

# Public guideline on admission to the practice of engineering in Canada

May 2017

*National guideline - May 2017*

# Notice

## Disclaimer

Engineers Canada's national guidelines and Engineers Canada papers were developed by engineers in collaboration with the provincial and territorial engineering regulators. They are intended to promote consistent practices across the country. They are not regulations or rules; they seek to define or explain discrete topics related to the practice and regulation of engineering in Canada.

## **The national guidelines and Engineers Canada papers do not establish a legal standard of care or conduct, and they do not include or constitute legal or professional advice**

In Canada, engineering is regulated under provincial and territorial law by the engineering regulators. The recommendations contained in the national guidelines and Engineers Canada papers may be adopted by the engineering regulators in whole, in part, or not at all. The ultimate authority regarding the propriety of any specific practice or course of conduct lies with the engineering regulator in the province or territory where the engineer works, or intends to work.

## **About this Engineers Canada paper**

This national Engineers Canada paper was prepared by the Canadian Engineering Qualifications Board (CEQB) and provides guidance to regulators in consultation with them. Readers are encouraged to consult their regulators' related engineering acts, regulations, and bylaws in conjunction with this Engineers Canada paper.

## **About Engineers Canada**

Engineers Canada is the national organization of the provincial and territorial associations that regulate the practice of engineering in Canada and license the country's 295,000 members of the engineering profession.

## **About the Canadian Engineering Qualifications Board**

CEQB is a committee of the Engineers Canada Board and is a volunteer-based organization that provides national leadership and recommendations to regulators on the practice of engineering in Canada. CEQB develops guidelines and Engineers Canada papers for regulators and the public that enable the assessment of engineering qualifications, facilitate the mobility of engineers, and foster excellence in engineering practice and regulation.

## **About Equity, Diversity, and Inclusion**

By its nature, engineering is a collaborative profession. Engineers collaborate with individuals from diverse backgrounds to fulfil their duties, tasks, and professional responsibilities. Although we collectively hold the responsibility of culture change, engineers are not expected to tackle these issues independently. Engineers can, and are encouraged to, seek out the expertise of Equity, Diversity, and Inclusion (EDI) professionals, as well as individuals who have expertise in culture change and justice.

# Background

Provincial and territorial regulators have a legislated mandate to define requirements to be admitted to the practice of engineering in their own jurisdictions. Admission requirements seek to ensure public safety and effectively minimize risks to ensure that only qualified people are practising engineering in Canada or are appropriately supervised by a qualified engineer. Applicants must be granted a license by these provincial and territorial regulators in order to practice engineering in Canada.

The purpose of this Guideline is to:

- » provide an overview of current general admission requirements throughout the country for applicants
- » foster the harmonization of admission practices throughout the country

# Admission requirements

To be licensed as engineers, applicants must demonstrate to the regulator to whom they are applying that they are qualified to practise engineering. To be licensed, applicants must:

1. be academically qualified;
2. have demonstrated acceptable work experience, including an understanding of local practices and conditions;
3. be able to communicate in the language of their jurisdiction of practice;
4. be of good character[1]; and
5. understand and apply laws and ethical principles that affect the practice of engineering both directly and indirectly, and the professional standards to which they are held accountable.

## Academic requirements

To be admitted to the practice of engineering in Canada, applicants must demonstrate that they meet the academic requirement in the jurisdiction in which they are applying. Applicants are usually required to provide proof of graduation, which may include either a copy of or the original certificate of graduation. Where appropriate, applicants may have to arrange for transcripts to be sent directly from their academic institution to the regulator. Applicants may also be responsible for having their educational credentials authenticated through an independent third party.

Engineers Canada, through the Canadian Engineering Accreditation Board (CEAB), accredits specific programs in Canadian higher educational institutions. Applicants with a CEAB-accredited degree are generally accepted by regulators as meeting or exceeding the minimum academic requirements for licensure.

Applicants with non-CEAB-accredited degrees should expect that their academic requirements will be individually assessed by regulators. Regulators, at their discretion, may employ a variety of tools to assess academic requirements for individuals not holding a CEAB-accredited degree, including but not limited to mutual recognition and other international agreements, third party assessments, institution and degree information, interviews, experience review for senior practitioners and/or the use of technical examinations. It is important to note that the specific tools may vary from regulator to regulator.

