ENSURING THE
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SOUTH AFRICA

Competency Standard for Registration in Professional Categories as PE/PT/PCE/PN

R-02-STA-PE/PT/PCE/PN

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ECSA

TABLE OF CONTENTS

TABLES

DEFINITIONS

Benchmark Qualification: An ECSA accredited engineering qualification as set out in the relevant Qualification Standard. For a list of ECSA accredited qualifications meeting the educational requirements refer to document **E-20-PE/PT/PN**.

Competency area: The performance area in which all the outcomes can be demonstrated at the level prescribed by the specific technology in an integrated manner.

Competency indicator: The typifying guide to evidence indicating competence that is not normative.

Continuing Professional Development: The systematic maintenance, improvement and broadening of knowledge and skills, and the development of personal qualities necessary for the execution of professional and engineering duties throughout an engineering practitioner's career.

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

Engineering science: A body of knowledge based on the natural sciences and using a 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.

Ill-posed problem: A problem for which the requirements are not fully defined or may be defined erroneously by the requesting party.

Integrated performance: The overall satisfactory outcome of an activity, which 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.

Management of engineering works or activities: Management of the co-ordinated activities that are required.

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

Over-determined problem: A problem for which the requirements are defined in excessive detail, making the required solution impossible to attain in all its aspects.

Practice area: A generally recognised or distinctive area of knowledge and expertise developed by an engineering practitioner through the path of education, training and experience followed.

Range statement: The required extent of or limitations on expected performance stated in terms of situations and circumstances in which outcomes are to be demonstrated.

ABBREVIATIONS

AIET	Agreement for International Engineering Technicians
DoR	Degree of responsibility
DA	Dublin Accord
IETA	International Engineering Technologist Agreement
IPEA	International Professional Engineers Agreement
PCE	Professional Certificated Engineer
PE	Professional Engineer
PN	Professional Engineering Technician
PT	Professional Engineering Technologist
SA	Sydney Accord
WA	Washington Accord

BACKGROUND

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

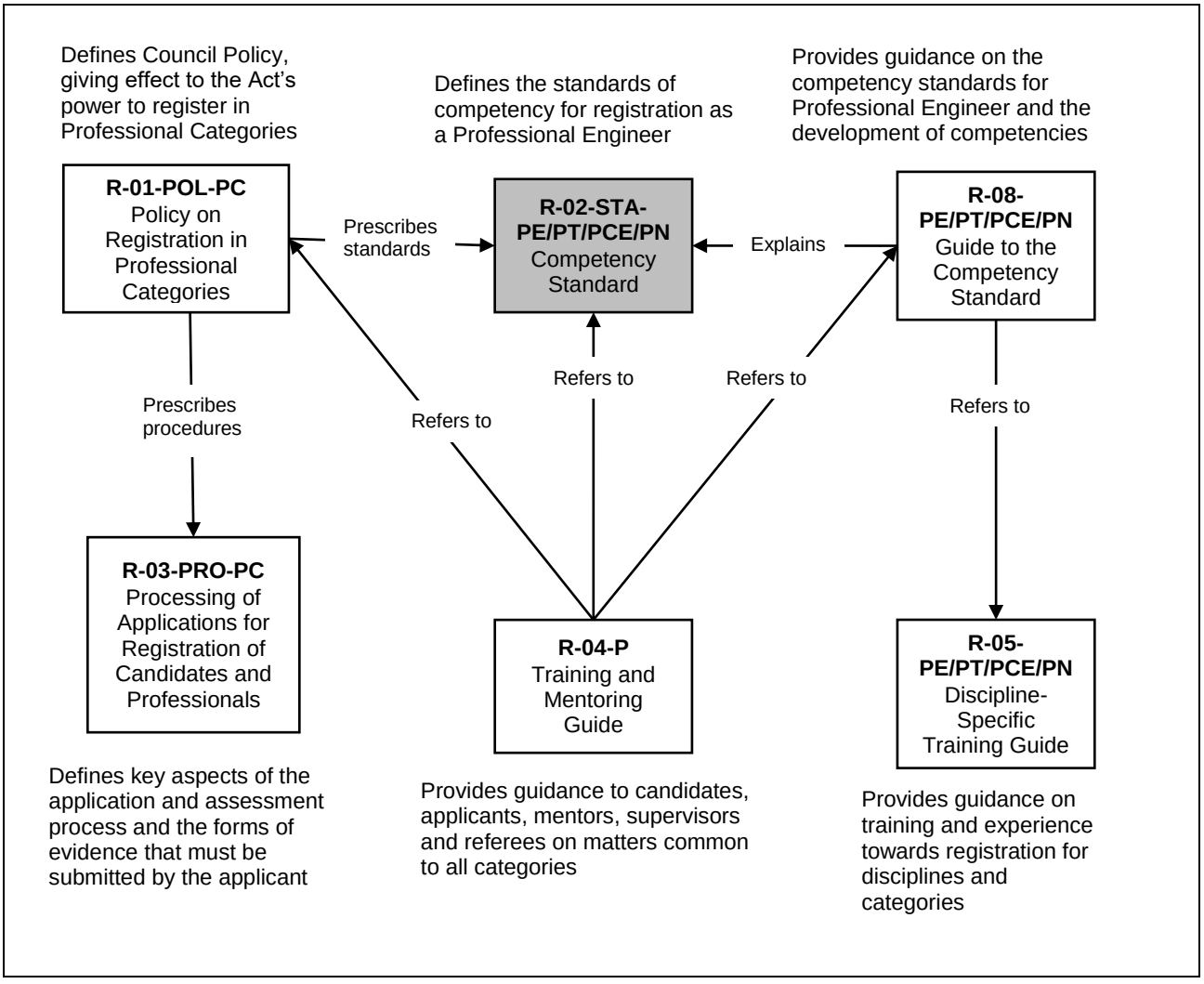

Figure 1: Documents defining the ECSA Registration System

1. PURPOSE OF THIS STANDARD

This Competency Standard defines the competencies required for registration across ECSA's categories of professional registrations: Professional Engineer, Professional Engineering Technologist, Professional Certificated Engineer and Professional Engineering Technician.

2. POLICY STATEMENT

The Competency Standards for professional registration is governed by the Policy on Registration of Professional Categories.

3. APPLICABLE LEGISLATIVE FRAMEWORK

The Engineering Profession Act, 46 of 2000 stipulates that the Council may, subject to this Act:

(a) consider and decide on any application for registration
(b) prescribe the period of validity of the registration of a registered person
(c) keep a register of registered persons and decide on:

  (i) the form of certificates and the register to be kept
  (ii) the maintenance of the register or issuing of certificates
  (iii) the reviewing of the register and the manner in which alterations thereto may be effected.

4. NATIONAL AND INTERNATIONAL COMPLIANCE

ECSA is internationally recognised under the auspices of the International Engineering Agency (IEA) via educational accords and competency agreements as follows:

Educational accords:

- Washington Accord (WA)
- Sydney Accord (SA)
- Dublin Accord (DA)

Competency agreements:

- International Professional Engineers Agreement (IPEA)

- International Engineering Technologist Agreement (IETA)
- Agreement for International Engineering Technicians (AIET)

5. POLICY PROVISIONS

5.2 Introduction to competence

In general, competence is defined as the possession of the necessary knowledge and training and experience to perform the activities within the respective professional category to the standards expected in independent employment or practice.

The knowledge component of competency consists of knowledge from the engineering education process and knowledge that is subsequently acquired during specialised engineering-related activities.

