

ELEMENTS OF COMPETENCE	MINIMUM SKILLS REQUIRED
18. Ensuring the execution of work relating to the installation of units supplying combustion air to heating equipment	18.1. Establishing, for this class, the sizes and locations of openings for the supply of dilution, combustion and ventilation air to combustion equipment
	18.2. Establishing, for this class, the location of air supply openings based on fuel type
	18.3. Establishing, for this class, the characteristics of a mechanical air supply system
	18.4. Knowledge of requirements relating to air supply
	18.5. Ensuring the execution of air supply work based on applicable standards in effect for this class, including among other: • *CSA-B149.1 – Natural Gas and Propane Installation Code (amended, Québec)* • *Québec Construction Code, Chapter II, Gas* • *CSA-B139 – Installation Code for Oil-Burning Equipment* • *CSA-B365 – Installation Code for Solid-Fuel-Burning Appliances and Equipment*
19. Ensuring the execution of work relating to the installation of special equipment	19.1. Ensuring the proper installation of equipment
	19.2. Explaining precautions to be taken when installing specific equipment
	19.3. Explaining requirements for safely moving the components of systems or units
	19.4. Explaining the maintenance requirements of specific equipment, excluding heating units
20. Implementing principles of sustainable development	20.1. Explaining best practices as they relate to sustainable development in the field of ventilation
	20.2. Knowledge of regulations incorporating new energy efficiency requirements in the construction sector
	20.3. Knowledge of ventilation systems allowing a reduction in greenhouse gases