

## Discipline Specific Guidelines: Electrical Engineering

### Acceptable Training for Registration as Professional Engineers

It is recommended that Candidate Engineers (CEs) provide a copy of this document to each supervisor of their training and to each of their referees.

#### 1. Introduction

**Note:**

**In this document, any reference to "electrical engineering" includes "bio-engineering", "computer engineering", "control engineering", "electronic engineering", "power engineering", "software engineering", "information engineering" and "telecommunications engineering".**

These guidelines are aimed at providing more information about the requirements for registration through the Engineering Council of South Africa (ECSA) in addition to the broader requirements set out in Policy Statement R2/1A.

- 1.1 Candidates wishing to become registered as professional engineers with ECSA must-
  - (i) hold a relevant academic qualification recognised by ECSA through accreditation or evaluation, or pass any examination which ECSA may prescribe; and
  - (ii) demonstrate that they have been trained to an acceptable level of competence in defined elements, in so far as it relates to electrical engineering, for at least three years; and
  - (iii) display attributes of a professional person.
- 1.2 Immediately upon graduation, candidates are encouraged to apply to ECSA for registration as candidate engineers (CEs), hereafter they will be provided with all relevant documents needed for the complete training period.
- 1.3 The recommended way of achieving the requisite levels of competence in all the training elements is through a focused and collaborative process of acceptable training, where the CEs and their employers (mentors) plan and execute the actual training on the basis of ECSA's Policy Statement R2/1A, as well as the training objectives listed in these Discipline Specific Guidelines.
- 1.4 CEs will be expected to gain practical experience in a position of responsibility and to prove that their education, training, experience and professional development have enabled them to discharge, in full, the responsibilities of a professional engineer in electrical engineering.

## **2. Academic Qualifications**

- 2.1 The minimum academic qualification required for registration as a CE is an accredited bachelor's degree in electrical engineering obtained from a South African university.

The list of South African bachelor degrees in electrical engineering, accredited by ECSA, may be obtained from the Education Department of ECSA at:

**Tel:** (011) 607-9500  
**Fax:** (011) 622-9295  
**E-mail:** [engineer@ecsa.co.za](mailto:engineer@ecsa.co.za)  
**Web:** [www.ecsa.co.za](http://www.ecsa.co.za)

or in writing at:

**Private Bag X691  
Bruma  
2026**

- 2.2 Persons who have graduated from a university not accredited by ECSA will be assessed individually on merit. If their qualifications are evaluated as being at least equivalent to an accredited South African degree, candidates will be eligible for registration as CEs and could then follow the formal route to registration as professional engineers.
- 2.3 Persons whose qualifications are not accredited or recognised by ECSA may follow an alternative route to meet the academic requirements for registration as CEs. Candidates must apply to ECSA and obtain the necessary information on the procedure to be followed.
- 2.4 Those who meet ECSA's academic requirements should register as CEs without delay. Application forms can be obtained from ECSA. CEs must, from the outset, also obtain copies of the application form for registration as professional engineers.

## **3. Training and Professional Development under a Commitment and Undertaking (CU), and Mentorship**

### **Commitment and Undertaking**

- 3.1 CEs must persuade their employers to register a Commitment and Undertaking with ECSA, namely that they will structure the training of, and actually train, their CEs, in accordance with the requirements of ECSA's Policy Statement R2/1A as well as the requirements set out in these Discipline Specific Guidelines. Each CU will be allocated a permanent registration number, which should be quoted by all CEs when applying for registration as professional engineers.
- 3.2 Employers must, at the same time, submit the name(s) of a mentor(s) from within the organisation (see § 3.4 below) or, if an internal mentor is not available, the name of an external mentor (see § 3.5 below) to guide CEs through the required process of training. A CU will not be registered by ECSA unless the name of at least one mentor (internal or external) is provided.

### **Mentorship and Supervision**

- 3.3 ECSA and the South African Institute of Electrical Engineers (SAIEE) will jointly maintain a list of internal and external mentors. A mentor must be registered as a professional engineer. Council will only in exceptional cases consider the listing of experienced and mature professional engineering technologists, professional certificated engineers, or professional engineering technicians, upon application and motivation by the organisation/mentor concerned. These mentors will be deemed not only to be capable of fulfilling their functions in a professional manner but also as being committed to advising and guiding their CEs in their professional development.