The training and experience component is defined by a set of assessable outcomes, whereby competence must be demonstrated: 1) within applicable engineering activities, 2) by the integrated performance of outcomes, 3) at the level defined for each outcome.

Thus, competence as defined for the purpose of this document, will be detailed in two categories:

- Knowledge component
- Training and experience component.

The training and experience component is deeply integrated with degree of responsibility (DoR).

5.2 Degree of responsibility

The DoR at which a Candidate operates needs to be given specific consideration in conjunction with the demonstration of competence. While the aspect of DoR is detailed elsewhere, such as in the relevant Training and Mentoring Guide, emphasis is placed on the importance of DoR; as such, the Table 1 is provided summarising the degrees of responsibilities from A to E.

Together with the educational and experiential requirements set out in this document, emphasis should be placed on degree of the “performing” degree of responsibility “E” for a Candidate to establish whether he/she is working at the level required for registration.

Table 1: Summary of Degree of Responsibility

DoR	Nature of Work	Responsibility	Level of Support
A Being Exposed	Undergoes induction, observes processes, work of competent practitioners	No responsibility, accept to pay attention	Mentor explains challenges and forms of solution
B Assisting	Performs specific processes under close supervision	Limited responsibility for work output	Supervisor/Mentor coaches, offers feed back
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 quality of work	Candidate articulates own reasoning and compares it with that of supervisor
E Performing	Works in a team without supervision, recommends work outputs, responsible but not accountable	Level of responsibility to supervisor is appropriate to a registered person	Candidate takes on problem solving without support; at most limited guidance

5.3 Level descriptors

The level descriptors referenced in this document pertain to:

- the level of an engineering problem
- the level of an engineering activity.

These descriptors are important in understanding what is expected of a Candidate to achieve satisfactory demonstration of competence.

5.3.1 Level descriptors for engineering problems

There are three level descriptors for engineering problems to consider within each category of registration:

- Complex engineering problems
- Broadly defined engineering problems

- Well-defined engineering problems.

Complex engineering problems

Complex engineering problems require in-depth, fundamental and specialised engineering knowledge that facilitates an analytical approach from first principles.

The characteristics of complex engineering problems include one or more of the following:

(a) Ill-posed, under or over specified and require identification and refinement.

(b) High-level problems that include component parts or sub-problems.

(c) Unfamiliar or involve infrequently encountered issues.

And one or more of the following*:*

(d) Solutions to complex engineering problems are not obvious and require abstract thinking or originality in analysis to formulate suitable models.

(e) Fall outside the scope of usual standards and codes.

(f) Require information from a variety of sources that is complex, abstract or incomplete.

(g) Involve wide-ranging or conflicting issues such as technical and engineering issues and interested or affected parties.

And one or both of the following:

(h) Require judgement in decision-making in uncertain contexts.

(i) Have significant consequences in a range of contexts.

Candidates often find challenges in determining whether an engineering problem can be classified as a *complex engineering problem*. The guide in Table 2 should be consulted by the Candidate in this regard.

Table 2: Test for a complex engineering problem

Step	Main question	Criteria
Step 1 Identify the engineering problem	Is the problem an engineering problem?	a) Does solving the problem require in-depth fundamental and specialised engineering knowledge?

Step	Main question	Criteria
Step 2 Establish the level of complexity of the initial problem state	What is the nature of the problem? Does it have *one or more* of the characteristics b, c and d?	b) The problem is ill-posed, under or over specified and requires identification and refinement.
		c) The problem is a high-level problem and includes component parts or sub-problems.
		d) The problem is unfamiliar or involves infrequently encountered issues.
Step 3 Determine the complexity of the solution path from the initial state	What is encountered in the solution process? Do the solutions have *one or more* of the characteristics e, f, g and h?	e) The solutions are not obvious and require originality or analysis based on fundamentals.
		f) The solutions are outside the scope of standards and codes.
		g) The solutions require information from a variety of sources that are complex, abstract or incomplete.
		h) The solutions involve wide-ranging or conflicting issues such as technical and engineering issues and interested or affected parties.
Step 4 Determine the level of decision-making required and potential consequences	What is involved in the decision-making while solving the problem and evaluating the solution? Does it have ***one or more*** of the characteristics **i** and **j**?	i) Decisions require judgement in decision-making in uncertain contexts.
		j) Decisions have significant consequences in a range of contexts.

Broadly defined engineering problems

Broadly defined engineering problems require coherent and detailed engineering knowledge underpinning the applicable technology area.

The characteristics of *broadly defined engineering problems* include one or more of the following:

(a) The problems are ill-posed, are under or over specified and require identification and interpretation into the technology area.

(b) The problems encompass systems within complex engineering systems.

(c) The problems belong to families of problems that are solved in well-accepted and innovative and sustainable ways.

And one or more of the following:

(d) The problems can be solved by structured analysis techniques.

(e) The problems may be partially outside standards and codes. Justification must be provided to operate outside standards and codes.

(f) The problems require information from the practice area and the sources interfacing with the practice area, and this information is often complex or incomplete.

(g) The problems involve a variety of issues that may impose conflicting technical constraints.

And one or both of the following:

(h) The problems require judgement in decision-making in the practice area and consideration of the interfaces with other areas.

(i) The problems have significant consequences that are important in the practice area and may extend more widely.

Candidates often find challenges in determining whether an engineering-problem can be classified as a *broadly defined engineering problem*. The guide in Table 3 should be consulted by the Candidate in this regard.

Table 3: Test for a broadly defined engineering problem

Step	Main question	Criteria
Step 1 Identification of the engineering problem	Is the problem an engineering problem?	a) Does solving the problem require coherent and detailed engineering knowledge underpinning the applicable technology area?
Step 2 Establishment of the level of complexity of the initial problem state	What is the nature of the problem? Does it have **one or more** of the characteristics **b**, **c** and **d**?	b) The problem is ill-posed, is under or over specified and requires identification and refinement into the technology area.
		c) The problem encompasses systems within complex engineering systems.
		d) The problem is classified as falling within typical engineering requirements and is solved in well accepted and innovative ways.

Step	Main question	Criteria
Step 3 Complexity of the problem path from the initial state	What is encountered in the problem investigation and analysis process? Does it have **one or more** of the characteristics **e**, **f**, **g** and **h**?	e) The problem can be solved by structural analysis techniques / tools / methodologies.
		f) Standards, codes and procedures must be applied to solve the problem, and justification to operate outside these standards and codes must be provided.
		g) The solutions require information from a variety of sources that are complex, abstract or incomplete.
		h) Involve set of interested and affected parties with defined needs to be taken into account, including needs for sustainability.
Step 4 Level of decision-making required and potential consequences	What is involved in the decision-making while analysing the problem? Does it have **either or both** characteristics **i** and **j**?	i) Practical solutions to the problem require knowledge and judgement in decision making in the practice area and require consideration of the interface with other areas.
		j) Decisions have significant consequences that are important in the practice area but may extend more widely.

Well-defined engineering problems

Well-defined engineering problems are mainly solved by practical engineering knowledge underpinned by related theory.

The characteristics of *well-defined engineering problems* include one or more of the following:

(a) Largely defined but may require clarification.

(b) Discrete, focused tasks within engineering systems.

(c) Routine and frequently encountered and may be unfamiliar but in a familiar context.

And one or more of the following:

(d) Can be solved in standardised or prescribed ways.

(e) Encompassed by standards, codes and documented procedures (authorisation required to work outside limits).

(f) Information is concrete and largely complete but requires checking and possible supplementation.

(g) Involve several issues but few of these impose conflicting constraints and involve a limited range of interested and affected parties.

