ENSURING THE EXPERTISE TO GROW SOUTH AFRICA

Standard for the Identification of Engineering Work

IDoEW-01-STD

REVISION No. 0: 12 April 2022

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ECSA

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PREAMBLE

The publication of the Identification of Engineering Work (IDoEW) in Government Gazette No. 44333 of 26 March 2021 is an essential breakthrough in the engineering fraternity in South Africa. This Standard, which is a legal requirement, brings needed clarity regarding the types of engineering activities and corresponding levels that the different ECSA professionally registered categories of engineers can responsibly undertake while assuming full accountability. This certainty will go a long way in ensuring quality and competitive engineering work in South Africa.

The arsenal of ECSA policies and standards on Registration (R-series) and Education (E-series) were developed before the official publication of the IDoEW Gazette. The latter also only loosely mentions existing ECSA policies. This disconnect between important documents regulating the engineering profession in South Africa was rectified by undertaking an alignment exercise that resulted in the development of the current ECSA standard.

This Standard will set out, guide and enable the various categories of Engineering Practitioner, professionally registered with ECSA and employers, to perform and identify the Work in accordance with the Law, taking full accountability and responsibility for the type of Engineering Specific activities undertaken on behalf of the end user.

The approach followed to develop the standard on the IDoEW has been to clarify the terminology used in the Gazette to align with ECSA definitions and concepts. In addition, the public has expanded a few areas related to the IDoEW of specialised categories, including the Certificated Engineers, as they were subject to possible inconsistent interpretation. Finally, a guideline to assist employers in identifying engineering work is provided at the end of this Standard. Care has been taken to avoid misrepresenting or correcting the Gazette, which admittedly has a few areas, duly mentioned in the Standard, that require future revisions.

As such, this Standard augments the IDoEW Gazette and should constitute the comprehensive one-stop document on IDoEW consistent with existing ECSA policies. The Standard, therefore, aims to promote the ultimate value of sound, reliable, quality Engineering Work in South Africa.

DEFINITIONS

Categories of registration: The categories in which a person is registered in terms of section 18(1)(a) of the Engineering Profession Act.

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.

Construction works: The provision of a combination of goods and services arranged for the development, extension, installation, repair, maintenance, renewal, removal, renovation, alteration, dismantling or demolition of a fixed asset including buildings.

Construction works project: A project in which the scope comprises construction works.

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.

Core service: Engineering work in a practice area of an engineering discipline.

Discipline: The demarcation of the specific body of knowledge within a profession that is applied in a specific context.

Engineering discipline: The body of knowledge which is applied in one of the following contexts:

(a) aeronautical
(b) agricultural
(c) chemical
(d) civil
(e) electrical
(f) industrial
(g) mechanical
(h) metallurgical
(i) mining
(j) any other engineering field introduced.

Engineering infrastructure: Infrastructure comprising engineering works that encompass for example transport, water, energy, communications, waste management and the likes.

Engineering Profession Act: The Engineering Profession Act, 2000 (Act No. 46 of 2000) and any regulations issued in terms thereof.

Engineering project: A project in which the scope comprises engineering work including engineering infrastructure.

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.

Engineering work: The process of applying engineering and scientific principles, concepts, contextual and engineering knowledge to the research, planning, design, implementation and management of work in both the natural and the built environments.

Identified engineering work: Entails the engineering activities reserved in terms of this document for a person registered in any of the ECSA categories.

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

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

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.

Principal agent: The person or entity appointed by the client and who has full authority and obligation to act in terms of the construction contract.

Professional certificated engineer: A person registered in that category in terms of section 18(1)(a)(iii) of the Engineering Profession Act.

Professional engineer: A person registered in that category in terms of section 18(1)(a)(i) of the Engineering Profession Act.

Professional engineering technician: A person registered in that category in terms of section 18(1)(a)(iv) of the Engineering Profession Act.

Professional engineering technologist; A person registered in that category in terms of section 18(1)(a)(ii) of the Engineering Profession Act.

Registered person: A person registered with ECSA as a professional engineer, candidate engineer (under the direction, control and direct supervision of a professionally registered person), professional engineering technologist, candidate engineering technologist (under the direction, control and direct supervision of a professionally registered person), professional certificated engineer, candidate certificated engineer (under the direction, control and direct supervision of a professionally registered person), professional engineering technician, candidate engineering technician (under the direction, control and direct supervision of a professionally registered person), or a specified category practitioner.

Specialised service: A service that falls outside the standard competencies of a registered person who is a professional and which requires an additional qualification, experience, skill and/or registration.

Specified category practitioner. A person registered in terms of section 18(1)(c) of the Engineering Profession Act as a registered lift inspector, registered lifting machinery inspector, medical equipment maintainer, fire protection systems inspector or any other category specified by ECSA.

ABBREVIATIONS

AIET	Agreement for International Engineering Technicians
DoR	Degree of Responsibility
DA	Dublin Accord
ECSA	The Engineering Council of South Africa established under section 2 of the Engineering Profession Act
IETA	International Engineering Technologist Agreement
IDoEW	Identification of Engineering Work
IPEA	International Professional Engineers Agreement
PCE	Professional Certificated Engineer
PE	Professional Engineer
PN	Professional Engineering Technician
PT	Professional Engineering Technologist
SA	Sydney Accord
SC	Specified Category
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.

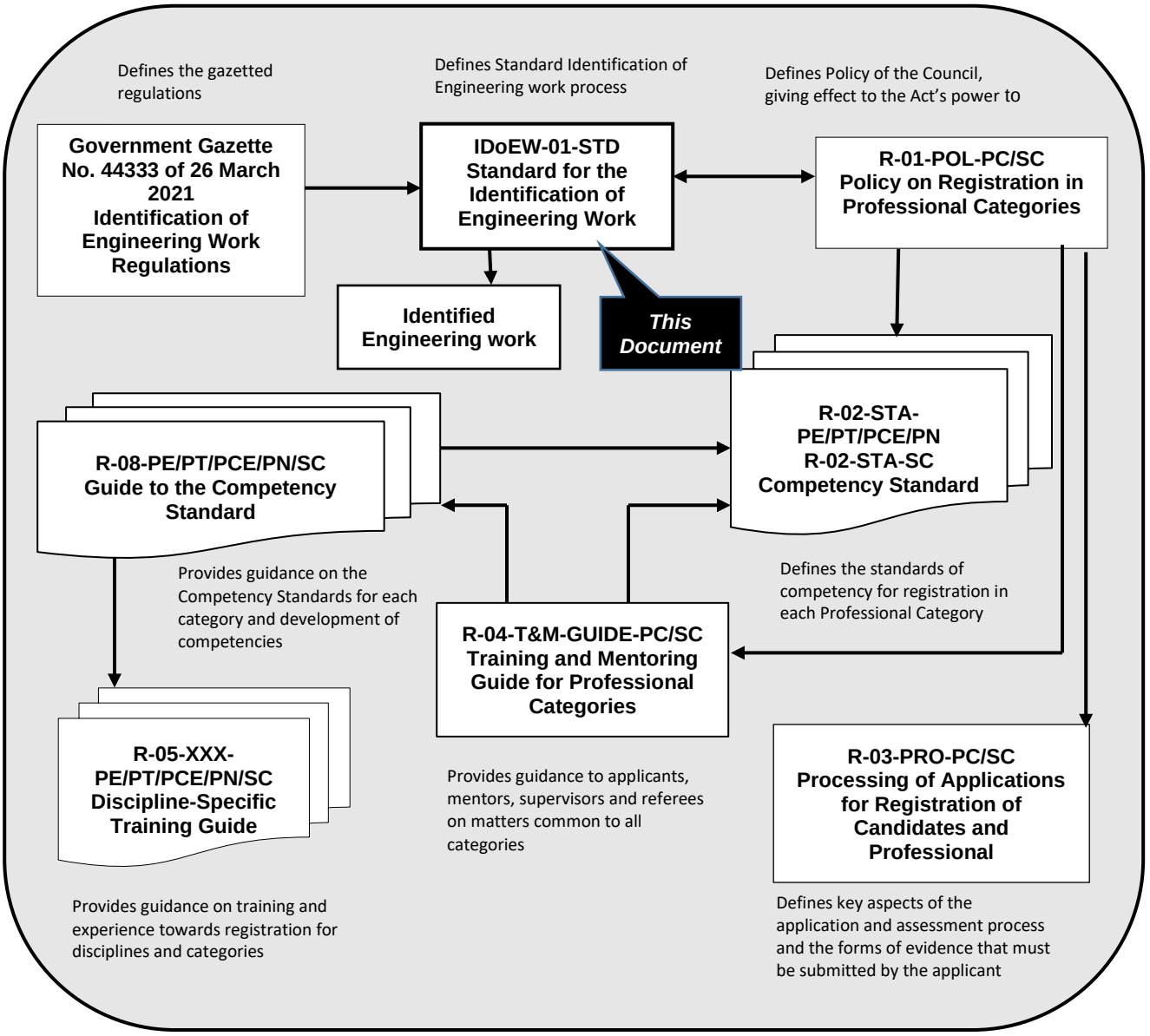

Figure 1: Documents defining the ECSA Identification of Engineering Work and Registration

1. PURPOSE OF THIS STANDARD

This Standard defines the policies set by the Council of ECSA that govern the identification of work for persons registered in the four professional categories of professional engineer, professional engineering technologist, professional certificated engineer, professional engineering technician, as well as the corresponding candidate categories and the specified categories. The policies give effect to provisions of the Engineering Profession Act, 46 of 2000 (the Act) regarding candidate and professional registration and registration in specified categories.

