



ENSURING THE EXPERTISE TO GROW SOUTH AFRICA

Training and Mentoring Guide for Professional Categories

R-04-T&M-GUIDE-PC

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DEFINITIONS

Applicant: A person applying through the ECSA for consideration/registration in a professional category

Benchmark Route: The normal process to attain registration consisting of completion of an accredited, recognised or evaluated substantial qualification and a well-structured and effectively executed programme of training and experience for the category of registration

Candidate: A person who is registered with the ECSA in a Candidate Category of registration

Competency Standard: Statement of competency required for a defined purpose

Dublin Accord: Specifically focuses on the mutual recognition of academic programmes/qualifications that underpin the educational base for Engineering Technicians

Engineering problem: A problematic situation that is amenable to analysis and solution using engineering sciences and methods

Engineering science: A body of knowledge based on the natural sciences and using mathematical formulation where necessary that extends knowledge and develops models and methods to support its application, to solve problems and to provide the knowledge base for engineering specialisations

Integrated performance: An overall satisfactory outcome of an activity requires several outcomes to be satisfactorily attained. For example, a design will require analysis, synthesis, analysis of impacts, checking of regulatory conformance and judgement in decisions.

Level Descriptor: A measure of performance demands at which outcomes must be demonstrated

Mentee: A person who is under the guidance of a mentor


Mentor: A professionally registered person who guides the competence development of an applicant in an appropriate category

Outcome: A statement of the performance that a person must demonstrate in order to be judged competent at the professional level

Practice area: A generally recognised or distinctive area of knowledge and expertise developed

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by an Engineering Practitioner by virtue of the path of education, training and experience followed

Referee: A registered person who is willing to testify in writing about the character or ability of someone undergoing the application process

Specified Category: A category of registration for persons who are licensed through the Engineering Profession Act or a combination of the Engineering Profession Act and external legislation as having specific engineering competencies at NQF Level 5 relating to an identified need to protect the public safety, health and interest or the environment in relation to an engineering activity.


Supervisor: A person who directs and oversees the work activities

Sydney Accord: An international agreement between the bodies responsible for accrediting engineering technology academic programmes

Washington Accord: An international accreditation agreement relating to undergraduate academic degrees in professional engineering between the bodies responsible for accreditation in its signatory country and region

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ABBREVIATIONS

Adv Cert	Advanced Certificate
Adv Dip	Advanced Diploma
AJET	Agreement for International Engineering Technicians
B Eng	Bachelor of Engineering
B Tech	Bachelor of Technology
BSc	Bachelor of Science
C&U	Commitment and Undertaking
CPD	Continuing Professional Development
Dip Eng Tech	Diploma in Engineering Technology
DSTG	Discipline-Specific Training Guideline
E-17-PRO	Criteria and Process for the Recognition of Educational Qualifications for Professional Categories
E-18-PRO	Criteria and Process for the Assessment of Educational Achievement in Professional Categories
ECSA	Engineering Council of South Africa
EMF	Engineering Mobility Forum
EPA	Engineering Profession Act, No. 46 of 2000
ETMF	Engineering Technologists Mobility Forum
GCC	Government Certificate of Competency
IA	Individual assessment
IPD	Initial Professional Development
MEA	Mutual Exemption Agreement
NDip	National Diploma
NEC	New Engineering Contract
PCE	Professional Certificated Engineer
PE	Professional Engineer
PGDip	Postgraduate Diploma
PN	Professional Engineering Technician
PT	Professional Engineering Technologist
QE	Qualifications Evaluation

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R-01-POL	Registration Policy in Professional Categories
R-02-STA-PE/PT/PCE/PN	Competency Standard for Registration in Professional Categories PE/PT/PCE/PN
R-03-PRO	Process of Application for Registration of candidates and Professionals
R-05-xxx-	Discipline-specific Training Guideline and Requirements
R-08-xxx-	Guide to competency standards for registration
RPS	Research, Policy and Standards
TER	Training and Experience Report
TES	Training and Experience Summary
VA	Voluntary Association

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DOCUMENT CUSTODIAN

The Research, Policy and Standards (RPS) Division is the custodian of this document and is responsible for the development and review of the document.

BACKGROUND

The illustration below defines the documents that comprise the Engineering Council of South Africa (ECSA) system for registration. The illustration also locates the current document.

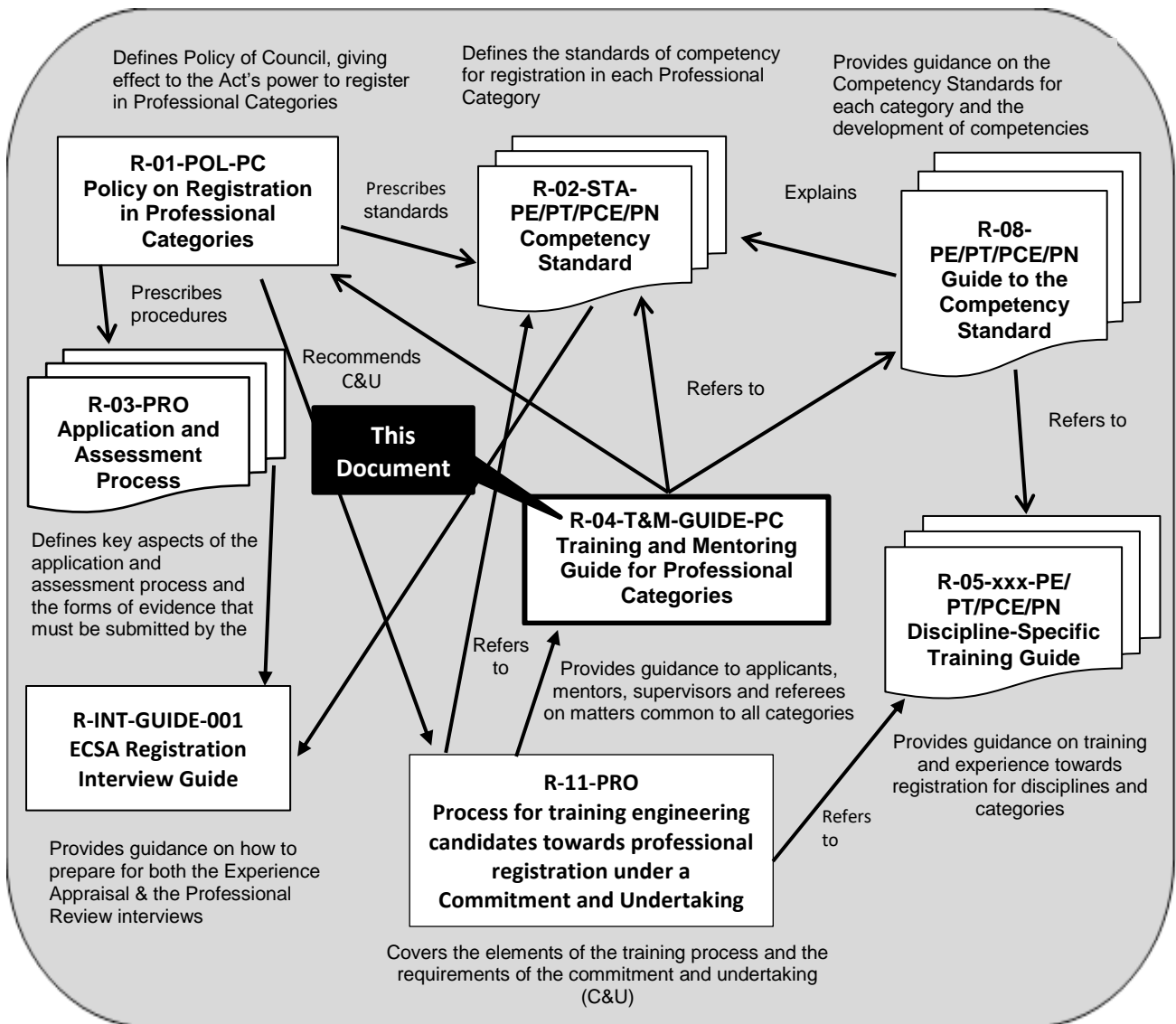



Figure 1: Documents defining the ECSA registration system

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1. PURPOSE OF THIS DOCUMENT

This document provides guidance for persons who are committed to registering with the ECSA in a professional category. The process of training towards registration and the requirements that must be met are described. Particular emphasis is placed on candidacy programmes as the preferred method of training towards registration. Guidance is provided for those who supervise candidates in the workplace and for those who mentor them. This guide covers the general requirements for all professional categories.