And one or both of the following:

(h) Interpretation requires practical judgement in the practice area in evaluating solutions and in considering interfaces with other role-players.

(i) Have consequences that are locally important but are not far reaching (wider impacts are dealt with by others).

Candidates often find challenges in determining whether an engineering problem can be classified as a well-defined engineering problem. The guide in Table 4 should be consulted by the Candidate in this regard.

Table 4: Illustrating the test for a well-defined engineering problem

Is the problem an engineering problem?	FACTORS
Can the problem:	a) be solved mainly by practical engineering knowledge that is underpinned by related theory?
What is the nature of the problem? Does it have one of the characteristics, b, c or d? *Problems*:	b) are largely defined but may require clarification c) are discreet, focused tasks within engineering systems d) are routine and frequently encountered and may be unfamiliar but in a familiar context.
What is encountered in the solution process? Do the solutions have one of the characteristics, e, f, g or h? *Solutions*:	e) can be solved in standardised or prescribed ways f) are encompassed by standards, codes and documented procedures (require authorisation to work outside limits) g) require information that is concrete and largely complete but require checking and possible supplementation h) involve set of interested and affected parties with defined needs to be taken into account, including needs for sustainability.
What is involved in decision-making while solving the problem and in evaluating the solution?	i) require practical judgement in the practice area of evaluating solutions and considering interfaces with other role-players? j) have consequences that are locally important but not far

Does it have one of the characteristics, i or j? *Do decisions:*	reaching (wider impacts are dealt with by others)?

5.3.2 Level descriptors for engineering activities

In general, the exact activities that are commonly and frequently carried out by Professional Candidates in the various registration categories depend on the Candidate's industry and sub-discipline. The Candidate needs to consider whether his/her activities meet the criteria of the outcomes that need to be demonstrated to be considered for professional registration. The Guide to the Competency Standard for Registration in the respective category, as well as the Discipline-specific Training Guidelines **R-08**, should be consulted for more information in this regard.

The level descriptors for engineering activities, however, are useful to categorise an activity based on its characteristics. There are three main level descriptors for engineering activities to consider within each category of registration, these are:

- Complex engineering activities
- Broadly defined engineering activities
- Well-defined engineering activities

Complex engineering activities

Complex engineering activities are characterised by the following aspects:

(a) The scope of activities may encompass entire complex engineering systems or complex subsystems and may extend beyond previous experiences, i.e., unfamiliar scenarios.

(b) Where the context of the activity is complex and requires identification and specification.

(c) Requiring diverse and significant resources, including people and money.

(d) Involvement of multiple facets such as equipment, materials and technology.

(e) Significant and complex interactions between wide-ranging or conflicting technical, engineering and other issues.

(f) Constraints and challenges with respect to time, finance, infrastructure, resources, facilities, applicable laws, standards and codes.

(g) Significant risks and consequences in a range of contexts, requiring responsibility and accountability in decision-making and judgement.

Broadly defined engineering activities

Broadly defined engineering activities are characterised by the following aspects:

(a) The scope of the practice area is linked to the technologies used and the changes due to the adoption of new technology into current practice.

(b) The practice area is located within a wider, complex context; it requires teamwork and has interfaces with other parties and disciplines.

(c) Involve the use of a variety of resources, including people, money, equipment, materials and technologies.

(d) Require the resolution of occasional problems arising from interactions between wide-ranging or conflicting issues such as technical and engineering issues.

(e) Constrained by available technology, time, finance, infrastructure, resources, facilities, applicable laws, standards and codes.

(f) Having significant risks and consequences in the practice area and related areas.

Well-defined engineering activities

Well-defined engineering activities are characterised by the following aspects:

(a) Scope of practice area is defined by the techniques applied and the techniques that are changed through the adoption of new techniques into current practice.

(b) Practice area is located within a wider, complex context and involves well-defined working relationships with other parties and disciplines.

(c) Work involves a familiar and defined range of resources, including people, money, equipment, materials and technologies.

(d) Resolution of interactions manifested among specific technical factors with limited impact on wider issues is required.

(e) Constrained by operational context, defined work packages, time, finance, infrastructure, resources, facilities, applicable laws, and standards and codes.

(f) Demonstrate risks and consequences that are locally important but are not generally far reaching.

5.4 Competence: Knowledge component

The criteria and processes for recognition of education qualifications for professional categories as defined by ECSA are detailed in document **E-17-PRO**, while the Registration Policy document (**R-01-POL-PC**) sets out the minimum requirements for registration in the respective categories.

5.5 Competence: Training and experience component

Table 5 provides an overview of the benchmark educational and knowledge-components for the respective registration categories and Training and Experience requirements for each category of registration, in conjunction with the corresponding level descriptor. The subsequent section provides more detail for each registration category.

Table 5: Summary of qualification benchmarks

Category of registration	Qualification (benchmark)	Qualification duration (benchmark)	Training and experience	Level descriptor
Professional Engineer Pr Eng	BSc (Eng) BEng	4 years	3 years	Solving *complex engineering problems* and performing complex engineering activities
Professional Engineering Technologist Pr Tech Eng	Adv Dip Eng BTech (Eng) BEng Tech	3 years 4 years	4 years 3 years	Solving *broadly defined engineering problems* and performing broadly defined engineering activities
Professional Certificated Engineer Pr Cert Eng	NDip Dip Eng Tech Dip Eng	Obtain one of the seven GCCs	3 years including a legal appointment for 12 months	Solving *broadly defined engineering problems* and performing broadly defined engineering activities
Professional Engineering Technician Pr Techni Eng	Certificate of Competency Adv Cert (Eng) Adv Cert (Eng Prac)	2 years 3 years	4 years 3 years	Solving well-defined engineering problems and performing well-defined engineering activities
Note: Academic programmes must be accredited, recognised or evaluated as substantially equivalent, with individual assessments where required.				

5.5.1 Professional Engineer

Competence must be demonstrated within *complex engineering activities* by integrated performance of the outcomes at the level defined for each outcome. Required contexts and functions are specified in the applicable Discipline Specific Guide.

A crucial requirement for the demonstration of the outcomes for registration as a Professional Engineer is to satisfy the criteria of *complex engineering activity*. Candidates who fall short of the requirements for registration in this category almost always do so because the term *complex engineering problem* is not understood and therefore cannot be demonstrated.

Insofar as the time-based minimum requirements are concerned, the onus is on the Candidate to ensure that he/she fulfils all outcomes within the ambit of the definition of *complex engineering problem*.

5.5.2 Professional Engineering Technologist

Competence must be demonstrated within broadly defined engineering activities by integrated performance of the Outcomes defined, at the level specified for each Outcome. Required contexts and functions may be referred to in the applicable Discipline Specific Training Guidelines and Guide to the Competency Standards for Registration as a Professional Engineering Technologist (**R-08-PT**).

5.5.3 Professional Certificated Engineer

Competence must be demonstrated within broadly defined engineering activities by integrated performance of the Outcomes defined, at the level specified for each Outcome. Required contexts and functions may be referred to in the applicable Discipline Specific Training Guidelines and Guide to the Competency Standards for Registration as a Professional Engineering Technologist (**R-08-PT**).

- Electrical Engineer's Certificate of Competency issued in terms of the Mines Health and Safety Act, 1996

- Mechanical Engineer's Certificate of Competency issued in terms of the Mines Health and Safety Act, 1996
- Electrical Engineer's Certificate of Competency issued in terms of the Occupational Health and Safety Act, 1993
- Mechanical Engineer's Certificate of Competency issued in terms of the Occupational Health and Safety Act, 1993
- Manager's Certificate of Competency (Metalliferous) issued in terms of the Mines Health and Safety Act, 1996 or Minerals Act, 1991
- Manager's Certificate of Competency (Coal) issued in terms of Mines Health and Safety Act, 1996 or Minerals Act, 1991
- Chief Engineer Officer – Foreign Going Certificate of Competency issued in terms of the Merchant Shipping Act, 1951.