The Identification of Work Gazette No. 43495 was promulgated by the Council for the Built Environment (CBE) in July 2020 for all six Built Environment Councils and the IDoEW was promulgated by ECSA in March 2021. With the advent of this long-awaited document, it has become necessary to align ECSA's registration policies with the legal provisions of identified engineering work contained in the Gazette. This Standard provides a bridge that gives context and a better understanding of ECSA's registration policies.

2. POLICY STATEMENT

The Standard on Identification of Engineering Work defines and expands understanding of the type of engineering work content, which is reserved for registered persons.

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

(d) identify work to be reserved for ECSA registered persons and specified categories.

4. NATIONAL AND INTERNATIONAL COMPLIANCE

The Educational Accords and Competence Agreements members of the International Engineering Alliance establish and enforce internationally bench-marked standards for engineering education and expected competence for engineering practice.

ECSA accredited qualifications and registrations are 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

5.1 Introduction to competence

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

5.2 Identified engineering work

1. Identified engineering work–

(a) entails the engineering activities performed by a person registered in one of the categories of registration that differentiates one category of registration from another

(b) requires for the core competencies within the competency areas that a registered person must possess to perform engineering work in the appropriate category of registration

(c) includes the core services performed by a registered person in any of the categories of registration in a particular engineering discipline

(d) includes the practice areas of a particular engineering discipline within which a registered person performs engineering work

(e) involves performing core services in any of the practice areas of an engineering discipline in accordance with the scope of services, if applicable.

2. The elements of identified engineering work contemplated in sub-item (1) are referred to in:

(a) **item 5.3** which contains the criteria for category differentiation used to determine the engineering activities performed by a person registered in one of the categories of registration

(b) **item 5.4** which contains the core competencies required for each competency area

(c) **items 6.1** to **6.10** which contain the core services and practice areas for each of the engineering disciplines

(d) **item 6.11** which contains the scope of services for specific engineering work.

5.3 Differentiation of registration categories and engineering activities

1. The criteria for category differentiation are based on a distinction among –

(a) a complex, broadly defined, well-defined and specifically defined engineering problem

(b) a complex, broadly defined, well-defined and specifically defined engineering activity.

2. A **complex engineering problem** is a problem that –

(a) requires in-depth fundamental and specialised engineering knowledge and at least one of the following attributes:

(i) Is ill-posed, under- or over specified and requires identification and refinement
(ii) Is high-level and includes component parts or sub-problems
(iii) Is unfamiliar or involves infrequently encountered issues; and

(b) possesses, in addition to the attributes referred to in paragraph (a), at least one of the following attributes:

(i) The solution is not obvious and requires originality or analysis based on fundamentals.
(ii) Is outside the scope of standards and codes.

(iii) Requires information from a variety of sources that are complex, abstract or incomplete.

(iv) Involves wide-ranging or conflicting issues of a technical or engineering nature and involves wide-ranging interested or affected parties with wide-ranging or conflicting opinions; and

(c) possesses, in addition to the attributes referred to in paragraphs (a) and (b), (at least) one of the following attributes:

(i) The problem requires judgement in decision-making in uncertain contexts.

(ii) Has significant consequences in a range of contexts.

3. A **broadly defined engineering** problem is a problem that –

(a) requires coherent and detailed engineering knowledge underpinning the applicable technology area and at least one of the following attributes:

(i) Is ill-posed, under- or over specified, requiring identification and interpretation into the technology area

(ii) Encompasses systems within broadly defined engineering systems

(iii) Belongs to families of problems that are solved in well-accepted but innovative ways

(b) possesses, in addition to the attributes referred to in paragraph (a), at least one of the following attributes:

(i) Can be solved by structured analysis techniques

(ii) May be partially outside standards and codes but must provide justification to operate outside

(iii) Requires information from a practice area and sources interfacing with a practice area that is broadly defined or incomplete

(iv) Involves a variety of issues that may impose conflicting constraints: technical, engineering and interested or affected parties

(c) possesses, in addition to the attributes referred to in paragraphs (a) and (b), at least one of the following attributes:

(i) Requires judgement in decision-making in a practice area, considering interfaces to other areas.

(ii) Has significant consequences that are important in a practice area but may extend more widely.

4. A **well-defined engineering problem** is a problem that –

(a) can be solved mainly by practical engineering knowledge, underpinned by related theory

(b) possesses, in addition to the attributes referred to in paragraph (a), at least one of the following attributes:

(i) Is largely defined but may require clarification
(ii) Requires discrete, focused tasks within engineering systems
(iii) Is routine, frequently encountered and may be unfamiliar but in familiar context

(c) possesses, in addition to the attributes referred to in paragraphs (a) and (b), at least one of the following attributes:

(i) Can be solved in standardised or prescribed ways.
(ii) Is bounded by standards, codes and documented procedures and requires authorisation to work outside limits.
(iii) The information is concrete and largely complete but requires checking and possible supplementation.
(iv) Involves several issues but with few of these imposing conflicting constraints and a limited range of interested and affected parties, and

(d) possesses, in addition to the attributes referred to in paragraphs (a), (b) and (c), at least one of the following attributes:

(i) Requires practical judgement in a practice area in evaluating solutions, considering interfaces to other role-players.
(ii) Has consequences that are locally important but not far reaching.

5. A **specifically defined engineering problem** is a problem that –

(a) can be solved primarily by specific practical engineering knowledge, underpinned by related theory and at least one of the following attributes:

(i) Is fully defined but requires feedback
(ii) Has discrete, specifically focused tasks within engineering systems
(iii) Is routine, frequently encountered and may be unfamiliar but in a familiar specified context

(b) possesses, in addition to the attributes referred to in paragraph (a), at least one of the following attributes:

(i) Can be solved by standardised or prescribed ways.
(ii) Is encompassed by specific standards, codes and documented procedures and requires authorisation to work outside limits.
(iii) The information is concrete, specific and largely complete, but requires checking and possible supplementation
(iv) Involves specific issues but few of these imposing conflicting constraints and a specific range of interested and affected parties.

(c) possesses, in addition to the characteristics referred to in paragraphs (a) and (b), at least one of the following attributes:

(i) Requires practical judgement in a specific practice area in evaluating solutions, considering interfaces to other role players.
(ii) Has consequences that are locally important but within a specified category and its wider impact is dealt with by others.

6. For the purpose of this item, **a complex engineering activity** means an activity that has two or more of the following characteristics:

(a) The scope of activities may encompass entire complex engineering systems or complex subsystems.

(b) It has a context that is complex and varying, is multidisciplinary, requires teamwork, unpredictable, may need to be identified.

(c) It requires diverse and significant resources including people, money, equipment, materials and technologies.

(d) Significant interactions exist among wide-ranging or conflicting technical, engineering or other issues.

(e) It is constrained by time, finance, infrastructure, resources, facilities, standards and codes and applicable laws.

(f) It has significant risks and consequences in a range of contexts.

(g) It includes but is not limited to design; planning; investigation and problem resolution; improvement of materials, components, systems or processes; implementation, manufacture

or construction; engineering operations; maintenance; closure or disposal; project management; research, development and commercialisation.

7. For the purpose of this item, **a broadly defined engineering activity** means an activity that has two or more of the following characteristics:

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

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

(c) It involves using a variety of resources including people, money, equipment, materials and technologies.

(d) It requires resolution of occasional problems arising from interactions between wide-ranging or conflicting technical, engineering and other issues.

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

(f) It has significant risks and consequences in a practice area and related areas.

(g) It includes but is not limited to design; planning; investigation and problem resolution; improvement of materials, components, systems or processes; implementation, manufacture or construction; engineering operations; maintenance; closure or disposal; project management; research, development and commercialisation.