This guide is designed for two main audiences:

- Persons who are in the process of registering in a candidate or professional category
- Mentors, supervisors and referees who support the candidate's training

This document is supplemented in each professional category (Professional Engineer, Professional Engineering Technologist, Professional Engineering Technician and Professional Certificated Engineer) by a guide relating to the professional competencies for the category (documents **R-08-PE/PT/PN**). In addition, within a category, each discipline may provide further guidance on the training and registration requirements in the form of a Discipline-Specific Training Guide (documents **R-05-xxx**).

2. GUIDELINE PROVISIONS


2.1 Development Process of the Engineering Professional

The main stages in the development of an engineering professional are described in **Figure 2** below. This guide applies to the development process between graduation with an accredited or recognised qualification and application for registration as a professional in any category. The development of an engineering professional is divided into three stages:

- **Stage 1:** Meet standard for engineering education
- **Stage 2:** Meet the professional competency requirements for registration
- **Stage 3:** Maintain competency through Continuing Professional Development (CPD) and observe the code of conduct

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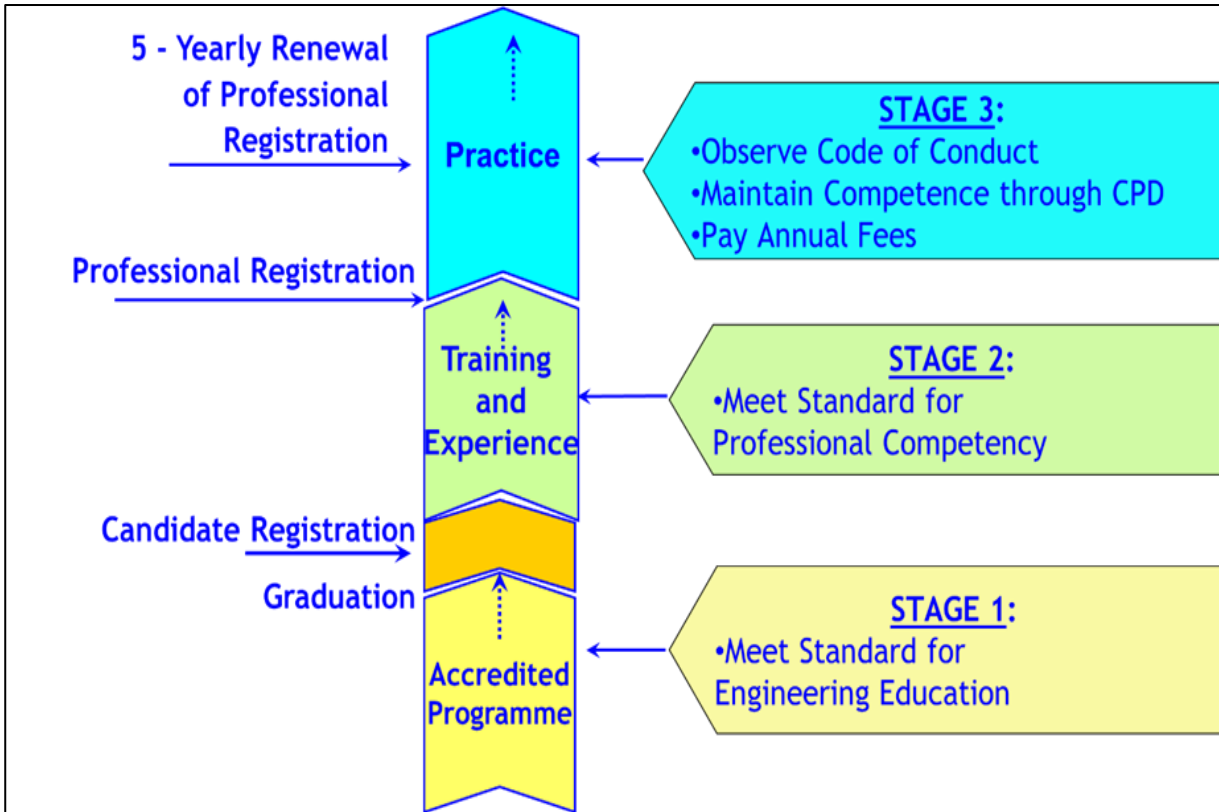


Figure 2: Three developmental stages of an engineering professional


During Stage 1, a person undergoes training to meet the engineering educational requirements of an ECSA accredited programme or qualification. This is the first critical stage towards the development of the competency necessary for registration as a professional. Registration as a candidate in the relevant category is strongly recommended after graduation (completion of Stage 1).

By Stage 2, a person is normally registered as a candidate. A programme of training and experience that is designed to develop a person is called a *candidacy programme* or the *candidacy phase*. In this guide, a person working towards registration is referred to as a *candidate*. While training through a structured programme is the advised method of developing the competencies for registration, registration as a candidate is optional.

Unless the context requires otherwise, the term candidate is used throughout this guide and its companion documents. When the candidate reaches the stage of applying for registration and

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throughout the application process, the term *applicant* is used.

During the period of training and experience, the person is in employment and works with and under the supervision of qualified engineering professionals. The training process may involve structured activities that include induction and training courses on specific skills or technologies. The candidate also participates in self-initiated professional development activities, which are termed *Initial Professional Development (IPD)* activities. Where applicable, the candidate will be trained under the Commitment and Undertaking (C&U) programme, which is a commitment that the employer has with the ECSA. This is the stage where the candidate develops the professional competencies required for professional registration.

During Stage 3, the person is now registered as an Engineering Professional under a certain category. The requirement in this stage is that competency is maintained through CPD and both the code of conduct and the code of practice are observed. The renewal of professional registration is every five years, with registration fees paid annually.

2.2 Professional Competency and Competency Standards for Registration


Professional competence means having the necessary attributes to perform the activities within the profession to the standards expected in independent employment or practice. The Engineering Profession Act, No. 46 of 2000 (EPA) uses a competency-based approach to registration. The EPA subsection 19 2(a)(1) stipulates that the ECSA *must register applicants in a professional category who have demonstrated competency against standards determined by the Council for the category.* This statement embodies the notion of standards of competency and demonstration of competency.

2.2.1 What is a Competency Standard?

Competence of an Engineering Professional in a category is defined as having the necessary attributes to perform the activities within the professional category to the expected standards. The standard of competency or the Competency Standard defines a number of outcomes that a person must achieve. In order to be judged competent to register in a category, the outcomes must be achieved at the level stated. Eleven outcomes are defined and these are conveniently grouped into five sets. The stem of each outcome is the same in the standards for the Professional Engineer, Professional Engineering Technologist, Professional Certificated Engineer and Professional

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Engineering Technician.