To register as a Professional Certificated Engineer, a minimum period of three years appropriate post-Government Certificate of Competency experience and training is required, which includes a legal appointment as a Certificated Engineer for at least one year in a non-acting capacity, and updating of competence throughout. Only experience and legal appointments, which meet the following requirements, are considered:

(a) A minimum of three years as:

(i) Manager at a metalliferous or coal mine of which one year must include an appointment in terms of the Mines Health and Safety Act, 29 of 1996, which requires the possession of a Government Certificate of Competency

(ii) Engineer (Electrical or Mechanical) of which one year must include an appointment in terms of the Mines Health and Safety Act, 29 of 1996 in charge of installed power of no less than 2,500 kW.

(iii) Engineer (Electrical or Mechanical) of which one year must include an appointment in terms of the General Machinery Regulations issued in terms of the Occupational Health and Safety Act, 85 of 1993 in charge of installed power of no less than 3,000 kW.

(iv) A Chief or Second Marine Engineer Officer on a vessel with a registered power of no less than 3,000 kW in terms of the Merchant Shipping Act, 57 of 1951.

(b) In all cases mentioned above, the experience shall entail direct involvement in the solution of problems related to the installation, operation and/or maintenance of machinery which require sound engineering judgement and management.

(c) Experience gained as an Engineer includes engineering drawings and design reviews for compliance with operational requirements, risk assessment, analysis and synthesis of solutions to production related problems, failure analysis and incident investigations, construction methods and construction management, training and personnel development – project execution methodologies, stakeholder management, and operational optimisation, provided that at least two of the required three years of experience are directly concerned with the installation, operation and/or maintenance of machinery which require sound engineering judgement and management and which demonstrate the applicant's competence at the required level of broadly defined engineering work.

(d) Alternative certificates and exemptions

(i) The holder of a Certificate of Competency issued in terms of the Minerals Act, 1991 who wishes to qualify for the equivalent certificate for Factories, must re-apply for acceptance as a Candidate together with proof of at least one year's appropriate experience in the maintenance and operation of machinery at a factory to the satisfaction of the Commission of Examiners. After acceptance, the subject Legal Knowledge (Factories) must be passed.

(ii) The holder of a Certificate of Competence as Mechanical Engineer who wishes to qualify for a certificate as an Electrical Engineer must re-apply. He/she must produce proof of appropriate experience, which must be to the satisfaction of the Commissioner of Examiners. Such experience must consist of at least 2 years' experience in the maintenance and operation of electrical machinery or at least 4 years "mixed" experience in the maintenance and operation of both electrical and mechanical machinery, which was gained after the acquisition of the mechanical certificate. The applicant is also required to produce proof of passing the conversion subjects required to cover the syllabus for the Certificate of Competency as Electrical Engineer, with a mark of at least 50%.

(iii) The holder of a Certificate of Competency as an Electrical Engineer who wishes to qualify for a certificate as Mechanical Engineer must re-apply. He/she must produce proof of appropriate experience, which must be to the satisfaction of the Commissioner of Examiners. Such experience must consist of at least 2 years' experience in the maintenance and operation of mechanical machinery or at least 4 years "mixed" experience in the maintenance and operation of both mechanical and electrical machinery, which was gained after the acquisition of the electrical certificate. The applicant is also required to produce proof of passing the conversion subjects required to cover the syllabus for the Certificate of Competency as Mechanical Engineer, with a mark of at least 50%.

5.5.4 Professional Engineering Technician

Competence must be demonstrated within well-defined engineering activities (defined below) by the integrated performance of the outcomes defined in section 3 at the level defined for each outcome. Required contexts and functions may be referred to in the applicable Discipline Specific Training Guidelines (e.g. **R-05-CIV-PN**, etc.) and Guide to the Competency Standards for Registration as a Professional Engineering Technician (**R-08-PN**).

5.6 Competency standards

The competency standards are now summarised in Table, followed by more detailed descriptors for each category of registration.

Table 6: Summary of competency standards

Professional Engineer	Technologists/ Certificated Engineers	Technicians
Level descriptor: complex	Level descriptor: broadly defined	Level descriptor: well-defined
GROUP A – Engineering Problem Solving (Knowledge-based) Outcome 1: Define, investigate and analyse ***(level)*** of engineering problems Outcome 2: Design or develop solutions ***(level)*** of engineering problems Outcome 3: Comprehend and apply knowledge: Principles, specialist knowledge, jurisdictional and local knowledge		

GROUP B – Managing Engineering Activities
Outcome 4: Manage part or all of one or more ***(level)*** of engineering activities
Outcome 5: Communicate clearly with others in the course of his/her engineering activities
GROUP C –Risk and Impact Mitigation
Outcome 6: Recognise and addresses the reasonably foreseeable social, cultural and environmental effects of ***(level)*** of 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 – Act ethically, exercise judgment and take responsibility
Outcome 8: Conduct engineering activities ethically
Outcome 9: Exercise sound judgment in the course ***(level)*** of engineering activities
Outcome 10: Be responsible for making decisions on part or all ***(level)*** of engineering activities
GROUP E – Initial Professional Development
Outcome 11: Undertake Professional Development activities sufficient to maintain and extend his/her competence.

Table 7: Competency standards

Professional Engineer	Professional Engineering Technologist	Professional Certificated Engineer	Professional Engineering Technician
GROUP A – OUTCOMES: ENGINEERING PROBLEM SOLVING This group of outcomes requires the Candidate to apply appropriate theoretical and practical methods to *identify*, *analyse* and *solve* (level) engineering problems.			
Outcome 1: Define, investigate and analyse *complex engineering problems*	**Outcome 1:** Define, investigate and analyse *broadly defined engineering problems*	**Outcome 1:** Define, investigate and analyse *broadly defined engineering problems*.	**Outcome 1:** Define, investigate, interpret and analyse *well-defined engineering* problems
Competency indicators	**Competency indicators**	**Competency indicators**	**Competency indicators**
The definition, investigation and analysis of *complex engineering problems* within the competence area typified by the following performance is expected: • Define the engineering problem and method statement for solving the problem within the parameters of complexity as defined. • Evaluate pertinent information and identify systems and sub-systems of complex problems. • Analyse relevant assumptions, inputs and required outputs of a complex problem.	A definition, an investigation and an analysis of *broadly defined engineering problems* within the competence area typified by the following performances is expected: • Perform or contribute to defining engineering problems, thus leading to an agreed definition of the problems to be solved. • Perform or contribute to investigating engineering problems, including collecting, organising and evaluating information. • Perform or contribute to analysing engineering problems, using conceptualisation, justified assumptions,	A definition, investigation into and analysis of *broadly defined engineering problems* within the competence area, typified by the following performances, is expected: • Perform or contribute to defining engineering problems, thus leading to an agreed definition of the problems to be solved. • Perform or contribute to investigating engineering problems, including collecting, organising and evaluating information. • Perform or contribute to analysing engineering problems, using conceptualisation, justified	A definition, an investigation into and an analysis of *well-defined engineering* problems within the competence area and typified by the following performances are expected: • Received work instructions are interpreted, checking with the client or supervisor that the interpretation is correct. • Further clarifying information is obtained, analysed, interpreted and evaluated, and instruction is revised as a result.