Most regulators may assign technical confirmatory examinations to assess the academic qualification of applicants, which are based on the Engineers Canada Examination Syllabi. Some jurisdictions might also use the United States Fundamentals of Engineering (FE) Examination as an option for assessing applicants.

Engineers Canada Syllabi are broadly representative of accredited programs offered in Canada. They are used to ensure that applicants have an appropriate breadth and depth of knowledge in common discipline-specific subjects to confirm that they have reached the necessary minimum academic level for licensing. Each regulator has its own policy for reviewing academic credentials and assigning the specific number and type of examination. Further details can be found on the regulators' websites.

Applicants who hold a non-accredited degree but successfully complete all assigned examinations are normally considered academically qualified for licensure. The date at which the engineering work experience is eligible to be counted is at the discretion of each regulator, depending on what date the regulator has deemed the academic requirement to be completed. As such, the deemed academic requirement completion date may be different than the bachelor degree completion date if there were deficiencies that had to be completed.

Regulators may alternatively opt to evaluate the academic qualifications of experienced practitioners through a review of their engineering work experience. Such an evaluation allows senior practitioners to demonstrate that they have the knowledge, skills and level of judgement required to practise engineering competently. Each regulator decides whether or not an experience review is an appropriate way to assess the academic qualifications of practitioners.

## Work experience requirement

Individual regulators define the work experience requirement in their jurisdiction, as well as the process to assess how the requirement is met.

Currently, before being admitted to practice, every Canadian jurisdiction requires that applicants demonstrate at least four years of relevant experience, except in Québec where two years are required. In addition to measuring an applicant's ability to practise engineering, the work experience assessment process seeks to confirm that the applicant has a certain level of knowledge of local engineering laws, practices, standards, customs, culture, codes, conditions, climate and technology. Instead of a time-based requirement, many of the regulators are moving toward a competency-based assessment process. In this case, specific competencies must be demonstrated (refer to Appendix A). Most jurisdictions offer an Engineer-in-training (EIT) program, completion of which normally fulfills the majority of this requirement. For more information, please see the Public guideline for the engineer-in-training program.

Engineering experience in a Canadian environment is required for all applicants in all jurisdictions. It is important to note that a one-year timeframe is typical and that regulators may use alternative evaluation methods and/or timeframes at their discretion. This experience is normally confirmed through sufficient documented experience practising engineering under the supervision of a Canadian registered engineer, or through other means acceptable to the regulator which may include examinations, bridging programs, detailed references, interviews or demonstrating competency in a Canadian environment.

The onus is on the applicant to provide evidence to the regulator that they possess, through experience, at a professional level, a satisfactory capability:

- »to ensure that the applicant is familiar with the applicable Canadian engineering and regulatory practices; applicable laws, codes and standards; technical and business practices; customs, culture, conditions and climates
- »to verify that the Canadian engineering work experience supports the academic formation of the applicant
- »to determine that the applicant's experience is sufficiently diverse as per the competencies outlined in Appendix A and at the level of complexity and responsibility that demonstrates that they are ready to accept professional responsibility
- »to ensure that the applicant has reached the level of professional maturity needed to judge when they are out of their area of competence

## **Language requirement**

Applicants must meet the language requirements of their jurisdiction. Language competency means that the applicant is able to communicate effectively with the public, colleagues, employers and others. Communication should be clear and professional, both orally and in writing. Regulators use a variety of methods to assess language competency.

## **Good character**

All applicants must demonstrate good character.[2] The underlying objectives of this requirement are public protection, the maintenance of high professional standards and the maintenance of public confidence in the engineering profession. Regulators may assess good character of applicants through self-disclosure questions in the application form, direct contact during the application process and/or the comments of references. For more information, please see the Public guideline on good character.

## **Understanding of law and ethical principles**

Applicants for licensure are required to pass to confirm that they have sufficient knowledge of the ethical considerations and obligations that accompany the privileges of professional status, and the legal concepts relevant to engineering practice. For more information, please see the Public guideline on the code of ethics and the Public guideline on the professional practice examination.