8. For the purpose of this item, **a well-defined engineering activity** means an activity that has two or more of the following characteristics:

(a) The scope of the practice area is defined by techniques applied and changes from adopting new techniques into current practice.

(b) The practice area is located within a wider, complex or broadly defined context, with well-defined working relationships with other parties and disciplines.

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

(d) It requires resolution of interactions manifested among specific technical factors with limited impact on wider issues.

(e) It is constrained by operational context, defined work package, time, finance, infrastructure, resources, facilities, standards and codes and applicable laws.

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

(g) It includes but is not limited to design; planning; investigation and problem resolution; improvement of materials, components, systems or processes; implementation, manufacture or construction; engineering operations; maintenance; closure or disposal; project management; research, development and commercialisation.

9. For the purpose of this item, **a specifically defined engineering activity** means an activity or task where it is a legal requirement that a specified category practitioner performs such activity or task, or an activity or task that has two or more of the following characteristics:

(a) The scope of the specific practice area is defined by specific techniques applied and changes from adopting new specific techniques into current narrow practice.

(b) The practice area is located within a wider, complex context, with specifically defined working relationships with other parties and disciplines.

(c) The work involves specific familiar resources, including people, money, equipment, materials and technologies.

(d) It requires resolution of interactions manifested among specific technical factors with limited impact on wider issues.

(e) It is constrained by operational context, defined work package, time, finance, infrastructure, resources, facilities, standards and codes and applicable laws.

(f) It has risks and consequences that are locally important but specifically defined.

(g) It includes but is not limited to planning; investigation and problem resolution; improvement of materials, components, systems or processes, engineering operations, maintenance, project management, development and commercialisation.

10. ECSA has developed guidelines using the complex, broadly defined, well-defined and specifically defined criteria contemplated in this item to enable a client or an employer to establish which category of registered person is required to perform the work of a specific nature.

5.4 Core competencies required to perform identified engineering work

1. A person who performs any identified engineering work in a particular engineering discipline must, in addition to any other requirement contemplated in the Engineering Profession Act –

(a) be suitably qualified

(b) be registered by ECSA in the appropriate category applicable to the level of service performed

(c) possess the necessary core competency in the competency areas referred to in this item to perform such core service as a professional engineer, professional engineering technologist, professional certificated engineer, professional engineering technician or a specified category practitioner.

2. For the purpose of sub-item (1) “suitably qualified” means being in possession of a qualification that is recognised or accredited by ECSA for purposes of registering a person in any of the categories referred to in section 18(1)(a), (b) and (c) of the Act.

3. The competency areas referred to in sub-item (1)(c) for a professional engineer, professional engineering technologist, professional certificated engineer, professional engineering technician and a specified category practitioner are as follows:

(a) Define, investigate and analyse engineering problems.

(b) Design or develop solutions to engineering problems.

(c) Comprehend and apply engineering, technological, technical and specific knowledge in the practice area.

(d) Manage part or all of one or more engineering activities.

(e) Communicate clearly with others in the course of the engineering activity.

(f) Recognise and address, if applicable, the foreseeable social, cultural and environmental impact of engineering activities generally.

(g) Meet all legal and regulatory requirements and protect the health and safety of persons in the course of his or her engineering activity.

(h) Conduct engineering activities ethically:

(i) Exercise sound judgement in the course of engineering activities.

(ii) Be responsible for making decisions on part or all of one or more engineering activities.

(iii) Undertake professional development or independent learning activities sufficient to maintain and extend his or her competence.

4. The core competencies referred to in sub-item (1)(c) that a person registered as a professional engineer, professional engineering technologist, certificated engineer and professional engineering technician or specified category practitioner must possess when he or she performs any core service in a particular engineering discipline referred to in item 5 are as indicated by the competency area in document **R-02-STA-PE/PT/PCE/PN**.

5. The purpose of a competency area is to limit the activities of each category of registration to the applicable knowledge required for that category of registration.

6. The core competencies must be assessed by using the competency indicators for each competency area referred to in Table 1 below.

7. The competency indicators in Table 1 below are only typifying; other competency indicators may be used provided such other competency indicators are clear indicators of competence.

Table 1 provides the competency indicators to determine the competency in each of the competency areas required of a person registered as a professional engineer, professional engineering technologist, professional certificated engineer, professional engineering technician and a specified category practitioner. The competency indicators for professional engineer, professional engineering technologist and professional engineering technician are aligned to the International Engineering Alliance (IEA) professional competencies.

Table 1: Competency indicators required

Professional Engineer	Professional Engineering Technologist and Professional Certificated Engineer	Professional Engineering Technician	Specified Category Practitioner
Competency Area 1: Define, investigate and analyse *complex engineering* problems.	**Competency Area 1:** Define, investigate and analyse *broadly defined engineering* problems.	**Competency Area 1:** Define, investigate and analyse *well-defined engineering* problems	**Competency Area 1:** Define, investigate and analyse *specifically defined engineering* problems (tasks)
Competency Indicator: A creative, systematic analysis of complex problems typified by the following performances is expected: • Define, investigate or analyse complex engineering problems	**Competency Indicator:** A structured analysis of broadly defined problems typified by the following performances is expected: • Identify and formulate the problem.	**Competency Indicator:** A structured analysis of well-defined problems typified by the following performances is expected: • Identify and interpret the activity.	**Competency Indicator:** An analysis of specifically defined engineering problems (tasks) typified by the following performances is expected: • Understand the activity agreeing with the client.

Professional Engineer	Professional Engineering Technologist and Professional Certificated Engineer	Professional Engineering Technician	Specified Category Practitioner
• Perform/assist in defining or formulating engineering problems, leading to an agreed definition to the problem to be addressed. • Perform/assist in investigating engineering problems including: ○ collecting ○ organising ○ Evaluating information. • Perform/assist in analysing engineering problems: ○ Use conceptualisation, abstraction, modelling ○ Identify and justify assumptions, limitations, constraints, premises using analytical methods both mathematical and non-mathematical ○ Evaluate result of analysis, using judgement ○ Express an understanding emerging from the analysis.	• Agree with client on a problem statement. • Analyse and evaluate information. • Use conceptualisation, abstraction and modelling. • Justify judgement and assumptions made. • Express understanding emerging from analysis.	• Agreeing with client on a problem statement. • Analyse and clarify information, drawings, codes, procedures, etc. Revise and agree on acceptance criteria if necessary.	• Analyse and clarify information, drawings, codes, procedures, etc.
Competency Area 2: Design or develop solutions to complex engineering problems	**Competency Area 2:** Design or develop solutions to broadly defined engineering problems	**Competency Area 2:** Design or develop solutions to well-defined engineering problems.	**Competency Area 2:** Design or develop (plan) solutions to specifically defined engineering problems (tasks).
Competency Indicator: This competency area is normally demonstrated after a problem analysis as defined in competency area 1. Working systematically to synthesise a solution to a complex problem, typified by the following performances is expected: 1. Analyse the design/ planning /solution requirement and draw up detailed requirements specification. 2. Synthesise a range of potential solutions to problem or approaches to developing a solution.	**Competency Indicator:** This competency area is normally demonstrated after a problem analysis as defined in competency area 1. Working systematically to synthesise a solution to a broadly defined problem, typified by the following performances is expected: 1. Analyse the requirement drawing up a design specification. 2. Synthesise potential solutions or approaches and evaluate. 3. Select the best complete solution and develop fully. 4. Present reasoned arguments and proposal.	**Competency Indicator:** This competency area is normally demonstrated after a problem analysis as defined in competency area 1. Working systematically to synthesise a solution to a well-defined problem, typified by the following performances is expected: 1. Develop and analyse alternative approaches to meeting the problem specification. 2. Check impacts. 3. Select the best complete solution, seeking advice on aspects of the proposal or design process that fall	**Competency Indicator:** This competency area is normally demonstrated after a problem (task) analysis as defined in competency area 1. Working systematically to reach a solution to a specifically defined problem (task), typified by the following performances is expected: 1. Develop and analyse alternative approaches to do the task. 2. Check impacts. 3. Select the best complete plan, seeking advice on aspects of the proposal or plan that fall outside established practice or standards.