The standards are differentiated by the insertion of level descriptors. These level descriptors are defined for the four professional categories in the Competency Standards defined in documents **R-02-PE/PT/PCE/PN**. The candidate or prospective applicant for registration should be familiar with the requirements of the applicable standards for the category.

Group A: Knowledge-based engineering problem-solving

- **Outcome 1:** Define, investigate and analyse *[level] engineering problems*
- **Outcome 2:** Design or develop solutions to *[level] engineering problems*
- **Outcome 3:** Comprehend and apply knowledge: principles, specialist knowledge, jurisdictional and local knowledge

Group B: Manage engineering activities

- **Outcome 4:** Manage part or all of one or more *[level] engineering activities*
- **Outcome 5:** Communicate clearly with others in the course of his/her *engineering activities*

Group C: Impacts of engineering activity

- **Outcome 6:** Recognise and address the reasonably foreseeable social, cultural and environmental effects of *[level] engineering activities*
- **Outcome 7:** Meet all legal and regulatory requirements and protect the health and safety of persons in the course of his/her *[level] engineering activities*

Group D: Exercise judgement, take responsibility and act ethically


- **Outcome 8:** Conduct engineering activities ethically
- **Outcome 9:** Exercise sound judgement in the course of *[level] engineering activities*
- **Outcome 10:** Be responsible for making decisions on all or part of *[level] engineering activities*

Group E: Continuing Professional Development

- **Outcome 11:** Undertake sufficient professional development activities to maintain and extend his/her competence

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Outcomes 1 and 2 require a level descriptor for the level of *problem-solving*. This descriptor considers the knowledge that is required for the analysis and design or development of solutions, the degree to which the problem is defined, factors that may make the solution difficult and the uncertainty and consequences of the problem and solution.

Outcomes 4, 6, 7, 9 and 10 also require a level descriptor for the demands of the engineering activity for each category.

2.2.2 How is competency demonstrated?

According to **Figure 2**, the first stage towards demonstrating competency is the attainment of an educational qualification; this is an important foundation. During the training and experience phase, the candidate progressively performs more demanding work and assumes more responsibility. At Stage 2, the candidate should be working at the level expected of a person who has newly registered but is still under the supervision and control of a registered person.

While working at Stage 2, the candidate will be undertaking work that requires problem analysis and solution, accounting for impacts and regulation, managing processes to ensure that the engineering goals are met, behaving ethically, exercising judgement in decision-making and taking full responsibility to the supervisor for the work completed. Effective performance of this work is, therefore, evidence of competence. The applicant must document this evidence for the registration application and must undergo documentary interactive assessment by engineering professionals who judge the demonstrated competency against the defined standards.

Detailed guides are available regarding the Competency Standards for each professional category in documents **R-02-STA-PE/PT/PCE/PN**.

2.3 About Registration


2.3.1 The categories of candidate and professional registration

The ECSA is empowered to register persons in four *professional categories*:

- Professional Engineer
- Professional Engineering Technologist
- Professional Certificated Engineer

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- Professional Engineering Technician

2.3.2 Registration as a candidate

Each professional category has a corresponding candidate category for which the educational requirements must be met:

- Candidate Engineer
- Candidate Engineering Technologist
- Candidate Certificated Engineer
- Candidate Engineering Technician

Registration as a candidate is intended for persons who have completed their engineering education and are training towards registration. Registration as a candidate serves several purposes:

- Signals the person's intent to seek registration
- Confirms that educational requirements have been met
- Provides access to mentoring, information and advice
- Provides the opportunity to incorporate discipline-specific requirements for registration in the training
- Provides an environment for planning and monitoring the candidate's training and experience
- Clarifies the position of the yet unregistered person with respect to performing identified engineering work


While most candidates are likely to have attained an accredited or recognised qualification, persons proceeding by other routes may find it useful to have formal recognition of meeting the educational requirements as soon as these can be fulfilled. Thereafter, registration as a candidate may benefit the person's training.

In the case of an applicant for registration as a professional who is not registered as a candidate, the educational standing of the applicant is evaluated within the registration process.

For persons who perform critical work of an engineering nature that has a direct impact on public

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safety and health but who cannot register as a professional, the mentoring and training guideline (document **R-04-T&M-GUIDE-SC**) will provide guidance for such practitioners. Document **R-01-POL-SC** defines the policy that governs the registration of practitioners in specified categories and the corresponding candidate categories.

2.3.3. Common requirements for all applicants

In terms of Section 19(2)(b) of the EPA and policies laid out in the ECSA document **R-01-POL-PC**, to attain registration with the ECSA in a professional category, an applicant must demonstrate that he/she


- Meets the educational requirements for the category
- Demonstrates competent performance against the standards laid down for registration in the category.

The educational requirements may be met by the following:

- (i) holding an accredited qualification or acceptable combination of accredited qualifications prescribed for the category; or
- (ii) holding a qualification or combination of qualifications recognised under an international academic agreement relevant to the category; or
- (iii) holding a qualification or combination of qualifications that have been determined by case-by-case evaluation to satisfy criteria for substantial equivalence to an accredited qualification for the category by virtue of:
 - a) the qualification(s) being awarded in a jurisdiction or by a provider that has a record of quality or a quality assurance system known to the ECSA; or
 - b) examination of detailed documentation on the qualification(s) reflecting substantial equivalence; or
- (iv) presenting a combination of evidence determined by Council for the category, which according to criteria, indicates an individual's level of educational achievement that is substantially equivalent to an accredited qualification. Evidence may include
 - a) qualification(s) or credits towards qualifications not already presented under (iii); or
 - b) completion of examinations or other forms of assessment set or prescribed by Council; or
 - c) portfolio(s) of evidence of work and other outputs presented for assessment; or

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d) other evidence of prior learning presented for assessment.

2.3.4 Documents defining the registration system

The registration system of the ECSA is defined in various documents, namely policies, standards and supporting documents. This document is a guide for persons who aspire to register as a candidate or a professional and who apply for registration. The main documents and their relationships are shown in **Figure 1**.

The registration policy that is applicable to all categories of registration and to all applicants who are proceeding by different routes is defined in the ECSA document: **R-01-POL-PC: Policy on Registration in Professional Categories**.

The Competency Standard applicable to the category must be consulted; these documents define the outcomes that must be demonstrated by the applicants for registration and the level at which the applicants must perform (documents **R-02-STA-PE/PT/PCE/PN**).

The procedures for processing the registration applications of candidates and professionals are contained in document **R-03-PRO**. Further *guidelines* for persons proceeding to registration in professional categories are available in documents **R-08-PE/PT/PN**.

Guidelines specific to individual disciplines (where these exist) are available in the following documents:


- **R-05-nnn-PE:** Discipline-Specific Training Guide for Candidate Engineers
- **R-05-nnn-PT:** Discipline-Specific Training Guide for Candidate Engineering Technologists
- **R-05-nnn-PN:** Discipline-Specific Training Guide for Candidate Engineering Technicians
- **R-05-PCE:** Discipline-Specific Training Guideline and Requirements for Candidate Certificated Engineers

2.4 Meeting Educational Requirements

The educational requirements are defined in the standards for accredited qualifications in each category. In the case of recognised and evaluated qualifications, it is policy of the ECSA that substantial rather than exact equivalence is required. There are several routes available to meet

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the educational requirements. These are detailed in Section 2.4.1 below.

2.4.1 ECSA-accredited qualifications

The ECSA accredits engineering education programmes and the qualifications that are needed for meeting the educational requirements for registration in candidate and professional categories. There are no accredited qualifications for Certificated Engineers; a Government Certificate of Competency (GCC) is required for registration as a candidate or professional.