Professional Engineer	Professional Engineering Technologist	Professional Certificated Engineer	Professional Engineering Technician
	limitations and evaluation of results.	assumptions, limitations and evaluation of results.	
Range statement	*Range statement*	*Range Statement*	*Range statement*
The problem may be a design requirement, an applied research and development requirement or a problematic situation in an existing component, system or process. This outcome (1) is concerned with the identifying, understanding and formulating a problem statement: Outcome 2 is concerned with the solution.	The *broadly defined engineering problem* may be a design requirement, an applied research and development requirement or a problematic situation in an existing component, system or process. The problem is amenable to solution by technologies that are applicable to the competence area and known to the applicant. This Outcome is concerned with understanding the problem: Outcome 2 is concerned with the solution.	The problem may be a design requirement, an applied research and development requirement or a problematic situation in an existing component, system or process. The problem is one amenable to solution by technologies known to the applicant applicable to the competence area. This outcome is concerned with understanding a problem: Outcome 2 is concerned with the solution.	The problem may be a design requirement, an applied research and development requirement or a problematic situation in an existing component, system or process. This Outcome (1) is concerned with identifying, understanding and formulating a problem statement: Outcome 2 is concerned with the solution.
Outcome 2: Design or develop solutions to *complex engineering problems.*	**Outcome *2:*** Design or develop solutions to *broadly defined engineering problems.*	**Outcome 2:** Design or develop sustainable solutions to *broadly defined engineering problems*.	**Outcome 2:** Design or develop sustainable solutions to *well-defined engineering problems.*

Professional Engineer	Professional Engineering Technologist	Professional Certificated Engineer	Professional Engineering Technician
Competency indicators	**Competency indicators**	**Competency indicators**	**Competency indicators**
After having applied the identification, investigation and analysis of the complex engineering problem (Outcome 1), this outcome is the actual synthesis and development of the solutions to the *complex engineering problem*, and competence is indicated by: • carrying out the solution to the problem and testing the validity and reasonability of the assumptions • making use of first or fundamental principles; i.e., an approach that is systematic but may be within unfamiliar or previously encountered techniques • articulating the solution and development of an integrated implementation plan.	This outcome is normally demonstrated after the problem analysis defined in Outcome 1. Working systematically to reach a solution to a *broadly defined problem* typified by the following performances is expected: • Design/develop solutions to *broadly defined engineering problems* and check impacts and sustainability. • systematically synthesise solutions and alternative solutions/approaches to the problem by analysing designs, correlating with requirements and including costs and impacts on outside parameters. • Draw up detailed specification requirements and design documentation for implementation to the satisfaction of the client.	This outcome is normally demonstrated after a problem analysis as defined in Outcome 1. Working systematically to reach a solution to a *broadly-defined problem,* typified by the following performances is expected: • Design or develop solutions to *broadly defined engineering problems*. • Check impacts and sustainability. • Systematically synthesise solutions and alternative solutions or approaches to the problem by analysing designs against requirements, including costs and impacts on outside parameters • Draw up detailed specification requirements and design documentation for implementation to the satisfaction of the client.	This outcome is normally demonstrated after the problem analysis referred to in Outcome 1 has been performed. Working systematically to reach a solution to a *well-defined problem* that is typified by the following performances is expected: • Present designed or developed and analysed alternative approaches to conduct the work. • Check impacts and sustainability. • Attach competency assessment to support calculations and engineering documentation. • State the final solution to performing the work and ensure that the client or the supervisor agrees.

Professional Engineer	Professional Engineering Technologist	Professional Certificated Engineer	Professional Engineering Technician
Range statement	*Range statement*	*Range Statement*	*Range statement*
The solution may be the design of a component, system or process or a recommendation of the remedy to a problematic situation within the context of the defined problem (Outcome 2).	Solutions to broadly defined engineering problems are enabled by the technologies in the applicant's competence area. Engineering should not only consider decreasing impacts but also restoring and regenerating through design. This Outcome is concerned with the solution to the problem.	Solutions are those enabled by the technologies in the applicant's competence area. Engineering should look not only to decrease impacts, but also to restore and regenerate through design.	The solution is amenable to established methods, techniques or procedures within the applicant's competence area. Engineering should not only consider decreasing impacts but also consider restoring and regenerating through design and the development of systems.
Outcome 3: Comprehend and apply advanced knowledge – principles underpinning good practice, specialist knowledge, jurisdictional knowledge and local knowledge.	**Outcome 3:** Comprehend and apply the knowledge embodied in widely accepted and applied engineering procedures, processes, systems and methodologies that is specific to the jurisdiction in which the applicant practises	**Outcome 3:** Comprehend and apply the knowledge embodied in widely accepted and applied engineering procedures, processes, systems or methodologies and those specific to the jurisdiction in which he/she practices.	**Outcome 3:** Comprehend and apply knowledge that is embodied in established engineering practices and that is specific to the jurisdiction in which the Engineering Technician practises
Competency indicators	**Competency indicators**	**Competency indicators**	**Competency indicators**
During the course of applying Outcomes 2 and 3, competence is indicated in the evaluation and solution of the complex engineering problem by the application of sound and testable assumptions, underpinned by the utilisation of requisite advanced	This outcome is normally demonstrated during the planning, investigation and operations that are confined to the competence area: • Apply knowledge related to finance, statutes, sustainability, safety and management.	This outcome is normally demonstrated during the planning, investigation or operations confined to the competence area: • Apply engineering principles, practices, technologies, including the application of GCC level theory in the	This outcome is normally demonstrated during the planning, investigation or operations confined to the competence area: • Procedures and systems at N Dip-level or equivalent engineering standard used to execute the work and applied Dip-level

Professional Engineer	Professional Engineering Technologist	Professional Certificated Engineer	Professional Engineering Technician
principles relevant to a particular problem.	• Indicate a working knowledge of areas of practice that interact with the practice area to underpin teamwork. • Apply knowledge related to finance, statutes, sustainability, safety and management.	practice area. • Indicate working knowledge of areas of practice that interact with practice area to underpin teamwork. • Apply related knowledge of finance, statutory, sustainability, safety and management.	theory to understand and/or verify these procedures. • Theoretical calculations at N Dip-equivalent level and/or reasoning on why the application of this theory is considered to be correct (actual examples).
Range statement	*Range statement*	*Range Statement*	*Range statement*
Applicable knowledge includes the following: • Specialist knowledge that has depth in the practice area and is underpinned by the fundamental knowledge of an engineering discipline or cross-disciplinary area. In-depth specialist knowledge in the practice area supports a fundamentals-based, first-principles analytical approach and develops models as required. • Sound working knowledge of interacting disciplines (engineering and other) to underpin teamwork. • Jurisdictional knowledge that includes legal and regulatory requirements in	Applicable knowledge includes the following: • Technological knowledge that is well-established and applicable to the practice area, irrespective of location. This knowledge is supplemented by locally relevant knowledge, for example, established properties of local materials. Emerging technologies are adopted from the formulations of others. • A working knowledge that is confined to the competence area of interacting disciplines (engineering and other) to underpin teamwork. • Jurisdictional knowledge that includes legal and regulatory requirements and	Applicable knowledge includes the following: • Technological knowledge that is well-established and applicable to the practice area irrespective of location, supplemented by locally relevant knowledge, for example, established properties of local materials. Emerging technologies are adopted from formulations of others. • A working knowledge of interacting disciplines (engineering and other) to underpin teamwork confined to the competence area. • Jurisdictional knowledge includes legal and regulatory requirements as	Applicable knowledge includes the following: • Technical knowledge, which is knowledge applicable to the practice area, irrespective of location. It is supplemented by locally relevant knowledge, for example, established properties of local materials. • A working knowledge of immediately interacting disciplines confined to the competence area. Codified knowledge includes the related areas of finance, statutes, safety and management. • Jurisdictional knowledge includes legal and regulatory requirements together with prescribed codes of practice and the application of sustainable materials and