Professional Engineer	Professional Engineering Technologist and Professional Certificated Engineer	Professional Engineering Technician	Specified Category Practitioner
3. Evaluate the potential approaches against requirements, including cost, and impacts outside requirements. 4. Present reasoned arguments and proposal for preferred option. 5. Fully develop design of selected option. 6. Evaluate resulting solution. 7. Produce design documentation for implementation.	5. Agree with client and produce design documentation for implementation.	outside established practice or standards. 4. Agree with client.	4. Agree with client.
Competency Area 3: Comprehend and apply advanced knowledge: principles, specialist knowledge, jurisdictional and local knowledge.	**Competency Area 3:** Comprehend and apply the knowledge embodied in widely accepted and applied engineering procedures, processes, systems or methodologies specific to the jurisdiction in which he/she practices.	**Competency Area 3:** Comprehend and apply knowledge embodied in established engineering practices and knowledge specific to the jurisdiction in which he/she practices.	**Competency Area 3:** Comprehend and apply knowledge embodied in established specific engineering practices and knowledge specific to the field in which he/she practices.
Competency Indicator: This competency area is normally demonstrated in the course of design, investigation or operations. 1. Display mastery of understanding of engineering principles, practice and technologies in the practice area. 2. Apply general and underpinning engineering knowledge to support analysis and provide insight. 3. Use a fundamentals-based, first principles analytical, approach building models as required. 4. Display working knowledge of areas that interact with the practice area. 5. Display a working knowledge of interacting disciplines (engineering and	**Competency Indicator:** This competency area is normally demonstrated in the course of design, investigation or operations. 1. The thorough understanding and application of engineering principles to support analysis. 2. The use of specialised knowledge in an analytical approach and application of related knowledge in broadly defined engineering activities.	**Competency Indicator:** This competency area is normally demonstrated in the course of design, investigation or operations. 1. The use of codified underpinning educational knowledge in practical well-defined activities. 2. The understanding of knowledge expressed in well-defined procedures and techniques.	**Competency Indicator:** This competency area is normally demonstrated in the course of planning investigation or operations. 1. The use of codified underpinning educational knowledge in practical specifically defined engineering activities. 2. The understanding of knowledge expressed in specifically defined procedures and techniques.

Professional Engineer	Professional Engineering Technologist and Professional Certificated Engineer	Professional Engineering Technician	Specified Category Practitioner
other) to underpin teamwork. 6. Apply related knowledge: financial, statutory, safety, management.			
Competency Area 4: Manage part or all of one or more complex engineering activities.	**Competency Area 4:** Manage part or all of one or more broadly defined engineering activities.	**Competency Area 4:** Manage part or all of one or more well-defined engineering activities.	**Competency Area 4:** Manage part or all of one or more specifically defined engineering activities.
Competency Indicator: The display of personal and work process management abilities is expected: 1. Manage complex engineering activities. 2. Plan, organise, lead and control complex engineering activities. 3. Manage him- or herself. 4. Participate effectively in a team environment. 5. Manage people, and/or work priorities, and/or work processes and/or resources. 6. Demonstrate knowledge of finance as it is applied in engineering. 7. Demonstrate knowledge of the conditions and operations of contract. 8. Demonstrate the ability to establish and maintain professional and business thinking.	**Competency Indicator:** The display of personal and work process management abilities is expected: 1. Manage broadly defined engineering activities. 2. Participate effectively in a team environment. 3. Manage self-people, and/or work priorities, and/or work processes and/or resources. 4. Demonstrate knowledge of finance as it is applied to engineering. 5. Demonstrate knowledge of the conditions and operations of contract. 6. Demonstrate the ability to establish and maintain professional and business relationships.	**Competency Indicator:** The display of personal and work process management abilities is expected 1. Manage self, work priorities, processes and resources. 2. Participate effectively in a team environment.	**Competency Indicator:** The display of personal and work process management abilities is expected: 1. Manage self, work priorities, processes and resources. 2. Participate effectively in a team environment.
Competency Area 5: Communicate clearly with others in the course of his or her engineering activities.	**Competency Area 5:** Communicate clearly with others in the course of his or her broadly defined engineering activities.	**Competency Area 5:** Communicate clearly with others in the course of his or her well-defined engineering activities	**Competency Area 5:** Communicate clearly with others in the course of his or her specifically defined engineering activities
Competency Indicator: Demonstrates effective communication: 1. Writing clear, concise, effective, technically correct reports using a structure and style which meets communication objectives	**Competency Indicator:** Demonstrates effective communication: 1. Writing clear, concise, effective, technically correct reports using a structure and style which meets communication objectives	**Competency Indicator:** Demonstrates effective communication: 1. Writing clear, concise, effective, technically correct reports.	**Competency Indicator:** Demonstrates effective communication: 1. Writing clear, concise, effective, technically correct reports.

Professional Engineer	Professional Engineering Technologist and Professional Certificated Engineer	Professional Engineering Technician	Specified Category Practitioner
and user/audience requirements. 2. Reading and evaluating technical and legal matters relevant to the function of a professional engineer. 3. Receiving instructions, ensuring correct interpretation. 4. Issuing clear instructions to subordinates using appropriate language and communication aids, ensuring that language and other communication barriers are overcome. 5. Making oral presentations using structure style, language, visual aids and supporting documents appropriate to the audience and purpose.	and user/audience requirements. 2. Reading and evaluating technical and legal matters relevant to the function of a professional engineering technologist. 3. Receiving instructions, ensuring correct interpretation. 4. Issuing clear instructions to subordinates using appropriate language and communication aids, ensuring that language and other communication barriers are overcome. 5. Making oral presentations using structure, style, language, visual aids and supporting documents appropriate to the audience and purpose.	2. Issuing clear instructions to subordinates and present point of view effectively.	2. Issuing clear instructions to subordinates and present point of view effectively.
Competency Area 6: Recognise and address the reasonably foreseeable social, cultural and environmental effects of complex engineering activities.	**Competency Area 6:** Recognise and address the foreseeable social, cultural and environmental effects of broadly defined engineering activities generally.	**Competency Area 6:** Recognise the foreseeable social, cultural and environmental effects of well-defined engineering activities generally	**Competency Area 6:** Recognise the foreseeable social, cultural and environmental effects of specifically defined engineering activities generally
Competency Indicator: This competency area is normally displayed in the course of analysis and solution of problems, by typically: 1. Identifying interested and affected parties and their expectations. 2. Identifying interactions among technical and social, cultural and environmental factors. 3. Identifying environmental impacts of the engineering activity. 4. Identifying sustainability issues. 5. Proposing and evaluating measures to mitigate	**Competency Indicator:** This competency area is normally displayed in the course of analysis and solution of problems, by typically: 1. Identifying interested and affected parties and their expectations. 2. Identifying interactions between technical and social, cultural and environmental factors. 3. Identifying environmental impacts of the engineering activity 4. Identifying sustainability issues. 5. Proposing and evaluating measures to mitigate	**Competency Indicator:** This competency area is normally displayed in the course of analysis and solution of problems, by typically: 1. Identifying affected parties and environmental impacts of the engineering activity. 2. Proposing mitigating measures and communicating with stakeholders.	**Competency Indicator:** This competency area is normally displayed in the course of evaluating and planning tasks, by typically 1. Identifying affected parties and environmental impacts of the engineering activity. 2. Proposing mitigating measures and communicating on measures with stakeholders.

Professional Engineer	Professional Engineering Technologist and Professional Certificated Engineer	Professional Engineering Technician	Specified Category Practitioner
negative effects of engineering activity. 6. Communicating with stakeholders.	negative effects of engineering activity. 6. Communicating with stakeholders.		
Competency Area 7: Meet all legal and regulatory requirements and protect the health and safety of persons in the course of his or her complex engineering activities.	**Competency Area 7:** Meet all legal and regulatory requirements and protect the health and safety of persons in the course of his or her broadly defined engineering activities.	**Competency Area 7:** Meet all legal and regulatory requirements and protect the health and safety of persons in the course of his or her well-defined engineering activities.	**Competency Area 7:** Meet all legal and regulatory requirements and protect the health and safety of persons in the course of his or her specifically defined engineering activities.
Competency Indicator: 1. Identifying applicable legal, regulatory and health and safety requirements for the engineering activity. 2. Identifying health and safety requirements applicable for the engineering activity. 3. Assistance or awareness of the selection of safe and sustainable materials, components and systems. 4. Assistance or awareness of recognising and identifying risk and applying accepted risk management strategies.	**Competency Indicator:** 1. Identifying applicable legal, regulatory and health and safety requirements for the engineering activity. 2. Identifying health and safety requirements applicable for the engineering activity. 3. Assistance or awareness of the selection of safe and sustainable materials, components and systems. 4. Assistance or awareness of recognising and identifying risk and applying accepted risk management strategies.	**Competency Indicator:** 1. Identifying applicable legal, regulatory and health and safety requirements for the engineering activity. 2. Managing risks and use safe and sustainable materials, components and systems, seeking advice when necessary.	**Competency Indicator:** 1. Identifying applicable legal, regulatory and health and safety requirements for the specifically defined engineering activity. 2. Managing risks and use safe and sustainable materials, components and systems, seeking advice when necessary.
Competency Area 8: Conduct engineering activities ethically	**Competency Area 8:** Conduct engineering activities ethically	**Competency Area 8:** Conduct engineering activities ethically	**Competency Area 8:** Conduct engineering activities ethically
Competency Indicator: A professional approach must be demonstrated at all times by the following: 1. Knowledge of ECSA Code of Conduct. 2. Member/active participation in activities of a recognised voluntary association (VA). 3. Understanding of Professional Society structures/Network/Interacti on Sensitivity to ethical issues and the adoption of a systematic approach to resolving these issues is expected, typified by:	**Competency Indicator:** A professional approach must be demonstrated at all times by the following: 1. Knowledge of ECSA Code of Conduct. 2. Member/active participation in activities of a recognised VA. 3. Understanding of Professional Society structures/Network/Interacti on Sensitivity to ethical issues and the adoption of a systematic approach to resolving these issues is expected, typified by:	**Competency Indicator:** Sensitivity to ethical issues and the adoption of a systematic approach to resolving these issues is expected, typified by the following: 1. Identifying ethical problems and affected parties and their interests. 2. Compliance with ECSA's Code of Conduct.	**Competency Indicator:** Sensitivity to ethical issues and the adoption of a systematic approach to resolving these issues is expected, typified by the following: 1. Awareness of ethical problems and affected parties and their interests. 2. Compliance with ECSA's Code of Conduct.