The lists of ECSA-accredited programmes are available and are presented below.

Professional and Candidate Engineers:

- BEng/BSc(Eng)/BIng-type programmes (document **E-02-PE**) listed on the ECSA website
- MEng programme (document **E-22-PE**) (with cognate BEng Tech (Hons)/PGDip plus BEng Tech as prerequisites) listed on the ECSA website

Professional and Candidate Engineering Technologists:

- B Tech programmes (NATED-aligned), with a cognate NDip (Nated-aligned) as a prerequisite listed on the ECSA website
- BEng Tech programmes (document **E-02-PT**) and Adv Dip Eng programmes (document **E-05-PT**) BEng Tech (Hons) (document **E-09-PT**) or PGDip (document **E-09-PGDip**) listed on the ECSA website

Professional and Candidate Engineering Technicians:

- NDip programmes (Nated-aligned) listed on the ECSA website
- Dip Eng programmes (document **E-02-PN**)/Adv Cert (Eng Prac) programmes (document **E-21-PN**)/Adv Cert (Eng) programmes (document **E-06-PN**)


2.4.2 Qualifications recognised under international agreements

The substantial equivalence of qualifications accredited by other signatories to international agreements is verified and monitored by mechanisms provided in the agreements for the various categories.

Professional and Candidate Engineers: Holders of qualifications from programmes accredited

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(singly or in combination) by a Washington Accord Signatory

Professional and Candidate Engineering Technologists: Holders of qualifications from programmes accredited (singly or in combination) by a Sydney Accord Signatory

Professional and Candidate Engineering Technician: Holders of qualifications from programmes accredited (singly or in combination) by a Dublin Accord Signatory

The Washington Accord, Sydney Accord and Dublin Accord have signatories, which are national accrediting bodies that enjoy recognition under the agreements. The accords also have a form of membership called 'provisional status', which is for national accrediting bodies that are working towards becoming signatories but have not yet proved that their standards and processes meet the accepted level of the accord. Qualifications accredited by bodies holding provisional status in an accord are, therefore, not recognised by other signatories. Applicants holding qualifications from countries with provisional status that were completed while or before the body had provisional status must apply for educational evaluation.

To determine whether a qualification is accredited by a signatory, the website of the signatory should be consulted to locate the database or list of accredited qualifications. Holders of qualifications accredited by a signatory that were awarded before the country's accession to the accord must also apply for educational evaluation.


2.4.3 Educational evaluation

Meeting the educational requirements for a category is the first step towards registration in a professional category and is the sole requirement for registration in a candidate category (except in the case of Candidate Certificate Engineers where the GCC is required). Applicants for registration who do not hold a qualification from an accredited programme or who are not recognised through international agreements must have their educational achievements evaluated.

The ECSA policy (document **R-01-POL-PC**) does not require qualifications to meet the exact requirements for an ECSA-accredited qualification for the category but they must be *substantially equivalent* according to the criteria defined in document **E-17-PRO**. Appropriately worded criteria for substantial equivalence of qualifications and individual achievement are defined for Engineers, Engineering Technologists and Engineering Technicians in document **E-17-PRO**. The criteria

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broadly follow the criteria for accredited qualifications. Criteria that cannot readily be evaluated and that are covered at the registration level are omitted.

Two cases are defined in the policy under sections (iii) and (iv):

- (iii) Holders of *qualifications evaluated* (QE) by the ECSA as substantially equivalent to an accredited qualification from both providers whose quality is known to the ECSA, thus allowing an accelerated verification of the qualification, and providers where a comprehensive evaluation is necessary.
- (iv) Persons who may have partial recognition for qualifications under (iii) and must undergo an *individual assessment* (IA) to obtain the balance of their recognition of substantial equivalence. A variety of individual assessment processes are proposed for different purposes.


Processes for the evaluation of qualifications, defined in case (iii), and for the assessment of individuals, as in case (iv), are clearly demarcated and well co-ordinated. The normal sequence is initially to evaluate the applicant's qualification. If the qualification does not meet all the criteria for substantial equivalence, individual assessment is invoked, with or without additional learning. This will address most applicants who require educational evaluation.

Where an applicant's qualifications do not meet the criteria defined in document **E-17-PRO**, examinations appropriate to each category of registration may be used to fulfil the requirements:

- *Engineering Fundamentals*: At the category level, knowledge in engineering fundamentals relevant to broad disciplinary groupings with embedded assessment of essential mathematics and natural sciences underpinning the fundamentals is examined (criteria 1.1 and 1.2).
- *Specialist Engineering Sciences*: At the category level, these are evidenced by writing and passing a specified number of examinations at the exit level of the accredited qualification that is offered by the education provider whose programme(s) are accredited by the ECSA for the category (criteria 1.3 and 2).
- *Engineer in Society Essay Test*: This assesses contextual knowledge (criteria 7 and 8) and communications (Criterion 6).

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Criteria 4 and 5 may be satisfied through the recognition of prior or workplace learning via design or investigation/research portfolios. A supporting document provides an overview of the methods for meeting the educational requirements indicated in (iii) and (iv).

This process is essentially an advisory service. There is no concept of refusal to recognise. Rather, the applicant is advised of the criteria that have been satisfied for individual categories. Reasons for non-compliance with individual criteria are given. The applicant may provide further evidence, undertake further learning and undergo further assessment until the requirements of the category are fulfilled.

2.5 Training through a Candidacy Programme

A candidacy programme normally commences when the trainee graduates from an accredited or recognised programme, registers as a candidate and enters employment with an employer who is committed to training persons towards registration. For Certificated Engineers, a letter of appointment as the responsible person is an additional requirement.

The duration of a candidacy programme is typically at least three years. The final level of competence must be that defined in the standard for the category.

The objective of the programme is through training, experience and IPD to attain the level of competence for registration and through work performance to provide evidence of that competence. Initial Professional Development consists of activities identified as meeting the post-registration CPD requirements but carried out before registration.


2.5.1 Process of training and experience

Training is the process of attaining specific practical knowledge, skills, attitudes and values under the direction of competent persons. Training may be supported by formal courses and other learning activities. The majority of training time is spent in engineering work. *Experience* is the process of gaining competence by active involvement in the work environment.

The trainee should register as a candidate in the relevant category as early as possible in the training process and preferably upon graduation from an accredited or recognised educational programme. The process of training and experience generally consists of phases or substantial

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tasks that form convenient units for planning the training and assessing performance.

Figure 3 shows the general elements of a programme of training and experience. The process is governed by standards, policies and procedures. The candidate engages in a sequence of activities that may be the completion of a particular aspect of training or a unit of work shown as a development phase in **Figure 3** below. For each of the development phases, the candidate, working with the supervisor and mentor, sets and documents the competency development objectives of the phase. At the end of the phase, the candidate, supervisor and mentor review the achievements of the just-completed phase against the objectives that were set for the phase. Thereafter, objectives are set for the next phase. After one or more phases of working at the exit level (Responsibility E: Performing) defined in **Table 3**, the mentor and candidate may determine that sufficient evidence of competence has been accumulated to apply for registration, provided that the three-year minimum period has elapsed. The candidate then prepares an application for registration, setting out evidence of competency.