## **Concluding Remarks**

This Guideline on admission to the practice of engineering is meant to provide an overview for applicants on academic, work experience and language, good character, and law and ethics requirements to be licensed in Canada. In addition, its purpose is to continue fostering harmonization of assessment processes of regulators throughout Canada. Please visit the Engineers Canada website for more information on national guidelines and on regulators' admission requirements and assessment practices.

# Appendix A

## Core Engineering Competencies

Competencies are observable and measureable skills, knowledge, abilities, motivations or traits that are defined in terms of the actions and behaviours required for successful job performance. They are acquired through experience and the application of knowledge, skills and abilities.

Each core engineering competency has a pre-ambule, which gives the context and intent of the competency. The competency is then comprised of a title, a definition and indicators. **All** of the indicators must be demonstrated at a level of proficiency expected of an engineer in order to meet the competency. Applicants must meet the requirements on **all seven** engineering competencies to meet the overall engineering work experience requirement.

Applicants must produce detailed written competency demonstrations from their engineering work experience that indicate not only *what* they did in a situation, but also *how* and *why* they did it. This added detail is essential for the assessment of the engineering work experience. For each competency, applicants must write about situations from their engineering work experience and show **what** they did, **how** they did it and **why** they did it.

## Competency A - Apply engineering knowledge, methods and techniques

**Engineers are problem solvers.** This competency is about solving engineering problems in a systematic way. Engineers define, analyze, and investigate problems so that solutions can be developed, tested and verified. This process is applied to all engineering problems. An “engineering problem” is any challenge that you are faced with that makes you apply your knowledge of engineering principles. When you answer questions like “How do we fix this process?” “How do we make a better product?” “How do we design this component?” you are applying engineering knowledge.

As you approach a project and define the problem, you analyze all relevant data to make sure that you fully understand the issues. Typically there are several possible solutions, but by evaluating them you narrow it down to the preferred one. The solution is developed and tested to make sure that it does satisfy all the original requirements. A key component of this process is evaluating and verifying that the solution interacts as it was intended in the environment for which it was designed.

To demonstrate this competency, think of an engineering challenge that you have faced, and describe how you solved it. What did you do? How did you do it? Why did you do it?

### A. Apply engineering knowledge, methods and techniques

#### Definition

Solves engineering problems using appropriate theoretical and practical engineering principles.

#### Indicators

- A1. Defines the engineering problem to be solved.
- A2. Analyses relevant data.
- A3. Identifies alternate solutions based on feasibility, technology and economic assessments.
- A4. Develops the solution that best meets system requirements and specifications.
- A5. Tests the solution to verify that it meets system requirements and specifications.
- A6. Evaluates and verifies the practicality and effectiveness of the engineering solution in the environment for which it was designed.

## Competency B - Use engineering tools, equipment or technology

**Engineers use the right tool for the job.** This competency is about demonstrating that you can use appropriate engineering tools, equipment and technology to solve engineering problems. These include everything from software to earth-moving equipment; from measuring devices to data analyzers, in other words, the engineering tools, equipment and technology that are used in your field of practice. You may use these engineering tools, equipment and technology yourself, or you may supervise their use by others.

For this competency we are not interested in the analysis or solution to the problem, we are interested in

**what** you used to solve the problem and how and why you picked those particular tools, equipment or technology over all the available ones. You need to understand the underlying principles behind the tools, equipment or technology that you use, even if you are using a standard one, and provide reasons for selecting them. You need to be able to use what is relevant in your field. It is very important to detail the evaluation that you did before you used the tool, equipment or technology. Detail what you did to check that it was reliable, effective or appropriate for the application, and what you did to check that you were using it within its operating limits. Finally, you need to be able to check that the tool, equipment or technology that you used gave you a reasonable and valid result.

To demonstrate this competency, think of the engineering tools, equipment and technology that you have used and tell us why you used *those ones*, how you selected them, and what you did to apply them in the solution of engineering problems.

## **B. Use engineering tools, equipment or technology**

**Definition:** Uses appropriate engineering tools, equipment or technology based on a sound understanding of engineering principles.