Professional Engineer	Professional Engineering Technologist and Professional Certificated Engineer	Professional Engineering Technician	Specified Category Practitioner
a) Identifying the central ethical problem. b) Identifying affected parties and their interest. c) Searching for possible solutions for the dilemma. d) Evaluating each solution using the interests of those involved, accorded suitable priority. e) Selecting and justifying the solution that best resolves the dilemma.	a) Identifying the central ethical problem. b) Identifying affected parties and their interest. c) Searching for possible solutions for the dilemma. d) Evaluating each solution using the interests of those involved, accorded suitable priority. e) Selecting and justifying the solution that best resolves the dilemma.		
Competency Area 9: Exercise sound judgement in the course of complex engineering activities.	**Competency Area 9:** Exercise sound judgement in the course of broadly defined engineering activities.	**Competency Area 9:** Exercise sound judgement in the course of well-defined engineering activities.	**Competency Area 9:** Exercise sound judgement in the course of specifically defined engineering activities.
Competency Indicator: Exhibition of sound engineering judgement is expected by the following: 1. Considering several factors, some of which may not be well-defined or unknown. 2. Considering the interdependence interactions and relative importance of factors. 3. Foreseeing consequences of actions. 4. Evaluating a situation in the absence of full evidence. 5. Drawing on experience and knowledge.	**Competency Indicator:** Exhibition of judgement is expected by the following: 1. Considering several factors, some of which may not be well-defined or unknown. 2. Considering the interdependence interactions, and relative importance of factors. 3. Foreseeing consequences of actions. 4. Evaluating a situation in the absence of full evidence. 5. Drawing on experience and knowledge.	**Competency Indicator:** Exhibition of judgement is expected by the following: 1. Considering a limited number of factors and their independence. 2. Foreseeing consequences of actions, evaluating a situation in the absence of full evidence.	**Competency Indicator:** Exhibition of judgement is expected by the following: 1. Considering specific factors applicable to the category and how they are interrelated. 2. Foreseeing consequences of actions, evaluating a situation in the absence of full evidence.
Competency Area 10: Be responsible for making decisions on part or all of complex engineering activities.	**Competency Area 10:** Be responsible for making decisions on part or all of one or more broadly defined engineering activities.	**Competency Area 10:** Be responsible for making decisions on part or all of all of one or more well-defined engineering activities.	**Competency Area 10:** Be responsible for making decisions on part or all of one or more specifically defined engineering activities.
Competency Indicator: Responsibility is displayed by the following performance: 1. Having due regard to technical social, environmental and	**Competency Indicator:** Responsibility is displayed by the following performance: 1. Having due regard to technical social, environmental and	**Competency Indicator:** Responsibility is displayed by the following performance: 1. Demonstrating a professional approach at all	**Competency Indicator:** Responsibility is displayed by the following performance: 1. Demonstrating a professional approach at all

Professional Engineer	Professional Engineering Technologist and Professional Certificated Engineer	Professional Engineering Technician	Specified Category Practitioner
sustainable development considerations. 2. Seeking advice from a responsible authority on any matter considered to be outside area of competence. 3. Making decisions on and taking responsibility for one or more complex engineering activities.	sustainable development considerations. 2. Seeking advice from a responsible authority on any matter considered to be outside area of competence. 3. Making decisions on and take responsibility for one or more broadly defined engineering activities.	times by applying theory to justify solutions. 2. Taking advice from a responsible authority on any matter considered to be outside applicable standards and codes. 3. Evaluating work output, revising as required and taking responsibility for this work output.	times by applying knowledge to justify actions. 2. Taking advice from a responsible authority on any matter considered to be outside applicable standards and codes. 3. Evaluating work output, revising as required and taking responsibility for this work output.
Competency Area 11: Undertake professional development activities sufficient to maintain and extend his or her competence.	**Competency Area 11:** Undertake professional development activities sufficient to maintain and extend his or her competence.	**Competency Area 11:** Undertake independent learning activities sufficient to maintain and extend his or her competence.	**Competency Area 11:** Undertake independent learning activities sufficient to maintain and extend his or her competence.
Competency Indicator: Self-development typically managed by the following: 1. Planning own professional development strategy. 2. Selecting appropriate professional development activities. 3. Keeping record of professional development strategy and activities. 4. Displaying independent learning ability. 5. Completing professional development.	**Competency Indicator:** Self-development typically managed by the following: 1. Planning own professional development strategy. 2. Selecting appropriate professional development activities. 3. Keeping record of professional development strategy and activities. 4. Displaying independent learning ability. 5. Completing professional development.	**Competency Indicator:** Self-development typically managed by the following: 1. Planning own professional development strategy. 2. Selecting appropriate professional development activities. 3. Keeping record of professional development strategy and activities. 4. Displaying independent learning ability. 5. Completing professional development.	**Competency Indicator:** Self-development typically managed by the following: 1. Planning own professional development strategy. 2. Selecting appropriate professional development activities. 3. Keeping record of professional development strategy and activities. 4. Displaying independent learning ability. 5. Completing professional development.

6. PERFORMANCE OF CORE SERVICE IN PRACTICE AREA

1. Identified engineering work in any engineering discipline consists of core services in certain practice areas.

2. For the purposes of section 26(3)(a) of the Engineering Profession Act, work identified for persons registered in one of the categories in section 18(1)(a) or (c) of the Engineering Profession Act includes the core services for the practice areas referred to in Items 6.1 to 6.11.

3. The core services and practice areas listed in items 6.1 to 6.11 are not exhaustive and any similar activity that is undertaken to perform a core service in compliance with an agreement to provide engineering work in an engineering discipline and which work is not identified in items 6.1 to 6.11 is deemed to be a core service identified in items 6.1 to 6.11.

6.1 Identified engineering work in aeronautical engineering discipline

The core services in the aeronautical engineering discipline consists of the analysis, planning, design and development, manufacture, construction, operation and maintenance of all types of flight vehicles including fixed wing aircraft, helicopters, sail planes, airships, spacecraft and missiles, based on engineering sciences underlying flight dynamics, aerospace structures and propulsion systems .

The core services in the aeronautical engineering discipline are performed in the following practise areas:

(a) Aircraft design

(b) Aircraft structures

(c) Aircraft propulsion systems

(d) Aerodynamics

(e) Avionics

(f) Aero-elasticity

(g) Stability and control

(h) Aircraft systems including hydraulic, pneumatic and avionic systems

(i) Wind tunnel testing

(j) Flight testing

(k) Aircraft performance monitoring

(l) Airport/airfield management

(m) Certification and safety programmes

6.2 Identified engineering work in agricultural engineering discipline

The core services in the agricultural engineering discipline consist of the analysis, planning, design and development, manufacture, construction, management, operation and maintenance of agricultural machinery, mechanisation, production and processing and natural resource management through the application of engineering sciences.

The core services in the agricultural engineering discipline are performed in the following practice areas:

(a) Agricultural energy engineering

(b) Agricultural renewable energy engineering

(c) Agricultural product processing engineering

(d) Agricultural structures and facilities engineering

(e) Agricultural waste handling and management

(f) Aquaculture engineering

(g) Mechanisation engineering

(h) Irrigation engineering

(i) Hydrology and agricultural water use management

(j) Natural resources engineering

(k) Food engineering

(l) Environmental engineering

(m) Rural infrastructure engineering

6.3 Identified engineering work in chemical engineering discipline

The core services in the chemical engineering discipline consist of the analysis, planning, design and development, manufacture, construction, management, operation, maintenance of industrial-scale processes to convert raw and recycled materials to products through chemical and physical processes.