- 3.4 It is **STRONGLY RECOMMENDED** that all CEs should have a mentor who is working in the same organisation as the CE (internal mentor).
- 3.5 If an internal mentor is not available, a list of external mentors can be obtained from ECSA or SAIEE. It will be expected of employers who make use of the services of external mentors to create an environment in which such mentors can feel free to make recommendations in the reasonable knowledge that their recommendations will be given sympathetic consideration.
- 3.6 It will be expected of all mentors to become fully conversant with their functions and responsibilities referred to in Policy Statement R2/1A and guidelines issued by ECSA from time to time, to conduct regular discussions with their CEs and to assess their progress in accordance with the guidelines set out in Policy Statement R2/1A and these Discipline Specific Guidelines. Since the effectiveness of mentors will continuously be monitored, Council will attach much value to the opinion of "the conscientious mentor" as to the registrability (or otherwise) of their CEs.
- 3.7 It is not expected of mentors to take responsibility for the day-to-day supervision and training of CEs. Mentors/employers should do everything in their power to ensure that competent persons, preferably registered with ECSA, are available to oversee this function as supervisors.

#### **4. General**

- 4.1 Training reports, which must be updated regularly, form an essential part of the monitoring process, and these reports must be filled in on the correct forms (Forms A2.1 and A2.2) of the application form. These forms are part of the application form, which should be obtained from ECSA as soon as the CEs start their training.
- 4.2 It is a requirement that CEs who are aspiring to become professional engineers should, with the assistance of their mentors, achieve their training objectives by structuring their training in such a way as to cover the various elements of training referred to in Policy Statement R2/1A and these Discipline Specific Guidelines.
- 4.3 The rate at which CEs progress through their training is determined by themselves, their mentors and other factors, such as the state of the economy and availability of training opportunities.
- 4.4 Where CEs, training under a CU, decide to change employers, they should ensure that they continue their training under another CU registered by their new employers. CEs should also ensure that their new employers provide mentors to guide them through the remainder of their training period and to take over where the previous mentor ended. It may even be advisable to retain the previous mentor, if this is at all practicable.
- 4.5 Once all the objectives have been achieved to the satisfaction of the mentor, CEs should, in principle be registerable, and could then apply for registration as professional engineers. Depending on the circumstances, CEs may expect to take a minimum of three years to achieve acceptable competence in all the prescribed elements.
- 4.6 Regardless of whether or not CEs train under a CU, it is recommended that they strive to participate in a process of continuing learning. This concept includes continuing education and professional development.

- 4.7 Continuing learning may include attending courses, technical conferences, seminars, symposia, organised site visits and meetings of professional bodies, and self-study. The process of continuing learning should achieve a balance between technical content and managerial/professional aspects.
- 4.8 The mentors of CEs should, on a consultative basis, suggest suitable continuing learning programmes.
- 4.9 SAIEE and educational institutions may be able to assist in advising on courses which are available.
- 4.10 It will be to the advantage of CEs when applying for registration as professional engineers if they can demonstrate their participation in a process of continuing learning.

## **5. Professional Attributes**

The following attributes are considered common to all professional engineers and the requirements for these attributes are designed to ensure that CEs acquire competence in respect of professional responsibility in decision making, engineering judgement, communication and an appreciation of their own professional and working environments.

### **5.1 Professional Responsibility**

CEs must ensure that their work reaches a level of responsibility commensurate with that which ECSA would normally expect of an engineer with three years post-graduate experience, both in terms of the type and level of work being performed. This means that responsibility for directing personnel, money and materials must be taken during the execution of a project, or part of a project. When applying for registration as a professional engineer, CEs must demonstrate their ability to work satisfactorily on their own, that they have taken responsibility and, in having done so, achieved a satisfactory outcome.

### **5.2 Engineering judgement displayed in practical application**

When applying for registration as professional engineers, CEs must demonstrate that their engineering work required them to-

- exercise independent technical judgement, combining their experience and application of engineering principles;
- accept responsibility for such decisions; and
- understand and take into account financial, economic, commercial and statutory considerations.