Professional Engineer	Professional Engineering Technologist	Professional Certificated Engineer	Professional Engineering Technician
addition to locally relevant codes of practice. • Understanding and the application of engineering standards specific to the discipline and sub-specialisation of a subject. For example, regulatory body codes, industry standards and sound engineering principles.	locally relevant codes of practice as required for the practice area (i.e. law of contract, contract administration, health and safety, environmental, application of sustainable materials and practices, intellectual property, quality management, risk management, maintenance management, regulation, project management and construction management).	well as locally relevant codes of practice, as required for practice area: law of contract, contract administration, health and safety, environmental, application of sustainable materials and practices, intellectual property, quality management, risk management, maintenance management, regulation, project management or construction management.	practices.
GROUP B OUTCOMES: MANAGING ENGINEERING ACTIVITIES This group of outcomes requires the candidate to demonstrate technical leadership and effective interpersonal skills.			
Outcome 4: Manage part or all of one or more *complex engineering activities*	**Outcome 4:** Manage part or all of one or more *broadly defined engineering activities*	**Outcome 4:** Manage part or all of one or more *broadly defined engineering activities*	**Outcome 4:** Manage part or all of one or more *well-defined engineering activities*
Competency indicators	**Competency indicators**	**Competency indicators**	**Competency indicators**
The meticulous application of the solution and integrated performance of implementation of a *complex engineering activity* through: • identifying and delegating duties and responsibilities in an inter-disciplinary and varied skills environment	The display of personal and work process management abilities confined to the competence area is expected: • Manage self, people, work priorities, processes and resources in *broadly defined engineering* work. • Provide evidence of role in planning,	The display of personal and work process management abilities is expected confined to the competence area: • Manage self, people, work priorities, processes and resources in *broadly defined engineering* work.	Display of personal and work process management abilities confined to the competence area is expected: • Manage self, priorities, processes and resources when performing the work. • Provide evidence of the role and contribution of the work team.

Professional Engineer	Professional Engineering Technologist	Professional Certificated Engineer	Professional Engineering Technician
• clear communication of responsibility, accountability and impact of the solution • awareness of the effects of high-level decision-making on other parties involved.	organising, leading and controlling *broadly defined engineering* activities. • Provide evidence of knowledge in regard to conditions and the operation of contractors and demonstrate the ability to establish and maintain professional and business relationships.	• Provide evidence of role in planning, organising, leading and controlling *broadly defined engineering* activities. • Demonstrate knowledge of conditions and operation of contractors and the ability to establish and maintain professional and business relationships.	
Range statement	*Range statement*	*Range statement*	*Range statement*
Management is directed at achieving engineering results through the management of people, resources, processes, systems and money. Management involves: • planning *complex engineering activities* • organising *complex engineering activities* • leading *complex engineering activities* • controlling *complex engineering activities*.	See Outcome 5 below	See Outcome 5 below	See Outcome 5 below
Outcome 5: Communicate clearly with others during engineering activities	**Outcome 5:** Communicate clearly with others during engineering activities	**Outcome 5:** Communicate clearly with others during engineering activities.	**Outcome 5:** Communicate clearly with others during engineering activities

Professional Engineer	Professional Engineering Technologist	Professional Certificated Engineer	Professional Engineering Technician
Competency indicators	**Competency indicators**	**Competency indicators**	**Competency indicators**
Competency is indicated in the life cycle of a *complex engineering problem* solution and its implementation by: • presenting complex information to other parties that is factually sound but understandable and executable • demonstrating ability to issue clear and concise instructions and/or guidance to other stakeholders, being aware of various skills levels and disciplines.	The demonstration of effective communication is expected by providing evidence of the following: • Ability to write clear, concise and effective technical, legal and editorially correct reports. • Ability to issue clear instructions to stakeholders using appropriate language and communication skills. • Ability to execute oral presentations using structure, style, language, visual aids and supporting documents appropriate to the audience and the purpose.	Demonstrates effective communication by providing evidence of the following: • Ability to write clear, concise, effective technical, legal and editorially correct reports. • Ability to issue clear instructions to stakeholders using appropriate language and communication skills. • Ability to execute oral presentations using structure, style, language, visual aids and supporting documents appropriate to the audience and purpose.	Demonstrates effective communication by providing evidence of the following: • Presenting a point of view and the compiled reports after completion of the work. • Compiling and issuing instructions to entities working on the same task.
Range statement	*Range statement*	*Range statement*	*Range statement*
For Outcomes 4 and 5, communication involves strategic, managerial, technical and wider impacts of engineering work. Material communication includes concepts, analyses, proposals and informative subjects. The audience includes peers, superiors, persons implementing	For Outcomes 4 and 5, management and communication regarding *broadly defined engineering problems* involve: • planning the activities • organising the activities • leading the activities • implementing the activities	For Outcomes 4 and 5, management and communication in *broadly defined engineering* involve: • planning the activities • organising the activities • leading the activities • implementing the activities	For outcomes 4 and 5, management and communication involve the following: • Planning well-defined engineering activities • Organising well-defined engineering activities • Leading well-defined engineering activities • Implementing *well-defined engineering*

Professional Engineer	Professional Engineering Technologist	Professional Certificated Engineer	Professional Engineering Technician
designs and other work, persons in other disciplines, clients and wider stakeholders. Communication functions must be performed reliably and be repeatable. Communication must be clear and understandable by the various audiences, particularly in the definition and solution of *complex engineering problems*.	• controlling the activities. Communication relates to the technical aspects and the wider impacts of professional work. The audience includes supervisors, peers, subordinates, other disciplines, clients and all stakeholders confined to the competence area. Appropriate modes of communication must be selected. The Engineering Technologist is expected to perform the communication functions reliably and repeatedly.	• controlling the activities. Communication relates to technical aspects and wider impacts of professional work. Audience includes supervisors, peers, subordinates, other disciplines, clients and stakeholders. Audiences confined to the competence area. Appropriate modes of communication must be selected. The Certificated Engineer is expected to perform the communication functions reliably and repeatedly.	activities • Directing, managing and controlling *well-defined engineering* activities. Communication relates to information regarding the technical/project progress and involves verbal and written instructions to the team. Formats for documents are defined. The Engineering Technician is expected to perform the communication functions reliably and repeatedly and confine such functions to the competence area.
GROUP C OUTCOMES: RISK AND IMPACT MITIGATION This group of outcomes requires the candidate to demonstrate recognition of an obligation to society, the profession and the environment and to make a commitment to abide by the professional Code of Conduct			
Outcome 6: Recognise and address the reasonably foreseeable social, cultural and environmental effects of *complex engineering* activities.	**Outcome 6:** Recognise and address the foreseeable social, cultural, environmental and sustainability effects of *broadly defined engineering* activities.	**Outcome 6:** Recognise and address the foreseeable social, cultural, environmental and sustainability effects of *broadly defined engineering* activities.	**Outcome 6:** Recognise the foreseeable social, cultural, environmental and sustainable effects of *well-defined engineering* activities