### **Indicators**

- B1. Evaluates the reliability, effectiveness and limitations of available tools, equipment or technology for solving engineering problems.
- B2. Selects the appropriate tool, equipment or technology to solve engineering problems.
- B3. Uses, or directs the use of, the appropriate tool, equipment or technology to solve engineering problems.
- B4. Verifies that the tool, equipment or technology gave a valid result.

## **Competency C - Protect the public interest**

**Engineers protect the public.** This is the primary duty of engineers, and the reason that the practice of engineering is regulated. Protecting the public interest is about more than just adhering to legislation, regulation, codes, standards and following the law. It also involves being aware of the risks inherent in engineering work, and of the short- and long-term impacts of engineering activities.

Whether you are working on a job site, or creating new designs, keeping the public safe is an engineer's professional responsibility. When we talk about the public, we mean anyone who could be affected by your engineering work: your colleagues, yourself, the people who build your products, the people who use your products, and the people who are affected by your products. No matter who you are, or what your position is, when you identify safety concerns it is your responsibility to speak out and take action: you might design a redundancy, change a work procedure, or stop unsafe work.

Engineers must also understand the risks and the short- and long-term impacts inherent to engineering activities, and they must take action to assess, inform, address and mitigate those risks and impacts. These impacts could be environmental, economic, social or issues of sustainability. Consider how your work will impact the physical environment. Which members of society stand to gain or lose from this work? Will your work be sustainable? Will it provide benefits or harm the economy it operates in? Assess those impacts, employing expertise as appropriate, and make sure that decision-makers know what you know. Do others in your field recognize these same impacts?

To demonstrate this competency, think of the engineering work that you do and its safety, risks and impacts – both positive and negative. Tell us what you have done to hold paramount the health, safety and welfare of the public, how you did it, and why you did it. Tell us about the risks and impacts of the engineering work that you have been involved in: what were they? How did you consider them? And why did you do that?

## **C. Protect the public interest**

**Definition:** Practises engineering while safeguarding life, health, property, economic interests, and the environment, with an awareness of the risks and impacts of engineering work.

### **Indicators**

- C1. Adheres to all applicable legislation, regulations, codes, and standards.
- C2. Identifies the impacts of engineering activities, both positive and negative.
- C3. Ensures that the positive and negative impacts of engineering activities are assessed.
- C4. Assesses safety concerns and risks of engineering activities to identify hazards and potential harm.

C5.Takes action to address safety concerns and mitigate risks.

C6.Shares results of assessments with decision-makers.

## Competency D - Manage engineering activities

**Engineers manage work effectively.** For any engineering undertaking that you are assigned, you need to organize and plan how to get the work done before you start it. This can be demonstrated through managing your own engineering work, managing engineering teams, or managing engineering projects. To do this, you have to identify what work is required, what resources are available (other people? money? materials?), and what the limitations are (deadlines? budget?). Having identified these constraints, you can plan how to do the work. You document that plan as a “work plan” – something that explains who will get what done by when, using what resources.

Scope, schedule and budget are examples of common elements of engineering work that need to be monitored and managed by engineers. While you are executing the plan, things can change: budgets may increase or decrease, people may be hired or leave, workloads may increase unexpectedly. You are always looking out for any of these changes that would pose a risk to completing the work, and planning how to manage those risks. To properly manage your projects, you need to adjust your plan, documenting the reasons for changes, and making sure that you can still deliver. Finally you keep stakeholders informed so that they can adjust as necessary as well.

To demonstrate this competency, think about the work that you are responsible for. How did you plan, organize and manage it, keeping records and people informed. What actions did you take and why did you take them?

### D. Manage engineering activities

**Definition:** Plans and organizes engineering activities, monitors progress, and makes adjustments to complete work within constraints.

#### Indicators

D1.Seeks clarity of the assigned activities, including identification of constraints such as time, resources, quality or budget.

D2.Develops a work plan to complete work within identified constraints.

D3.Adjusts work plan to respond to changing circumstances that could pose a risk to completing assigned activities.

D4.Keeps stakeholders informed of progress, obstacles and changes to the work plan.

D5.Keeps records of engineering work and decisions.