### **5.3 Communication Skills**

CEs must develop the ability to communicate lucidly, accurately and with confidence. ECSA will base its assessment of a CE's communication skills on the quality of the application presented.

## 5.4 Professional Environment

CEs must, when reporting to their mentors on a regular basis, and in discussions with them, demonstrate that they have:

- a general understanding of engineering procedures applicable to their discipline of engineering;
- a general knowledge of legislation which has a bearing on the practice of engineering in South Africa, with a working knowledge of the provisions of the Engineering Profession Act, 2000 (Act 46 of 2000) and the Acts and Regulations applicable to their specific discipline of engineering;
- a good understanding of the Code of Professional Conduct applicable to registered persons;
- an understanding of the purpose of and relationship between the various organisations involved in their discipline of engineering; and
- full familiarity with the requirements for registration set out in Policy Statement R2/1A as well as these Discipline Specific Guidelines.

## 6. Discipline Specific Elements

The overall scheduling and the more specific requirements for the three-year training of electrical engineers in training vary considerably in view of the variety of areas of activity in electrical engineering and organisations providing training in this discipline of engineering.

Electrical engineering covers areas such as power, electronics, telecommunication, measurement, control and computer and software engineering.

Organisations vary depending upon the product they produce. These vary from small to large manufacturers of electrical components of various types and sizes, to design and installation contractors and to major utility organisations, such as ESKOM, TELKOM and TRANSNET.

Therefore, it is difficult to provide specific details for the training of CEs in their particular training environment.

### 6.1 Electrical Engineering Activities

The following activities cover the technical field, which a CE in electrical engineering would normally be exposed to during their training period:

- developing an engineering brief;
- documentation / literature review;
- designing a solution;
- reporting; and
- implementation.

CEs should record their personal involvement in these activities.

### **6.1.1 Developing an engineering brief**

CEs must demonstrate that they have experience in the accurate identification and definition of the nature of the engineering, economic, environmental and social dimensions, and the circumstances under which the electrical project is developed. It is, therefore, a requirement that CEs involve themselves actively, albeit in a supportive role, in researching, assembling and assessing basic data. When submitting their regular progress reports to their mentors, CEs should indicate their involvement in problem investigation and/or developing an engineering brief. They should demonstrate that they have become conversant with a systems approach directed towards identifying and evaluating a problem or task. All relevant factors should be taken into account to ensure a holistic solution.

### **6.1.2 Documentation / Literature Review**

Appropriate technical specifications and literature relating to engineering materials, equipment, available skills, finances, market conditions, information and all other productive resources are essential components of any solution. In addition to the above mentioned the overall safety of the solution and environmental impact should also be highlighted by the CEs through specific reference to legislation and regulations.

### **6.1.3 Designing a Solution**

In designing the solution to an engineering brief it is necessary to compile all relevant data acquired during the investigation and to perform an analysis. CEs must personally contribute to the process of synthesis and demonstrate their ability to generate a variety of solutions.

Significant factors influencing the merits of the solution must be identified.

### **6.1.4 Reporting**

A response to a specific engineering brief, or a solution to a problem, must be presented by the applicant in an appropriate fashion which would include an executive summary followed by a properly structured technical report comprising of text, diagrams, schematics, sketches, charts, general arrangement drawings and computer related documentation where applicable.

### **6.1.5 Implementation**

In order for CEs to program activities and plan work, it is necessary that they have a knowledge of the use, performance and cost of appropriate resources, such as plant and equipment, labour, technology, components, information and finances. CEs must display their knowledge of the manner in which the parties to a contract/agreement exercise their duties and responsibilities. They must demonstrate their involvement in the monitoring of and reporting on the progress achieved during solution implementation.

## **7. Information required in addition to ECSA's Application Form**

**A Project Summary Report Form (Form AD7), attached to these Discipline Specific Guidelines, must be submitted.**

The CE may submit reports on up to three projects. Whilst in some instances a report on full involvement in a single major project will suffice, in other cases a number of reports on projects in which CEs made smaller contributions should be submitted.