The core services in the chemical engineering discipline are performed in the following practice areas:

(a) Processes where hazardous substances are present in significant quantities

(b) Processes where chemical reactions present particular hazards

(c) Processes involving advanced water treatment for potable water

(d) Advanced process control

(e) Process simulation.

6.4 Identified engineering work in civil engineering discipline

The core services in the civil engineering discipline consist of the analysis, planning, design and development, manufacture, construction, management, maintenance and operation of works comprising:

(a) a structure such as a, building, dam, bridge, railway, runway or pipeline

(b) a transportation, water supply and treatment, drainage and sewerage system

(c) the result of an operation such as dredging, earthworks and a geotechnical process

(d) waste disposal

(e) sea defences and coastal protection through the application of civil engineering sciences.

The core services in the civil engineering discipline are performed in the following areas performed in the following practice areas:

(a) Structural engineering work

(b) Geotechnical engineering work

(c) Transportation engineering work

(d) Environmental engineering work

(e) Hydraulic engineering work

(f) Municipal engineering work.

- **Structural engineering work** is the buildings, dams, bridges, roads, highways, runways, harbours, railways, relating to the structural safety and serviceability of both the temporary and

permanent works associated with structures that provide shelter, carry loads or retain materials and fluids.

- **Geotechnical engineering work** is foundations, earthworks, excavations, ground improvement and geotechnical processes, subsurface investigation and sampling.
- **Transportation engineering work** is the transportation systems, including roads, railways, waterways, ports, harbours, airports, and all associated works such as yards, docks, lighthouses, rolling stock, and traffic engineering, geometric design – horizontal curves, vertical curves and sight distance.
- **Environmental engineering work** is solid waste disposal, soil conservation works, contaminated land remediation.
- **Hydraulic engineering work** is hydraulic systems including water resources and supply, pipelines, canals, water treatment and supply, stormwater and drainage works, sewerage systems, sanitation, waste disposal and coastal engineering.
- **Municipal engineering work** is services such as water treatment and supply – demands, hydraulic loading, storages (raw and treated water), sewerage works, transport building services, and urban development as indicated above.

6.5 Identified engineering work in electrical engineering discipline

The core services in the electrical engineering discipline consist of the analysis, planning, design, manufacture, construction, management, operation and maintenance of materials, components, plant and systems for generating, transmitting, distributing and utilising

(a) electrical energy

(b) electronic devices, apparatus and control systems for industrial systems, bio- medical and consumer products and processes

(c) computing, communication and software for critical applications instrumentation and control of processes, through the application of electrical, electromagnetic and information engineering sciences

(d) mechatronics.

The core services in the **electrical engineering discipline** are performed in the following primary practice areas:

(a) Electrical power engineering work

(b) Electronic engineering work

(c) Telecommunications engineering work

(d) Computer and software engineering work.

Electrical power engineering work includes the following practice areas:

(a) Conducting research and developing new or improved theories and methods related to electrical power engineering.

(b) Advising on and designing power stations and systems that generate, transmit and distribute electrical power.

(c) Specifying Instrumentation, measurement and control of equipment for the monitoring and control of electrical generation, transmission and distribution systems.

(d) Supervising, controlling, developing and monitoring the operation and maintenance of electrical generation, transmission and distribution systems.

(e) Advising on and designing systems for electrical motors, electrical traction and other equipment or electrical domestic appliances.

(f) Specifying electrical installation and application in industrial and other buildings and objects.

(g) Establishing control standards and procedures to monitor performance and safety of electrical generating and distribution systems, motors and equipment.

(h) Determining manufacturing methods for electrical systems as well as the maintenance and repair of existing electrical systems, motors and equipment.

(i) Designing and developing electrical apparatus.

Electronic engineering work includes the following practice areas:

(a) Conducting research and developing new or improved theories and methods related to electronics engineering.

(b) Advising on and designing electronic devices or components, circuits, semi-conductors and systems.

(c) Specifying production or installation methods, materials and quality standards and directing production or installation work of electronic products and systems.

(d) Supervising, controlling, developing and monitoring the operation and maintenance of electronic equipment and systems.

(e) Establishing control standards and procedures to ensure efficient functioning and safety of electronic systems and equipment.

(f) Organising and directing maintenance and repair of existing electronic systems and equipment.

(g) Designing electronic circuits and components for use in fields such as aeronautical guidance and propulsion control, acoustics or instruments and control.

(h) Determining manufacturing methods for electronic systems as well as the maintenance and repair of existing electronic systems and equipment.

(i) Researching and advising on radar, telemetry and remote-control systems, microwaves and other electronic equipment.

(j) Designing and developing signal processing algorithms and implementing these through appropriate choice of hardware and software.

(k) Developing apparatus and procedures to test electronic components, circuits and systems.

(l) Designing, specifying and implementing control and instrumentation of plant and processes.

(m) Designing, specifying, control and monitoring of equipment for fire and safety in plant and factories.

(n) Robotics and process control.

(o) Energy efficiency.

Telecommunications engineering work is a broad specialisation of electrical engineering encompassing the design, construction and management of systems that carry out the transmission, processing and storage of information as electrical or optical signals and the control services based on this capability. It includes the following practice areas:

(a) Conducting research and developing new or improved theories and methods related to telecommunications engineering.

(b) Advising on and designing telecommunications devices or components, systems, equipment and distribution centres.

(c) Specifying production or installation methods, materials, quality and safety standards and directing production or installation work of telecommunications products and systems.

(d) Supervising, controlling, developing and monitoring the operation and maintenance of telecommunication systems, networks and equipment.

(e) Determining manufacturing methods for telecommunication systems as well as the maintenance and repair of existing telecommunication systems, networks and equipment.

(f) Organising and directing maintenance and repair of existing telecommunication systems, networks and equipment.

(g) Researching and advising on telecommunications equipment.

(h) Planning and designing communications networks based on wired, fibre optical and wireless communication media.

(i) Designing and developing signal processing algorithms and implementing these through appropriate choice of hardware and software.

(j) Designing telecommunications networks and radio and television distribution systems including both cable and over the air.

Computer and software engineering work includes the following practice areas:

(a) Conducting research and developing new or improved theories and methods related to computer and software engineering.

(b) Advising on and designing computer-based systems or components, systems equipment, software and distribution centres.

(c) Specifying production or installation methods, materials, quality and safety standards and directing production or installation work of computer-based products, software and systems.

(d) Supervising, controlling, developing and monitoring the operation and maintenance of computer-based systems, software, networks and equipment.

(e) Organising and directing maintenance and repair of existing computer-based systems, programmes and equipment.

(f) Researching and advising on computer-based equipment and software.

(g) Planning and designing computer-based communications networks based on wired, fibre optical and wireless communication media and ultra-high speed data networks.

(h) System analysis, designing and developing complex computer-based systems and implementing these through appropriate choice of hardware and managing the development the necessary software.

(i) Determining manufacturing methods for computer-based systems as well as the maintenance and repair of existing computer-based systems, networks and equipment.

6.6 Identified engineering work in industrial engineering discipline

The core services in the industrial engineering discipline consist of the analysis, design, planning, manufacture, construction, management, maintenance, operation, improvement and installation of integrated systems of processes, people, materials, information, equipment and energy to ensure the effective and efficient delivery of quality goods and services through the application of industrial engineering sciences.

A registered person who performs work in the industrial engineering discipline investigates and reviews the utilisation of personnel, facilities, equipment and materials, current operational processes and established practices to recommend improvement in the efficiency of operations in a variety of commercial, industrial and production environments.

The core services in the **industrial engineering discipline** are performed in the following practice areas:

(a) Agricultural produce process engineering

(b) Automation, instrumentation and control engineering

(c) Clinical engineering

(d) Enterprise resource management engineering

(e) Fabrication engineering

(f) Industrial efficiency engineering

(g) Industrial machinery engineering

(h) Manufacturing logistics engineering

(i) Manufacturing technology engineering

(j) Operations research engineering

(k) Plant engineering

(l) Process design engineering

(m) Process engineering

(n) Production engineering

(o) Quality management engineering

(p) Robotics and production automation engineering

(q) Safety engineering

(r) Supply chain management engineering

(s) Value engineering

6.7 Identified engineering work in mechanical engineering discipline

The core services in the mechanical engineering discipline consist of the analysis, planning, design, manufacture, construction, management, operation and maintenance of materials, steel structures, components, machines plant and systems for:

(a) lifting, hoisting and materials handling

(b) turbines, pumps and fluid power, heating, cooling, ventilating and air conditioning

(c) fuels, combustion, engines, steam plant, turbines

(d) automobiles, trucks and special vehicles

(e) fire protection

(f) nuclear energy generation

(g) steel structures, through the application of engineering sciences: mechanics, solid mechanics, thermodynamics, fluid mechanics

(h) mechatronics

The core services in the **mechanical engineering discipline** are performed in the following practice areas:

(a) Advising on and designing machinery and tools for manufacturing, mining, construction, agricultural and other purposes.