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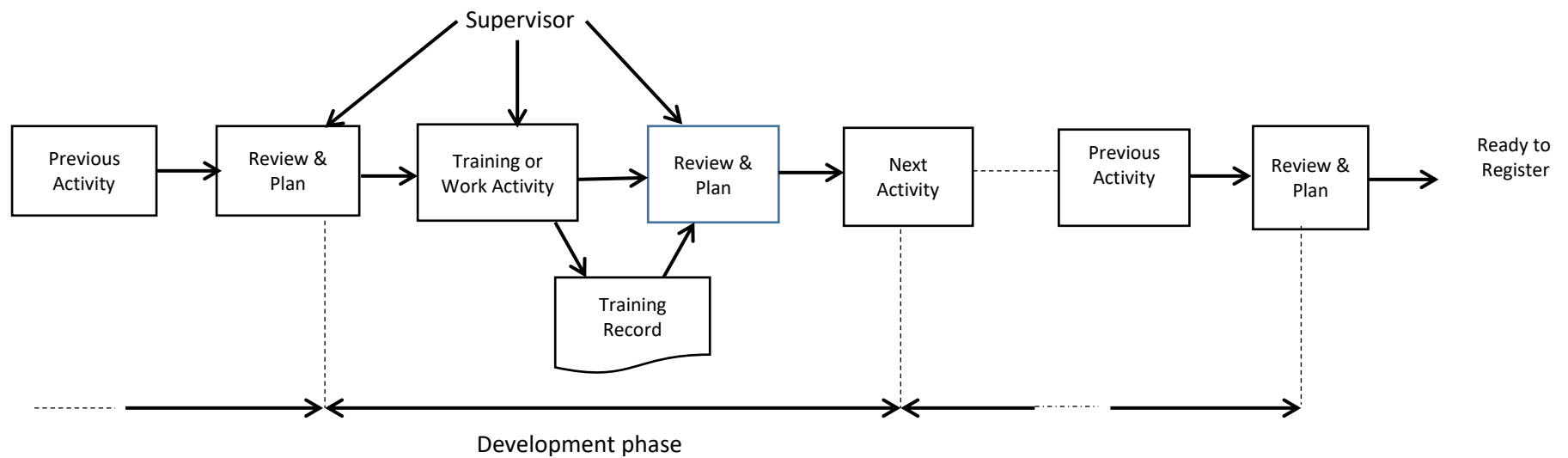



Figure 3: Main elements of the professional development process through a candidacy programme

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Detailed information on Planning and Managing a candidate's programme of training and experience is available later in this guide.

2.5.2 Roles and responsibilities

The goal of the training programme is to allow candidates to develop their competency until they are able to demonstrate the outcomes at the required level on a sustained basis and to take responsibility for the work performed. Three key players in the training of candidates are supervisors, mentors and referees. **Table 1** summarises the roles of these players. They are described in terms of roles because an individual may perform more than one function.

Table 1 Roles in training candidates and supporting applicants


Role	Supervisor of Engineering Work	Mentor	Referee
Function	Supervise the work of the candidate directly or through an intermediary; supervisor takes responsibility for work	Guides and facilitates the professional development of the candidate; guides timing and preparation of application for registration	Through knowledge of candidate's work performance, gives opinion of competency against standards and integrity
Reporting	Signs training reports		
Registration*	Supervisor registered in terms of s18(4) of the EPA; Intermediaries preferably registered	Must be registered	See Table 2
Location	Employer organisation	Employer organisation or external	Employer organisation or external
Multiple Roles	An individual may fulfil two or three of the above roles		
* Registration of mentors, supervisors, referees in the category of the applicant unless otherwise agreed by ECSA			

2.5.3 Candidate

Candidates should appreciate that it is their responsibility to ensure that the training received will culminate in the competency defined in the standards. The ECSA prefers that candidates follow a training programme under a C&U agreement (document **R-11-PRO**) that has been registered by

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the ECSA and as required, has at least one registered mentor. Should candidate engineers experience difficulties with their training, they should attempt to resolve them through the normal channels, for example, with the mentors responsible for their guidance. Relevant engineering institutions/institutes/bodies and organisations have indicated their willingness to assist candidates in this regard.

2.5.4 Supervisor

The supervisor is the person who directs and controls the engineering work of the candidate and who takes responsibility for the work in terms of section 18(4) of the EPA. Supervision that is not direct must be performed on an adequately informed base. Intermediaries between the candidate and the supervisor should preferably be registered but if not, must be of adequate engineering competence. The supervisor together with the mentor and candidate is expected to plan the training task by task in order to develop the candidate's competence and thereafter, to review the achievements of each task.


The supervisor may also fulfil the function of the mentor. The mentor must be professionally registered in the appropriate category or in another category if specifically agreed to by the ECSA in the particular case. The mentor's role is to guide and facilitate the professional development of the candidate.

In agreeing to assist a candidate, the mentor must commit to the following duties:

1. The mentor must participate in the planning and advise on the suitability of the programme of work and experience for the candidate's development. Training tasks or phases must be planned to ensure that the candidate develops the competency required for registration in the applicable category.
2. The mentor must ensure that the candidate is increasingly exposed to demands relating to problem-solving, management, impact assessment and mitigation in addition to consideration of ethical issues, judgement and responsibility.
3. The mentor must ensure that the candidate completes the agreed training.
4. If the mentor is not the candidate's supervisor, the mentor must liaise with the supervisor to ensure that the work assigned to the candidate is consistent with the training objectives.
5. On completion of each agreed task or phase, the mentor must receive a report from the candidate and review the outcomes achieved in view of the objectives.

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6. The mentor must assist the candidate in deciding when he/she is ready to apply for registration and thereafter, assist with the actual application.

Should the services of an internal mentor within the organisation not be available to the employer, the employer may use the services of an external mentor through one of the relevant engineering institutions/institutes/bodies. Mentors thus appointed should be sensitive to any limitations that the employer may set in any given situation.

2.5.5 Referees


Referees must be professionally registered persons who have first-hand experience of the candidate's engineering activities, particularly those that are indicative of the professional competency of the candidate. Referees will, therefore, have supervised, mentored or worked with the candidate or have been in a position of authority with clients for whom work was performed. Referees must be able to assess the candidate's competence as a professional and to attest to the candidate's ethical analysing confidently. The eligibility and preferred capacity of referees for applicants in various categories are shown in **Table 2**.

Table 2: Referee requirements

Category	Number	Registration	Order of Preference
Engineer	2	Engineer (at least one) Foreign Registered Engineer Technologist Certificated Engineer	Mentor Immediate supervisor Indirect supervisor Employer colleague (not more than 1) same or higher level, involved in work, not involved in work Client
Engineering Technologist	3	Engineer Technologist Certificated Engineer Technician	
Engineering Technician	3	Technologist Engineer Certificated Engineer Technician	
Certificated Engineer	2	Certificated Engineer (at least one) Professional Engineer	Senior to the applicant

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2.6 Planning and Managing the Candidacy Process

This section aims to assist the candidate and the mentor/supervisor in the planning of the programme and the progression of the candidate.

2.6.1 Types of programme

These guidelines apply to candidates proceeding via candidacy programmes. It is recognised that an individual candidate may experience a combination of training in and outside a candidacy programme and that training may be carried out with different employers. The result must always be the same – being able to perform at the required level of competency and to be responsible for the work that is performed and required for registration in the chosen category. Mixed-mode training requires extra planning and management effort on the part of supervisors, mentors and the candidate. Three measures are recommended:

1. The candidate's record-keeping must be consistent across the various periods and modes of training.
2. If possible, the candidate should retain the same mentor if the employer or mode of training changes.
3. In the final analysis, the candidate must take ownership of the training and negotiate with employers to ensure that the necessary competencies are attained.