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## **7.1 Professional Development Report**

### **A Professional Development Form (Form AD8) attached to these Discipline Specific Guidelines must be submitted**

The CE must complete a Professional Development Report (Form AD8) and provide evidence of his/her professional development in the various listed competencies covering the complete period of training. This form must be verified by the mentor/referee/supervisor. It is important that the CE very clearly details his/her competency level and the levels of his/her responsibilities.

## **7.2 Referee's Comments**

### **A Referee's Comment Form (AD9) attached to these Discipline Specific Guidelines, must be submitted together with the Referee's Report Form (Form A4.1)**

In addition to the Referee's Report Form (Form A4.1), referees must also be requested to complete the Referee's Comment Form (Form AD9) and submit this together with the Referee's Report Form (A 4.1) to ECSA

## **8. Guidelines: Structure of Training Programme**

### **8.1 Induction**

Training should begin with a short induction aimed at discussing, planning and establishing a programme which would structure the training and professional development of the CE, so that all the requirements set out in Policy Statement R2/1A and these Discipline Specific Guidelines can be met within three to four years after graduation. This is also an opportune time for mentors to impress upon their CEs the need for developing a predisposition towards thinking broadly, and to explain the benefits of such a mindset. Since the ultimate responsibility for the CE's professional development rests with themselves, it is important that they be encouraged to be proactive and to show initiative in every activity.

A structured training programme should include a period of basic practical experience, exposure to design, project work and the development of responsibility and judgement.

Time should also be made available for continuing learning as defined in § 4.

### **8.2 Basic Practical Training**

The total time expended on basic practical training is usually between three to six months. During this period emphasis should rather be placed on the qualitative aspects of such training rather than its duration.

### **8.3 Exposure to Design**

CEs should spend between six to nine months in the design of electrical engineering projects. This would involve the process of plant/system-layout and the economic use of people, materials and machines.

### **8.4 Project work**

The remainder of the time should be applied to the implementation of a project(s). During this period experience should range from simple to more advanced electrical engineering applications where attention should be given to the development of teamwork, with particular reference to participation in communication, human relations, cost analysis, budget control and profit accountability, and project control techniques such as critical path analysis.

### **8.5 Judgement and Responsibility Development**

During the total training period CEs should be given a progressively increasing measure of responsibility, the opportunity to co-ordinate the work of others and to carry out assignments requiring the exercise of judgement, even in the absence of full information. This experience is intended to introduce CEs to the "real world", which is often characteristic of the circumstances in which established professional engineers operate.



## Project Summary Report: Electrical Engineering

Use this form to report on a project to which you have made a significant contribution.  
Use a new form for each project. At least one, but not more than three projects.

**Applicants Surname & Initials:** \_\_\_\_\_

**Application Ref No:** \_\_\_\_\_

<b>Project name and dates</b>	
<b>Engineering brief and Objective</b>	
<b>Environment (Industry; Laboratory; Theory; Simulation)</b>	
<b>Summary</b> <i>(State engineering problems; solutions)</i>	
<b>Your contribution to the project</b> <i>(State aspects of engineering judgment)</i>	
<b>Title of report or publication</b>	
<b>Budget</b>	

**Signature of Applicant:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Mentor/Supervisor Surname & Initials:** \_\_\_\_\_

**Signature of Mentor/Supervisor:** \_\_\_\_\_

## Professional Development Report: Electrical Engineering

**Applicants Surname & Initials:** \_\_\_\_\_

**Application Ref No:** \_\_\_\_\_

### Qualifying Report on Professional Development:

Please complete each block with a paragraph explaining how you have demonstrated this competence.

Competence	Evidence of your Competence
<p><b>A1.</b> Maintain a sound theoretical approach in enabling the introduction of new and advancing technology and other relevant developments</p>	
<p><b>A2.</b> Apply a creative problem solving approach</p>	
<p><b>A3.</b> Look for ways of exploiting emerging technologies to enhance current practices and to ensure continuing fitness for purpose of engineered products and services.</p>	
<p><b>A4.</b> To promote innovation and technology transfer.</p>	
<p style="text-align: center;"><b>Declaration of Mentor / Referee / Supervisor</b></p>	<p>I am confident that the evidence above is a true record of the competence that has been demonstrated by the Candidate.</p> <p><b>Surname &amp; Initials:</b> _____</p> <p><b>Signature:</b> _____ <b>Date:</b> _____</p>