(b) Advising on and designing steam, internal combustion and other non- electric motors and engines used in propulsion of railway locomotives, road vehicles**,** or aircraft or for driving industrial or other machinery

(c) Advising on and designing hulls, superstructures and propulsion systems of ships, mechanical plant and equipment for the release, control and utilisation of energy, heating, ventilation and refrigeration systems, steering gear, pumps and other mechanical equipment.

(d) Advising on and designing airframes, undercarriages and other equipment for aircraft as well as suspension systems, brakes, vehicle bodies and other components of road vehicles.

(e) Advising on and designing non-electrical parts of apparatus or products such as word-processors, computers, precision instruments, cameras and projectors.

(f) Establishing control standards and procedures to ensure efficient functioning and safety of machines, machinery, tools, motors, engines, industrial plant, equipment or systems.

(g) Ensuring that equipment, operation and maintenance comply with design specifications and safety standards.

6.8 Identified engineering work in metallurgical engineering discipline

Metallurgical engineering discipline consist of either –

(a) physical metallurgical engineering, which is the analysis, design, production, characterisation, failure analysis and application of materials, including metals, for engineering applications based on an understanding of the properties of matter and engineering requirements; or

(b) extractive metallurgical engineering which is the research, planning, design, developing and operating commercial-scale processes for the extraction of metals or intermediate compounds from ores by chemical or physical processes, including those at high temperatures, the operation and optimisation of process plants, through the application of metallurgical engineering sciences.

The core services of a **physical metallurgical engineer** in the **metallurgical engineering discipline** are performed in the following practice areas:

(a) Developing, controlling and advising on processes used for casting, alloying, heat treating or welding of metals, alloys and other materials to produce commercial metal products or develop new alloys, materials and processes, evaluate and specify materials for engineering applications, and do quality control and failure analyses.

(b) Investigating properties of metals and alloys, developing new alloys and advising on and supervising technical aspects of metal and alloy manufacture, *processing and corrosion protection*.

(c) Doing residual life evaluations and predictions, failure analyses, and prescribing remedial actions to avoid material failures.

The core services of **extractive metallurgical engineer** in the **metallurgical engineering discipline** are performed in the following practice areas:

(a) Conducting research and developing methods of extracting metals from their ores and advising on their application.

(b) Design, development and implementation of complex process projects in hydrometallurgy, pyrometallurgy and mineral processing.

(c) Operation and optimisation of extractive metallurgy process plants or commercial-scale processes

6.9 Identified engineering work in mining engineering discipline

The core services in the **mining engineering discipline** consist of the analysis, planning, design and development, manufacture, construction, management, operation, maintenance and rehabilitation of works for the extraction of minerals from natural deposits on the earth's surface underground or under water through the application of mining engineering science.

The core services in the **mining engineering discipline** are performed in the following practice areas:

(a) Conducting fundamental or operational research and advising on occupational health and safety and environmentally responsible mineral excavation methodology, processes and systems.

(b) Designing and specifying mineral excavation processes, application of mining resources and mining technical support services required, occupational health, safety and environmental considerations and quality assurance.

(c) Establishing production and operational control standards and procedures to ensure compliance with legislation and site-specific requirements.

(d) Managing occupational health, safety and environmentally related hazards and accompanying risks.

(e) Performing tests throughout the life-cycle stages and mineral excavation processes to determine the degree of control over variables identified during the strategic and tactical mine design and planning processes.

(f) Developing appropriate site-specific risk management policies, procedures and standards.

(g) Preparing pre-feasibility and feasibility reports and life-of-mine exploitation strategies and plans, business plans and bankable documents based on site-specific assumptions, premises, constraints and best practice standards.

(h) Converting mineral resources into mineable reserves.

(i) Performing mineral asset valuations.

(j) Managing mineral assets.

(k) Educating and training candidate mining engineering practitioners.

6.10 Identified engineering work for professional certificated engineer

The core services in the **certificated engineering discipline** consist of the analysis, planning, design and development, manufacture, construction, management, operation and maintenance of plant and machinery through the application of engineering sciences.

For the purposes of section 26(3)(a) of the Act, work identified for persons registered in terms of section 18(1)(a)(iii) of the Act includes the core services for the practice areas referred to in sub-item (4) – provided that the person so registered holds a statutory certificate of competency issued in terms of the Mines Health and Safety Act, 1996, the Occupational Health and Safety Act, 1993 or the Merchant Shipping Act, 1951 and provided further that a Professional Certificated Engineer not registered with ECSA may only perform work under the appointment of an Act, under which the certificate is issued.

The list of activities identified sub-item (4) is not exhaustive and any similar activity that is undertaken to perform a core service in compliance with an agreement to provide engineering work that is not listed in sub-item (4) below is deemed to be an activity listed in sub-item (4).

Engineering work performed by a **professional certificated engineer** includes –

(a) the application of current engineering technology

(b) the management and operation of technology-based engineering solutions and processes

(c) the introduction of known engineering services and management methods

(d) the management of the implementation of broadly defined engineering projects and the routine maintenance of engineering infrastructure

(e) the management of moderate to high level of risks associated with engineering processes, systems, equipment and infrastructure; and the specify operational and safety requirements to ensure inherently safe working conditions within the specific context relating to persons working in factories, mines and on ships as certificated persons appointed in terms of the Occupational Health and Safety Act, 1993, the Mines Health and Safety Act, 1996 and the Merchant Shipping Act, 1951, respectively.

A person may perform work identified in this item if he or she is in possession of any one or more of the following government certificates of competency, provided that a Certificated Engineer not registered with ECSA may only perform work when designated in writing in terms of a regulation in the Act under which the certificate is issued:

- 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
- Manager's Certificate from the of Competency (Coal) issued in terms of Mines Health and Safety Act, 1996
- Chief Engineer Officer- Foreign Going Certificate of Competency issued in terms of the Merchant Shipping Act, 1951.

6.11 Identified engineering work for specified category practitioner

The core services in the **specified category practitioner** consist of the analysis, planning, design, manufacture, construction, management, operation, maintenance and inspection of plant, machinery and equipment to comply with Regulations and Standards.

For the purposes of section 26(3)(a) of the Act, work identified for persons registered in terms of section 18(1)(c) of the Act includes the core services for the practice areas referred to in sub-item (3). For the purpose of this item, a specifically defined engineering activity means an activity or task legally required to be performed by a specified category practitioner or an activity or task that has two or more of the characteristics listed below. The list of activities identified sub-item (3) is not exhaustive and any similar activity that is undertaken in order to perform a core service in compliance with an agreement to provide engineering work which is not listed in sub-item (3) below is deemed to be an activity listed in sub-item (3).

Engineering work performed by a **specified category practitioner** includes –

(a) the application of current Regulations, Standards, operating instructions and engineering technology

(b) the management and operation of technology-based engineering solutions and processes

(c) the introduction of known engineering services and management methods

(d) the management of the implementation of broadly defined engineering activities and the routine maintenance and inspection of specified machinery and equipment

(e) the management of moderate to high level of risks associated with engineering processes, systems, equipment and infrastructure

(f) the specify operational and safety requirements to ensure inherently safe working conditions; within the specific context relating to the type of machinery and/or equipment specifically registered for.

7. SCOPE OF SERVICES

The standard services performed by a person registered in any category referred to in section 18(1)(a) or (c) of the Act who performs identified engineering work in the applicable stages of an engineering project or construction works project are given in **Annexures A, B** and **C**.

7.1 Work by person who oversees planning, design and delivery of education and training programme and employee of organ of state deemed identified work

1. Any person who oversees the planning, design and delivery of education and training programmes accredited by ECSA and assessment of students at the engineering exit level at a higher education institution that is established, deemed to be established or declared as a public or private higher education institution under the Higher Education Act, 101 of 1997 or at a public college as defined in the Further Education and Training Colleges Act or TVET College Act is deemed to be a person who performs identified work contemplated in item 2 of this Standard.

2. Any person employed by an organ of state and whose conditions of service require of that person to manage the delivery and maintenance of engineering work is deemed to be a person who performs identified work contemplated in item 2 of this Standard.