2.6.2 Duration of the programme

The purpose of a training programme is to allow a person who has fulfilled the educational outcomes to attain the competency required for registration. It is unlikely that this competence can be developed and demonstrated at the required level in less than three years. Document **R-01-POL-PC** sets a minimum of three years of training and experience. During this time, the candidate's competency will develop and must be demonstrated at the required level over a certain period. Mentors, candidates and employers must plan for a period of not less than three years. The duration of the tasks on which the candidate is working at the level Responsibility E: Performing (see **Table 3**) must not be shorter than 52 weeks.


2.6.3 Planning principles

Three principles must be followed by supervisors and mentors when planning a candidate's training:

1. The planning, execution and monitoring must focus on the competencies to be developed.

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2. A variety of work activities is necessary for the proper development of a candidate. The object of having a variety of work is to broaden the experience of the candidate and to ensure that all aspects of competency are developed and ultimately assessed. Variety may be obtained in different ways, both singly and in combination:
- The engineering activities of an individual are located at various stages in the lifecycle of an engineering activity, that is, conception, planning, design, construction/implementation, operation and withdrawal.
 - Associated with this lifecycle are specific functions that include commissioning, testing, improving and trouble-shooting. The candidate should experience several stages in the lifecycle of a project or projects.
 - Variety may also involve different aspects of a discipline (or cross-disciplinary fields). The discipline-specific training guidelines/requirements give indications of the acceptable variety of experience in different disciplines and may elaborate on training aspects appropriate to the discipline.
3. Increasing responsibility and accountability within the organisation must be imposed and accepted by the candidate until he/she is capable of accepting professional responsibility in making and executing engineering decisions at the full professional level. The degree of responsibility defined in Table 3 should be used for quantifying the level of responsibility and accountability.


2.6.4 Progression of training programme

During development from the graduate level to meeting the competency requirements for registration, the candidate progresses through levels of work capability until the required level for registration is attained. A useful scale indicating progression throughout the candidacy programme is presented in **Table 3**. The table shows the nature of the candidate's work at each degree of responsibility, ranging from being orientated in the engineering environment at degree A: Being Exposed to working at the degree of responsibility required for registration, namely E: Performing. The responsibility that should be placed on the candidate at each stage is in terms of the candidate's own responsibility and the extent of supervision and mentoring support.

More detailed information on progression – how this general definition can be linked to particular disciplinary contexts – is included in the discipline-specific training guidelines.

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The main learning process is through working with competent engineering personnel. The trainee is under the direct or indirect supervision of an engineering professional. A mentor guides the trainee's professional development. The candidate is involved in engineering work of adequate variety and increasing demand and responsibility. Initially, the candidate *assists* with engineering work, carrying out defined tasks under close supervision. The candidate progresses by contributing individually and as a team member to the work. By the end of the training period, the candidate must perform individually and as a team member at the level of problem-solving and engineering activity that is required for registration and must exhibit a degree of responsibility E. This level of work provides evidence of competency against the standards. Over time, the emphasis on *training*, that is, learning through the inputs of others, gives way to *experience*, learning by performing engineering work and reflecting on observations and achievements.

Table 3: Progression throughout the candidacy period

Degree of Responsibility	Nature of work: the candidate	Responsibility of Candidate to Supervisor	Extent of Supervisor/ Mentor Support
A: Being Exposed	Undergoes induction, observes processes, work of competent practitioner	No responsibility	Mentor explains challenges and forms of solution
B: Assisting	Performs specific processes under close supervision	Limited responsibility for work output	Supervisor/Mentor coaches, offers feedback
C: Participating	Performs specific processes as directed with limited supervision	Full responsibility for supervised work	Supervisor progressively reduces support but monitors outputs
D: Contributing	Performs specific work with detailed approval of work outputs	Full responsibility to supervisor for immediate quality of work	Candidate articulates own reasoning and compares it with that of supervisor
E: Performing	Works in team without supervision, recommends work outputs, responsible but not accountable	Level of responsibility to supervisor is appropriate to a registered person; supervisor is accountable for candidate's decisions	Candidate takes on problem-solving without support, or at most, with limited guidance

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2.6.5 Documenting training and experience outline

Phase-by-phase planning and the review of the candidate's training must be supported by documentation for the immediate purpose of managing training and for compiling evidence when the candidate has to apply for registration.

Training and experience is generally arranged as separate activities, tasks or phases as shown in Figure 3. Each phase of an activity is designed to develop specific aspects of competency (outcomes) at an agreed level of problem-solving and engineering activity with the appropriate degree of responsibility detailed in documents **R-02-STA-PE/PT/PCE/PN**. Such a unit typically ranges from several weeks to several months in duration. For each task or phase, the candidate together with the supervisor and mentor should use a suitable format for recording the planned outcomes, the level to be achieved and the results of the previous phase.


Document **R-03-PRO** defines key aspects of the application and assessment process and the forms of evidence that must be submitted by the applicant. A suitable template is the Training and Experience Report (TER) form for professional engineering applicants. This form allows particular aspects of competency to be identified as being amenable to development in the task or phase. In addition, the level at which competency is to be demonstrated and the nature of the candidate's responsibility are identified.

When the task or phase is complete, the candidate, supervisor and mentor must assess the level of competence that was learnt and displayed. Level descriptors for problem-solving and the demands of engineering work should be consulted to determine progress to the exit level. Such achievement (or shortfall) may influence the planning for subsequent tasks or phases. This assessment is also recorded on the TER form. The assessment at the end of one phase should form an input to the planning of the subsequent and future phases.

The process continues until the candidate is working at the level required for registration (Degree of Responsibility E: Performing) against individual outcomes and as a whole. When the candidate applies for registration, each task or phase must be summarised in the Training and Experience Summary (TES) document and reported in a TER. Each activity is described in company and generic terms. Company terms include the names of specific plants, processes and sites while generic descriptions include terms such as design, trouble shooting, construction and

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commissioning. The TES and TER are required in the application for registration. It is, therefore, advisable for the candidate to complete the TER and update the TES at the same time.

As the programme progresses, the candidate's competency must develop towards that required for registration. Supervisors and mentors should be alert to the candidate arriving at this level of competence.

2.7 Demonstrating Sound Judgement, Responsibility and Ethics

The competency standards require not only the demonstration of technical and engineering management proficiency but also the ability to exercise sound judgement, to take responsibility and to act ethically in making engineering decisions. In this regard, the outcomes that the applicant must demonstrate are outcomes 8, 9 and 10 (Group D). The requirement is that the candidate must demonstrate that he/she is able to exercise sound judgement, take responsibility and act ethically throughout the engineering work performed. This requires careful management by the supervisor. The following section outlines the legal constraints on candidates exercising sound judgement, taking responsibility and acting ethically while performing engineering work.

2.7.1 Legal constraints


Under the EPA, a candidate is not allowed to take responsibility for the work. Various sections of the Act require registration for particular aspects of work. Section 18(2) requires registration to be able to practise in a professional category. Section 18(3) requires a person who practises in a consulting capacity to be registered in an appropriate category. Section 18(4) requires a person registered as a candidate to work under the supervision and control of a registered person.

Section 26 empowers and requires the ECSA to identify work that can only be performed or supervised and controlled by registered persons, and such persons must take responsibility for the work. While the regulations identifying engineering work have not yet been promulgated, they should be used as prudential guidelines for whether particular work falls into the 'identified' category.

Registration as a candidate in a category corresponding to a professional category provides a mechanism for persons to perform work under supervision – work that would otherwise be reserved for registered professionals – and thereby demonstrate competency for registration. Such work

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must be performed under the supervision and control of a registered person who must take responsibility for the work.