## Competency E - Communicate engineering information

**Engineers are communicators.** No matter what kind of engineering work you do, you must be able to clearly communicate engineering information to get that work done. Communication is more than just telling. It also involves active listening – making sure that you fully understand others and that they fully understand you. The audience that you communicate with could be your boss, your clients, your colleagues, your direct-reports or even the public. The ways that you communicate include graphically (such as drawings, sketches, schematics, flow diagrams, or 3-D models), in writing (such as mail, email, or reports) and verbally (such as presentations, meetings, or phone conversations).

The first step is to know your audience and make sure your message is tailored to their knowledge and needs. After delivering any message, you ensure that the audience understands with question and answer. You respond to questions and their input in the same way, checking that you understand what the audience is asking before responding.

To demonstrate this competency, think about a time that you communicated or received engineering information. Who was the audience? How did you communicate? How did you make sure that they understood you, and that you understood them?

### E. Communicate engineering information

#### Definition

Effectively communicates engineering information verbally, graphically and in writing



## Indicators

- E1.Tailors communications to the audience.
- E2.Communicates engineering information graphically (formal or informal).
- E3.Communicates engineering information in writing.
- E4.Communications engineering information verbally.
- E5.Uses two-way communication to verify own understanding and the understanding of the intended audience.

*Note: Applicants who do not communicate verbally due to a disability would demonstrate “verbal” communication through another interactive form of communication (i.e. sign, voice output communication aids, etc.)*

## Competency F - Work collaboratively in a Canadian environment

**Engineers work in teams.** Most engineering work in Canada involves teams, and engineers must be able to work with diverse teams. These teams can include formal teams such as project teams, or informal ones such as the team of client, engineer and end-user. The diversity of Canadian teams can include but is not limited to people of different professions, educational backgrounds, genders, levels of seniority in the organization, languages, cultures, etc. Engineers must be able to work professionally with everyone regardless of their expertise, background or title.

The first step in good teamwork is to be willing to share information and expertise with your team members, and to be willing to use the input from them as well. In order for the team to work towards a common goal, you must be able to agree on the goals and the best way to achieve them. As the team works towards its goals, you support each other, and recognize each others' contributions.

All examples for this competency must be demonstrated in a Canadian environment. To demonstrate this competency, think about a time when you worked with a team. Tell us what you did with the team, why you took the actions you did, and how you worked as a team to achieve the project goals.

### F. Work collaboratively in a Canadian environment

#### Definition

Practises engineering in a Canadian environment to achieve organizational and project goals in a collaborative manner.

#### Indicators

- F1.Shares information, knowledge and expertise with others.
- F2.Assists other team members when needed.
- F3.Considers the input of colleagues at all levels.
- F4.Builds consensus among team members.

## Competency G - Maintain and enhance engineering skills and knowledge

**Engineers keep their skills current.** Every day brings new challenges, new technologies, and advances in knowledge that you need to incorporate into your engineering practice. As you develop and seek out new challenges, you need new knowledge, skills and abilities to practise competently and to be successful. The first step is to identify any gaps or learning needs. You may have been asked to do something new, or you may need to learn more to enhance your engineering capabilities. Through activities like self-study, professional readings, experiential learning, coaching, mentoring or even courses, seminars, or conferences, you continue to learn throughout your career.

To demonstrate this competency, think about the new knowledge, skills and abilities you have acquired and why you sought those out. Tell us what you've done to stay current and knowledgeable in your field. Tell us about a time that you realized you needed to learn more, and how you did it. Any learning that was required for you to perform better in your job can be included here, but you must explain how it relates to your engineering work.

### G. Maintain and enhance engineering skills and knowledge

**Definition**

Takes actions to maintain and enhance proficiency in the practice of engineering activities.

**Indicators**

G1.Takes action to address gaps in knowledge, skills and abilities.

G2.Keeps current with the dynamic nature of engineering.

1, 2 - Please note that the Ordre des Ingénieurs du Québec (OIQ), by virtue of its own regulations, cannot refuse an applicant based on his or her character. When submitting an application to the OIQ, the applicant must declare any judicial or disciplinary action taken against him or her. Only a judicial or disciplinary action relating to professional practice can disqualify an applicant.