**Applicants Surname & Initials:** \_\_\_\_\_

**Application Ref No:** \_\_\_\_\_

Competence	Evidence of your Competence
<p><b>B1.</b> Identify potential projects and opportunities</p>	
<p><b>B2.</b> To conduct appropriate research, and undertake design and development of possible solutions</p>	
<p><b>B3.</b> To plan and implement solutions, taking a holistic approach to cost, benefits, health, safety, reliability, appearance and environmental impact.</p>	
<p><b>B4.</b> To evaluate the solutions and to make improvements.</p>	
<p><b>Declaration of Mentor / Referee / Supervisor</b></p>	<p>I am confident that the evidence above is a true record of the competence that has been demonstrated by the Candidate.</p> <p><b>Surname &amp; Initials:</b> _____</p> <p><b>Signature:</b> _____ <b>Date:</b> _____</p>

**Applicants Surname & Initials:** \_\_\_\_\_

**Application Ref No:** \_\_\_\_\_

Competence	Evidence of your Competence
<p><b>C1.</b> To plan for effective project implementation</p>	
<p><b>C2.</b> To plan, budget, organize, direct and control tasks, people or resources</p>	
<p><b>C3.</b> To develop the capabilities of staff to meet the demands of changing technical and managerial requirements</p>	
<p><b>C4.</b> To bring about continuous improvement through quality management</p>	
<p><b>Declaration of Mentor / Referee / Supervisor</b></p>	<p>I am confident that the evidence above is a true record of the competence that has been demonstrated by the Candidate.</p> <p><b>Surname &amp; Initials:</b> _____</p> <p><b>Signature:</b> _____ <b>Date:</b> _____</p>

**Applicants Surname & Initials:** \_\_\_\_\_

**Application Ref No:** \_\_\_\_\_

Competence	Evidence of your Competence
<p><b>D1.</b> To work and communicate with others at all levels</p>	
<p><b>D2.</b> To effectively present and discuss ideas and plans</p>	
<p><b>D3.</b> To build teams and negotiate</p>	
<p><b>Declaration of Mentor / Referee / Supervisor</b></p>	<p>I am confident that the evidence above is a true record of the competence that has been demonstrated by the Candidate.</p> <p><b>Surname &amp; Initials:</b> _____</p> <p><b>Signature:</b> _____ <b>Date:</b> _____</p>

**Applicants Surname & Initials:** \_\_\_\_\_

**Application Ref No:** \_\_\_\_\_

Competence	Evidence of your Competence
<p><b>E1.</b> To comply with the Codes and Rules of Conduct</p>	
<p><b>E2.</b> To manage and apply safe systems of work</p>	
<p><b>E3.</b> To undertake engineering work in compliance with the Codes of Practice on Risk and the Environment</p>	
<p><b>E4.</b> To carry out the continuing professional development necessary to ensure competence in areas of future intended practice</p>	
<p><b>Declaration of Mentor / Referee / Supervisor</b></p>	<p>I am confident that the evidence described above is a true record of the commitment that has been demonstrated by this Candidate.</p> <p><b>Surname &amp; Initials:</b> _____</p> <p><b>Signature:</b> _____ <b>Date:</b> _____</p>

**Professional Development Report:  
Electrical Engineering**

**Referees' Comments**

**Applicants Surname & Initials:** \_\_\_\_\_

**Application Ref No:** \_\_\_\_\_

(Please tick appropriate box.)

Remarks	Marginal	Satisfactory	Strong	Not known
<b>Breadth &amp; Depth of Knowledge</b>				
<b>Innovative &amp; Creative Approach</b>				
<b>Problem Solving Skills</b>				
<b>Implementation and evaluation of solutions</b>				
<b>Planning and Project Management</b>				
<b>Resource Management</b>				
<b>Communication and Presentation Skills</b>				
<b>People Skills</b>				
<b>Professional Approach / Conduct</b>				
<b>Commitment to Professional Development</b>				

**Signature of Referee:** \_\_\_\_\_

**Referee Surname & Initials:** \_\_\_\_\_

**Date:** \_\_\_\_\_