2.7.2 Managing conflict

The following aspects need to be considered:

- Taking due care to ensure that the objectives of engineering work are achieved in an ethical manner
- Addressing impacts of engineering work and risks
- Being *accountable* for the work, in particular that due care was taken to deal with risks

Supervisors and mentors must implement strategies to ensure that the candidate can demonstrate the ability to exercise *due care* without having to make decisions that require accountability; the supervisor must be accountable. Taking due care requires the candidate to exercise the following defined competencies: problem-solving, management, impact identification and mitigation, ethical behaviour together with acting responsibly and applying sound judgement. Working within the limits of these competencies is a clear requirement. In such a mode of working, the candidate would be required by the supervisor to express judgements and propose decisions and recommendations; these may be at the level that a registered person would normally perform. The candidate does not carry any legal accountability but within the employer or organisation, he/she is accountable. The supervisor must check the judgements, decisions and recommendations as he/she bears ultimate responsibility for the work.


2.7.3 Diversity of engineering

With the requirements for the candidate to exercise sound judgement, take responsibility and act ethically, it is important to recognise that the scope of engineering that must be adhered to is too wide for definitive training guides.

Engineering education, training and work is generally partitioned according to disciplines/sub-disciplines and industry sectors such as consulting, contracting, construction, manufacture, mining, process industries, services, utilities and infrastructure. Within a sector or discipline, an engineering practitioner may be concerned with systems, processes, components or materials. The competency standards identify the generic outcomes for competent practitioners irrespective of the discipline or industry sector, for example, identify and analyse problems and

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synthesise solutions. These represent the fundamental transferable competencies. Rather than formulating complex requirements for all functions, the system relies on engineering peers for training and assessment. Peers are persons who are engineering practitioners in the same discipline and are registered in the category to which the candidate aspires.

2.8 Competency-Focused Planning and Monitoring of Candidacy Programmes

The objective of training and experience in a candidacy programme is to develop the competency that must be demonstrated to be registered. Training and work experience must, therefore, be planned, executed and evaluated to ensure that this goal is attained.

2.8.1 Goals of training and experience

Section 2.2.1 summarises and groups the competencies that must be demonstrated in the assessment process when the candidate applies for registration. Engineering professional competence is more than satisfying a linear list of outcomes. Figure 3 visualises engineering competence.

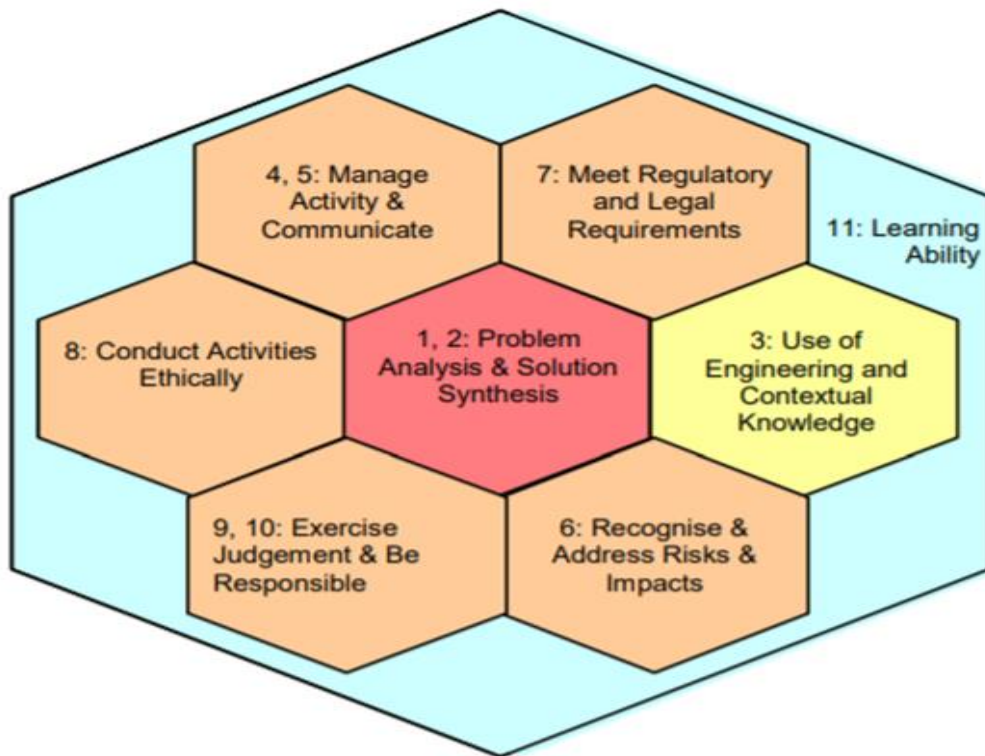



Figure 4: Visualising the interconnectedness of the outcomes that are evidence of engineering competence

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The core activity of engineering is problem-solving, that is, bringing about change from an initial state to a final state and overcoming the barriers involved to achieve a result that is useful to people, enterprises and society. Knowledge that is based on Engineering Science is applied while accounting for the impacts of engineering activities, the legal and regulatory factors, and ethics. Responsible, judgement-based decision-making and management of the process is essential to achieve the engineering goals. Competent engineering practitioners underpin their activities by continuous learning, both formally and informally.

Candidates, supervisors and mentors must focus at all times on the goal of training, namely the development of competence as specified by the outcomes in the standard and the required level of performance; these must be viewed in an integrated way. The required level of performance consists of two principal parts, the *level of engineering activities* within which the candidate operates and the *level of problem-solving*.

2.8.2 Relating the competency standards to specific work

The generic competencies of problem-solving, management, impact analysis and taking responsibility manifest themselves in several forms of activity such as design, investigation, trouble-shooting, improvement, research and development. Each of these activities can be expanded, for example, design includes the preparation of a brief. At a company-specific level, these activities are performed in relation to specific plant, operations and business functions. Candidates should consider both the specific requirements of the task or phase of work and the generic competencies required for the work.


The candidate should identify and analyse problems, synthesise solutions and use their knowledge in the process. The candidate must examine and deal with the legal and regulatory factors and the environmental, social and cultural impacts of the engineering activities.

2.8.3 Evidence-based system

Evidence of competent performance has two essential components: first, the capability to *perform a number of defined actions* must be demonstrated and second, the performance must be at or exceed a *specified level of demand*. The defined actions are the outcomes and typifying actions that reflect acceptable performance according to the assessment criteria. The level is defined by a

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specification of the demands of the engineering activities and the nature of problem-solving. In a professional field, evidence of competent performance is obtained from the competent performance of substantial engineering tasks by the person being assessed. Typical tasks provide evidence of several outcomes, and the assessment must be holistic.

The 11 outcomes defined for each category of engineering professional represent different aspects of holistic performance and professional attributes. The outcomes fall conveniently into five groups; the first relates to problem-solving, the following three to engineering practice and professional attributes and the last to the ability to maintain and develop competence. Four of these groups are recognised as competencies in the ECSA documents **R-02-STA-PE/PT/PCE/PN** while the fifth group recognises CPD as a competency.

While competence is specified by 11 outcomes to be demonstrated at a particular level, the applicant for registration must demonstrate integrated performance against outcomes. This reflects the reality that an engineering task or function is unlikely to require only one outcome, for example, problem analysis seldom stands alone; it will require the use of knowledge, the analysis of impacts and must lead seamlessly into the solution phase. A possible visualisation for engineering competence is shown in **Figure 4**.

Engineering problem-solving comprising analysis and synthesis is central to all engineering activities, including design, investigation and management. Problem-solving is supported by a number of capabilities corresponding to outcomes 3 to 10. Outcome 11, which is CPD, is better expressed as the maintenance and extension of competency and provides a platform for the performance of outcomes 1 to 10.