Professional Engineer	Professional Engineering Technologist	Professional Certificated Engineer	Professional Engineering Technician
Competency indicators	**Competency indicators**	**Competency indicators**	**Competency indicators**
This outcome is normally displayed while evaluating and planning tasks within the competence area by providing evidence of the following: • Ability to identify interested and affected parties and their expectations in regard to interactions among technical, social, cultural, environmental and long-term sustainability considerations. • Demonstration of measures taken to mitigate the negative effects of engineering activities.	This outcome is normally displayed while evaluating and planning tasks within the competence area by providing evidence of the following: • Ability to identify interested and affected parties and their expectations in regard to interactions among technical, social, cultural, environmental and long-term sustainability considerations. • Demonstration of measures taken to mitigate the negative effects of engineering activities.	This outcome is normally displayed while evaluating and planning tasks within the competence area, by typically providing evidence of the following: • Ability to identify interested and affected parties and their expectations in regard to interactions between technical, social, cultural, environmental and long-term sustainability considerations. • Demonstration of measures taken to mitigate the negative effects of engineering activities.	This outcome is normally while evaluating and planning tasks within the competence area by typically providing evidence of the following: • Ability to identify the social, cultural, environmental impacts and the long-term sustainability of the engineering activity. • Communication of mitigating measures to affected parties and acquiring stakeholder engagement.
Outcome 7: Meet all legal and regulatory requirements and protect the health and safety of persons and adhere to sustainable practices in the course of the *complex engineering activities.*	**Outcome 7:** Meet all legal and regulatory requirements, protect the health and safety of persons and adhere to sustainable practices in the course of the *broadly defined engineering activities*.	**Outcome 7:** Meet all legal and regulatory requirements and protect the health and safety of persons and adhere to sustainable practices in the course of his or her *broadly defined engineering activities*.	**Outcome 7:** Meet all legal and regulatory requirements, protect the health and safety of persons and adhere to sustainable practices in the course of the *well-defined engineering activities*.

Professional Engineer	Professional Engineering Technologist	Professional Certificated Engineer	Professional Engineering Technician
Competency indicators	**Competency indicators**	**Competency indicators**	**Competency indicators**
Competency is indicated by the following: • Identifying sustainable practices and applicable legal, regulatory, health and safety requirements and standards for the *complex engineering activity*. • Being aware of far-reaching implications of decisions made on *complex engineering* problem solving and execution.	Competency is indicated by the following: • Identifying sustainable practices and applicable legal, regulatory, health and safety requirements and standards for the *broadly defined engineering* activity. • Stating circumstances in which the applicant assisted in or demonstrated awareness regarding the selection of saving and sustainable materials, components and systems in addition to identifying risk and applied risk management strategies.	Competency is indicated by the following: • Identifying applicable legal, regulatory, health and safety requirements and standards and sustainable practices for the *broadly defined engineering* activity. • Stating circumstances where applicant assisted in or demonstrated awareness of the selection of save and sustainable materials, components and systems and have identified risk and applied risk management strategies.	Competency is indicated by the following: • Identifying applicable legal, regulatory, health and safety requirements and standards and sustainable practices for the well-defined engineering activity. • Stating how health and safety matters are being handled. Manage risks and use safe and sustainable materials, components and systems, seeking advice when necessary on the risk management system that is applied.
Range statement	*Range statement*	*Range statement*	*Range statement*
For Outcomes 6 and 7, impacts and regulatory requirements include the following: • Direct, indirect, immediate and long-term effects of engineering solutions. • Due regard for the principles of sustainability.	For Outcomes 6 and 7, impacts and regulatory requirements include the following: • Both explicitly regulated factors and factors that arise in the course of a particular work. • Impacts considered extend over the lifecycle of the project and include the	For Outcomes 6 and 7, impacts and Regulatory requirements include the following: • Requirements include both explicitly regulated factors and those that arise in the course of particular work. • Impacts considered extend over the lifecycle of the project and include the	For outcomes 6 and 7, impacts and regulatory requirements include the following: • Impacts to be considered are generally those identified within the established methods, techniques or procedures used in the practice area and within the customs and behaviours that exist in a population.

Professional Engineer	Professional Engineering Technologist	Professional Certificated Engineer	Professional Engineering Technician
• Regulatory requirements that are explicit for the context and are generally applicable. • Recognition that protection of society is the highest priority. • Pro-active approach to the implications of complex engineering designs regarding inter-disciplinary teams and management.	consequences of the technologies applied. • Effects to be considered include the direct and indirect effects and the immediate and long-term impact related to the technology used. • Safe and sustainable materials, components and systems must be employed. • Regulatory requirements are explicit for the context and general. • Defined and widely accepted risk management strategies must be applied. • The health and safety of persons located both inside and outside the workplace must be protected.	consequences of the technologies applied. • Effects to be considered include direct and indirect, immediate and long-term, related to technology used. • Safe and sustainable materials, components and systems. • Regulatory requirements are explicit for the context and generally. • Apply defined, widely accepted risk management strategies. • Persons whose health and safety are to be protected are both inside and outside the workplace.	• Regulatory requirements are prescribed. • Prescribed risk management strategies are to be applied. • Effects to be considered and methods used are defined. • Safe and sustainable materials, components and systems are prescribed. • The health and safety of persons located both inside and outside the workplace are to be protected. • The environment must be protected at all times.
GROUP D OUTCOMES: ACT ETHICALLY, EXERCISE JUDGEMENT, ANDTAKE RESPONSIBILITY This group of outcomes requires a Candidate to evaluate the outcomes and impacts of *complex engineering activities*.			
Outcome 8: Conduct engineering activities ethically			
Demonstration of sensitivity to ethical issues and the adoption of a systematic approach to resolving these issues is expected and typified by the following: • Confirmation of conversance with the ECSA Code of Conduct for registered persons • Confirmation of operations that are compliant with the ECSA Code of Conduct for registered persons			

Professional Engineer	Professional Engineering Technologist	Professional Certificated Engineer	Professional Engineering Technician
• Demonstration of how ethical problems and affected parties are identified, and how the best solution to resolve the problem is selected.			
Range statement			
Ethical behaviour involves the comprehension and application of professional ethics, responsibilities and norms of engineering practice within one's own limits of competence.			
Outcome 9: Exercise sound judgement in the course of *complex engineering* activities.	**Outcome 9:** Exercise sound judgement in the course of *broadly defined engineering* activities.	**Outcome 9:** Exercise sound judgement in the course of *broadly defined engineering* activities.	**Outcome 9:** Exercise sound judgement in the course of *well-defined engineering* activities.
Competency indicators	**Competency indicators**	**Competency indicators**	**Competency indicators**
Sound judgement is indicated by the following: • Comprehensive and systematic application of fundamental principles to *complex engineering* problems which may have significant implications on a multitude of stakeholders. • Cognisance of accountability and responsibility.	Exhibition of judgement is demonstrated by the following: • Exercising judgement in arriving at a conclusion within the application of technologies and their interrelationship with other disciplines and technologies. • Considering factors regarding risk, the consequences of the technology applied and the affected parties.	Exhibition of judgement is demonstrated by the following: • Exercising judgement in arriving at a conclusion within the application of technologies and their interrelationship to other disciplines and technologies. • Considering factors regarding risk, the consequences of the technology applied and the affected parties.	Exhibition of judgement is expected and is demonstrated by: • considering how the most important factors applicable to the work done were applied and how they were interrelated • how work consequences were foreseen and situations evaluated in the absence of full evidence.