Different engineering functions and assignments will have different mixes of demand. As part of the application for registration, the applicant is expected to provide evidence of working at the required level of problem-solving in engineering activities at the specified level of demand.

2.9 Advanced Study While a Candidate

In a competency-based system, various means can be used to enhance competency and present evidence of competency. Advanced study may contribute to learning and providing evidence against the professional outcomes (including educational outcomes for persons without accredited

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or recognised qualifications). For example, the design of novel equipment during a research degree may be considered evidence against problem-solving outcomes 1 and 2. Completing a research degree may provide evidence against the educational Outcome 5: Experimental Work and Investigation. Because the assessment for registration is competency focused, the previous policy of considering a reduction in the length of the candidacy programme falls away.

3. ADDITIONAL INFORMATION FOR EXPERIENCED APPLICANTS

3.1 Mature Applicants for Professional Registration

The documentation requirements within each category of professional registration differ between applicants with considerable experience after graduation who are at the level required for registration and applicants who do not have considerable experience. Specific documentation requirements for each category are defined in the relevant document **R-03-PRO**.

3.2 Process for Persons Already Registered in a Professional Category


Applicants who are already registered in a professional category and wish to register in an additional category must meet both the educational and competency requirements for the second category. In most cases of an additional registration, the additional category has more demanding educational and professional competence requirements. A person wishing to pursue this route is advised to become familiar with both the educational requirements and the professional competency standards for the additional category.

The enhanced educational requirements can be met by formal study in an accredited programme or other means. Document **E-17-PRO** defines criteria for meeting the educational requirements other than accredited or recognised degrees. A supporting document outlines various practical means for meeting the individual criteria. The educational requirements may be satisfied at any time before applying for registration.

Professional competencies must be developed through work performed to the level required for the additional category. The level of problem-solving within these engineering activities must be raised to a level that satisfies the higher-level descriptor.

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3.3 Process for Professional Registration under an International Agreement

The ECSA is a signatory to several international agreements that are aimed at reducing the complexity of the registration process for persons who are registered with a foreign signatory and who wish to register with the ECSA in a particular professional category. The agreements in force are summarised in **Table 4**.


The agreements require the applicant to be registered in a particular category with the foreign signatory and may place restrictions on the educational route followed by the applicant to obtain the original registration. See **Table 4**. The Mutual Exemption Agreement (MEA) in particular requires the educational qualification to have been obtained within the territory of the original signatory. The applicant is not required to meet further educational requirements with the ECSA. The evaluation of the application at the professional level is also reduced relative to the process for a person who applies directly. An applicant under an MEA is generally not required to attend an interview. Applicants under the Engineering Mobility Forum (EMF) and Engineering Technologists Mobility Forum (ETMF) require an interview to determine adaptation to the local regulatory environment and conditions.

Table 4: International agreements at the registration level

The ECSA is a signatory to a number of agreements designed to aid persons in obtaining ECSA registration who are registered in the categories and jurisdictions shown.		
Agreement	Eligibility Criteria	ECSA Category
Mutual Exemption Agreement: Institution of Civil Engineers (UK)	Chartered Engineer via the Institution of Civil Engineers (ICE), having obtained educational qualification(s) in UK	Professional Engineer
Mutual Exemption Agreement: Engineers Ireland	Chartered Engineer with Engineers Ireland: Civil, Electrical, Mechanical having obtained educational qualification(s) in Ireland	Professional Engineer
Agreement: Engineers Ireland	Engineers Ireland: Civil, Electrical, Mechanical Engineering having obtained educational qualification(s) in Ireland	

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Engineers Mobility Forum (EMF)	Registered as a Professional Engineer or equivalent on the International Register of an EMF signatory; Washington Accord or substantially equivalent education	Professional Engineer
Engineering Technologists Mobility Forum (ETMF)	Registered as a Professional Engineering Technologist or equivalent on the International Register of an ETMF signatory; qualification determined by the original registering signatory to meet the educational requirements specified in the ETMF	Professional Engineering Technologist

4. WHAT HAPPENS IF THE APPLICATION IS NOT SUCCESSFUL?

4.1 Educational Requirements Incomplete

The Educational Evaluation process never results in refusal. If the applicant's qualification(s) are not evaluated as completing the educational requirements, the applicant will be informed of the criteria that have been met and the outstanding criteria.

The applicant should then refer to Section 2.4 (Meeting Educational Requirements) of this document for guidance in ways to undertake further learning and assessment in order to meet the outstanding criteria. Credits awarded against criteria met will remain valid, and new evidence of outstanding criteria may be submitted as it becomes available.

4.2 Abeyance of Application for Professional Registration


Abeyance is a way of affording the applicant the opportunity to undertake further training or gain more experience to address particular deficiencies in the presented evidence of competency. The normal period of abeyance is up to 12 months. The applicant may submit new evidence as it becomes available within the 12-month period. An abeyance application is not considered a refusal and no further fee is payable unless the 12-month period has expired without submission of new evidence.

4.3 Application for Professional Registration Refused

Whenever an application is refused, the criteria that were not satisfied are identified and an

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indication of why the evidence provided was deficient is given. The applicant can then plan further training and experience to generate evidence of competency. A new application can be made once the evidence has been generated. The applicant should keep a record of professional development activities that are undertaken and submit a new application to demonstrate all competencies.

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REVISION HISTORY

Revision Number	Revision Date	Revision Details	Revision Number
Rev. 0: Concept	8 Sept 2007	Initial working skeleton	JIC Working Document
Rev. 0: Concept B	21 Oct 2007	Description of training process added	JIC Working Document
Rev. 0: Concept C	17 Nov 2007	Changes as discussed by JIC; Addition of categories of applicant; Best practice section filled out	JIC Working Document
Rev. 0: Concept H	5 Nov 2010	Navigation added; Understanding Engineering Competencies separated out	JIC Working Document
Rev. 0: Concept I	17 Jan 2011	Further development guide removed to separate category-specific document	JIC Working Document
Rev. 0: Concept J	1 March 2011	Document further developed; Rationalised some sections	JIC Working Document
Rev 0: Concept K	28 March 2011	Document sections rationalised and relocated	JIC Working Document
Rev. 0: Concept L	24 June 2011	Document diagram removed from Section 5.4; First page reformatted in standard form	JIC Working Document
Rev. 0: Draft 1	31 Oct 2011	Final: Submitted for no changes relative to Concept L approval	JIC Council
Rev. 1.0	12 Jan 2011	Approved by Council	Council
Rev. 2: Concept A	10 April 2017	Special provision for Professional Certificated Engineers; Providing for registration requirements in the DSTGs	For Consideration by PDSGC
Rev. 2	11 May 2017	Alignment with R-02-PCE	For consideration by the Pr Cert Working Group
Rev. 2	3 July 2017	Approved	PDSGC: For consideration by Council
Rev. 2	17 August 2017	Ratified	For ratification by Council
Rev. 3: Draft A	07 May 2021	Routine review and addition of the stages of development for an Engineering Professional (Figure 2)	ERPS
Rev. 3	20 May 2021	Approval	RPSC

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The Guide for

Training and Mentoring Guide for Professional Categories

Revision 3 dated 20 May 2021 and consisting of 42 pages was reviewed for adequacy by the Business Unit Manager and is approved by the Executive: Research, Policy and Standards (RPS).



Business Unit Manager

17/06/2021

Date



Executive: RPS

17/06/2021

Date

This definitive version of the policy is available on our website.

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