Professional Engineer	Professional Engineering Technologist	Professional Certificated Engineer	Professional Engineering Technician
Range statement	*Range statement*	*Range statement*	*Range statement*
Judgement in decision-making involves consideration of: • diverse and wide-ranging risk factors • significant consequences in a range of contexts • wide ranges of interested and affected parties with widely varying needs. • correct application of standards and regulations and regard for the accountability and responsibility in decision-making processes	Judgement is expected in the application of the applicant's technologies and in their wider impacts. Judgement is also expected in dealings regarding interfaces with other disciplines and other technologies. Judgement in decision-making involves: • consideration of several risk factors • reduced consequences in a technology application and related contexts • consideration of the ranges of interested and affected parties and their varying needs in addition to the need for sustainability.	Judgement is expected both within the application of the applicant's technologies, in their wider impacts and when dealing with interfaces to other disciplines and technologies. Judgement in decision-making involves: • taking several risk factors into account • significant consequences in a technology application and related contexts • ranges of interested and affected parties with varying needs considered, including needs for sustainability.	Judgement is expected in the implementation of the applicant's methods, techniques and procedures and in the assessment of their immediate impacts. Judgement in decision-making involves: • considering limited risk factors, some of which may be ill-defined • considering the consequences that are in the immediate work contexts • identifying the set of interested and affected parties and considering their defined needs and the needs of sustainability.
Outcome 10: Be responsible in the decision-making for part or all the *complex engineering* activities	**Outcome 10:** Be responsible for making decisions on part or all the *broadly defined engineering* activities	**Outcome 10:** Be responsible for making decisions on part or all the *broadly defined engineering* activities.	**Outcome 10:** Be responsible for making decisions on part or all the *well-defined engineering* activities

Professional Engineer	Professional Engineering Technologist	Professional Certificated Engineer	Professional Engineering Technician
Competency indicators	**Competency indicators**	**Competency indicators**	**Competency indicators**
Competency in responsible decision-making is indicated by: • identifying the impacts implementation of the decision of solving the complex engineering problem • considering negative impacts and assessing risk in a systematic manner • taking responsibility and being prepared to be held accountable for far-reaching and significant consequences (whether positive or negative).	Responsibility is displayed by the following performance carried out within the competency area: • Consideration of engineering, social, environmental and sustainable development in discharging responsibilities for significant parts of one or more activities. • Advice sought from a responsible authority on matters outside the applicant's area of competence. • Use of academic knowledge of at least NQF Level 7 combined with past experience in formulating decisions.	Responsibility is displayed by the following performance carried out within the competency area: • Engineering, social, environment and sustainable development taken into consideration in discharging responsibilities for significant parts of one or more activities. • Advice sought from a responsible authority on matters outside your area of competence. • Academic knowledge of at least GCC level combined with past experience used in formulating decisions.	Responsibility is displayed by the following performances carried out within the competency area: • Using Diploma level theoretical calculations to justify decisions taken in performing engineering work (Attach actual calculations). • Taking responsible advice on any matter falling outside own education and experience. • Taking responsibility for own work and evaluating any shortcomings in output.
Range statement	*Range statement*	*Range statement*	*Range statement*
Responsibility exercised for outcomes of significant parts of one or more *complex engineering* activities.	The applicant is expected to demonstrate discharging responsibility adequately regarding significant parts of one or more *broadly defined engineering* activities.	The applicant is expected to demonstrate adequately discharging responsibility for significant parts of one or more *broadly defined engineering* activities.	The applicant is expected to discharge responsibility for significant parts of one or more *well-defined engineering* activities.
7. GROUP E OUTCOMES: CONTINUING PROFESSIONAL DEVELOPMENT This outcome requires a Candidate to demonstrate a commitment to lifelong learning.			

Professional Engineer	Professional Engineering Technologist	Professional Certificated Engineer	Professional Engineering Technician
Outcome 11: Undertake sufficient professional development activities to maintain and extend competence.			
Competency indicators			
Self-development is managed by the following: • adopting strategy independently to enhance professional development • showing awareness of philosophy regarding professional development.			
Range statement			
Professional development involves: • taking ownership of own professional development • planning own professional development strategy • selecting appropriate professional development activities • recording professional development strategy and activities while displaying independent learning ability.			

REVISION HISTORY

Revision number	Revision date	Revision details	Approved by
Draft A	08 April 2020	Merging of R-02-STA-PE/PT/PCE/PN	RPS BU
Rev 0	06 July 2020	The R-02-PE, R-02-PT, R-02-PCE and R-02-PN are combined into R-02-STA-PE/PT/PCE/PN Knowledge component and summarised competency tables have been added. Alignment to the Policy and Standards Development Framework on ECSA Policies	RPS Executive
Rev 1	16 July 2020	Approval	RPSC
Rev 1	20 August 2020	Ratification	Council

The Competency Standard for:

Registration in Professional Categories as PE/PT/PCE/PN

Revision 1 dated 20 August 2020 consisting of 36 pages have been reviewed for adequacy by the Business Unit Manager and is approved by the Executive: Research, Policy and Standards (RPS).

..... 24/08/2020

Business Unit Manager Date

..... 24/08/2020

Executive: RPS Date

This definitive version of this policy is available on our website

Appendix A: Registration as a Professional Engineering Technologist post qualification

To register as a Professional Engineering Technologist, the appropriate minimum experience at the suitable complexity post qualification is tabled below. Only post qualification experience that meets the following requirements, will be considered:

Title/Name	Experience benchmark (Years)	Responsible experience benchmark (Years)
Prior to 1971		
ATC1/NTC2nn	14	10
ATC2/NTC5	13	9
NTD/NED	11	8
NDT	6	4
NHDT (Only Elec & Mech)	5	3
No Tertiary Qualification & N3	20	10
1972–1980		
NCT/NND	10	6
NHCT	9	5
ID	11	7
NDT	6	4
Mdip	3	1
T1 (Cert)	14	10
T1(Dipl)	13	9
T2 (Cert)	12	8
T2(Dipl)	11	7
Post 1980		
N4	14	10
N5	13	9
N6	11	8
NTD	10	7
Adv Cert (Eng)	8	5
Adv Cert (Eng Prac)	8	5
NDip	8	5

Title/Name	Experience benchmark (Years)	Responsible experience benchmark (Years)
Dip Eng	8	5
Dip Eng Tech	8	5
HND	6	4
BTech (Benchmark)	3	1
Adv Dip Eng (Benchmark)	3	1
BEng Tech (Benchmark)	3	1

Appendix B: Registration as a Professional Engineering Technician post qualification

To register as a Professional Engineering Technician, the appropriate minimum experience at the suitable complexity post qualification is tabled below. Only post qualification experience that meets the following requirements, will be considered:

Title/Name	Experience benchmark (Years)	Responsible experience benchmark (Years)
Prior to 1971		
ATC1/NTC4	8	1
ATC2/NTC5	7.5	1
NTD/NED	6	1
Nat Dip.Tech	3	1
NHDT (Only Elec & Mech)	3	1
No Tertiary Qualification & N3	10	1
1972–1980		
NCT/NND	6	1
NHCT	6	1
ID	6	1
NDT	3	1
Master Dip. Technology	3	1
T1 (Cert)	11	8.5
T1 (Dipl)	8	1
T2 (Cert)	7.5	1
T2 (Dipl)	6	1
Post 1980		
N4	8	1
N5	7.5	1
N6	7	1
NTD/NNDip	6	1
Adv Cert (Eng Prac) (Benchmark)	3	1
NDip (Benchmark)	3	1
Dip Eng (Benchmark)	3	1

Title/Name	Experience benchmark (Years)	Responsible experience benchmark (Years)
Dip Eng Tech (Benchmark)	3	1
HNDip	3	1
BTech	3	1
Adv Dip Eng	3	1
BEng Tech	3	1