3. For the purpose of this item, “engineering exit level” means the “exit level” contemplated in the Regulations issued in terms of the National Qualifications Framework Act, 67 of 2008.

7.2 Performance of identified work by a person registered in a different category

For the purposes of section 18(2) of the Act:

1. A person who is registered as a professional engineer is deemed to be registered as an engineering technologist or professional engineering technician and may perform the identified engineering work that a professional engineering technologist or professional engineering technician may perform as indicated in items 6.1 to 6.10 in the relevant engineering discipline **provided that he or she is competent in terms of his or her education, training and experience to perform that work**.

2. A person who is registered as a professional engineering technologist is deemed to be registered as a professional engineering technician and may perform any of the identified engineering work that a professional engineering technician may perform as indicated in items 6.1 to 6.10 in the relevant engineering discipline **provided that he or she is competent in terms of his or her education, training and experience to perform that work**.

3. A person who is registered as a professional certificated engineer may perform engineering work identified at the broadly defined level in the disciplines referred to in items 6.5, 6.7, 6.9 and 6.10 commensurate with the qualification or combination of qualifications that led to the issuing of the certificate of competency referred to in item 15. A certificated engineer not registered with ECSA may only perform work under the appointment of an Act under which the certificate is issued. A person who is registered as a professional certificated engineering is deemed to be registered as a professional engineering technician and may perform any of the identified engineering work that a professional engineer technician may perform as indicated in items 6.5, 6.7, 6.9 and 6.10 in the relevant engineering discipline **provided that he or she is competent in terms of his or her education, training and experience to perform that work**.

4. A person registered in a particular category referred to in section 18(1)(a) or (c) of the Act, may, notwithstanding the provisions of items 6.1 to 6.10, perform any work identified in items 6.1 to 6.10 for a different category of registered person, if ECSA grants such registered person a transitional authorisation, special consent or category adjustment, as the case may be.

5. Notwithstanding the provisions of this item, a person who is registered as a candidate referred to in section 18(1)(b) of the Act may not apply for special consent and may only perform identified engineering work under the direction, control and direct supervision of a person registered in the appropriate category in terms of the Act if the professional or person concerned is authorised under items 6.1 to 6.10 in the relevant engineering discipline to perform such identified engineering work.

6. A person registered in a specified category referred to in section 18(1)(c) of the Act may not perform any work identified in a different specified category under 6.11 unless ECSA grants such registered person a transitional authorisation, special consent or category adjustment, as the case may be.

8. TRANSITIONAL AUTHORISATION

A person who is registered in terms of the Engineering Profession Act and who, after commencement of that Act but before commencement of this Standard, performed identified engineering work referred to in items 6.1 to 6.10 for a person registered in a category of registration in which he or she is not registered may apply to ECSA for a transitional authorisation.

An application for a transitional authorisation must be in writing, submitted to ECSA in the form determined by ECSA within 6 months from the date of commencement of this Standard and be accompanied by –

(a) proof of practice during the period contemplated in sub-item (1) within the category that he or she is not registered for

(b) all available documents pertaining to that practice

(c) the name and contact details of at least two registered persons who are in a position to serve as personal referees

(d) the fee determined by ECSA in accordance with section 12 of the Act

(e) any other information required by ECSA.

7. When considering an application for a transitional authorisation, ECSA must take into account the education, training and experience of the applicant requesting such transitional authorisation to undertake the applicable identified engineering work commensurate with the competency requirements contemplated in item 5.4.

8. ECSA may, after evaluation of the application for transitional authorisation, refuse or approve the transitional authorisation and if it approves the transitional authorisation, it may subject the approval to any condition it considers appropriate.

9. If ECSA refuses to grant a transitional authorisation, it must, in writing, provide the applicant with the reasons for its decision within 7 days of that decision.

10. If ECSA approves the transitional authorisation, it must issue a transitional authorisation certificate in the manner determined by it and the certificate must contain the conditions of issue, if any.

11. A transitional authorisation certificate authorises the holder thereof to perform the work identified in terms of this Standard for another category of registered person for a period of 5 years provided that the holder remains a registered person and complies with the continuing professional development requirements and the conditions of approval, if any.

9. SPECIAL CONSENT

1. A registered person who, after commencement of this Standard, intends to perform work for a specific project, commission or appointment or a particular scope of work for which specific competencies are required and which is identified in this Standard for a person registered in a category of registration and linked to a particular discipline in which he or she is not registered, may apply to ECSA for special consent.

2. An application for special consent must be in writing submitted to ECSA in the form determined by ECSA and be accompanied by –

(a) a brief motivation for the application

(b) if applicable, an affidavit from the prospective client of the applicant, other consultants on the proposed team and the proposed contractor

(c) if applicable, an affidavit from the employer of the applicant who is entitled to perform the identified work by reason of the employer's registration in the applicable category

(d) all available documents pertaining to the proposed project

(e) the name and contact details of at least two persons who are in a position to serve as personal referees

(f) the fee determined by ECSA in accordance with section 12 of the Act

(g) any other information required by ECSA.

3. When considering a request for special consent, ECSA must take into account the education, training and experience of the applicant requesting such special consent to undertake the applicable identified engineering work at the level of complexity of a project contemplated in item 5.3 commensurate with the competency requirements contemplated in item 5.4.

4. ECSA may, after evaluation of the application for special consent referred to in this item, refuse or approve the special consent and if it approves the special consent, it may subject the approval to any condition it considers appropriate.

5. If ECSA refuses to grant a special consent it must, in writing, provide the applicant with the reasons for its decision within 7 days of that decision.

6. If ECSA grants the special consent:

(a) for a specific project, commission or appointment, it must issue a special consent certificate for that specific project, commission or appointment; or

(b) for a particular scope of work which requires specific competencies, it must issue a special consent certificate for that particular scope of work, in the manner determined by it and the certificate must contain the conditions of issue, if any.

7. A special consent certificate granted for –

(a) a specific project, commission or appointment, authorises the holder thereof to perform the relevant work for the duration of that project, commission or appointment; or

(b) a particular scope of work which requires specific competencies, authorises the holder thereof to perform the particular scope of work for a period of 5 years provided that the person remains a registered person, complies with continuing professional development requirements and the conditions of approval, if any.

10. CATEGORY ADJUSTMENT

1. A registered person who, after commencement of this Standard, generally wants to perform work identified in items 5.3 and 5.4 read with items 6.1 to 6.10 for a person registered in a category of registration in which he or she is not registered may apply to ECSA for a category adjustment.

2. An application for a category adjustment must comply with the rules of ECSA pertaining to registration (**Refer to RPL and E-17-PRO Policies**).

11. CROSS DISCIPLINARY PRACTICE

A person who is registered as a professional and who performs identified work in a particular discipline identified in items 6.1 to 6.10 for which he or she has the competence, education, training and experience may perform identified engineering work in a different discipline if he or she has the competence, education, training and experience to perform such work in that different discipline.

12. DUAL REGISTRATION

A person who is registered as a professional under any Act, other than the Engineering Profession Act, may apply for registration with ECSA **provided that such person can show proficiency to perform the identified engineering work applicable to the respective category of registration**.

Note: see paragraph below:

"The work shall include aspects that are common to more than one Council and / or discipline, where recognised requisite skills and competence permit the professional within one council to undertake work identified within the scope of works of another Council, without the need for dual registration."

13. SCOPE OF WORK IDENTIFIED BY THE CBE FOR PROFESSIONALS OF OTHER COUNCILS FOR THE PROFESSIONS

1. A person registered in a category referred to in section 18(1)(a) of the Architectural Profession Act , 44 of 2000 may perform the scope of work determined in **Annexure B** which falls within the scope of the engineering profession regulated by the Act if the education, training and experience of that person have specifically rendered him or her competent to perform that work and the work is performed within the framework of architectural work as defined in Notice No. 43495 of 2020 issued by the CBE.

2. A person registered in a category referred to in section 18(1)(a) of the Act may perform the scope of services contemplated in Notice No. 43495 of 2020 issued by the CBE which falls within the scope of services of the quantity surveying profession regulated by the Quantity Surveying Profession Act, 44 of 2000, if the qualification, training and experience of that person have

specifically rendered him or her competent to perform those services and the services are performed within the framework of engineering work.

3. A person registered in a category referred to in section 18(1)(a)(i) of the Act may perform the scope of work determined in **Annexure C** which falls within the scope of the project and construction project management professions regulated by the Project and Construction Project Management Professions Act, 48 of 2000 if the education, training and experience of that person have specifically rendered him or her competent to perform that work and the work is performed within the context of a construction works project.

4. A person registered in a category referred to in section 18(1)(a) of the Act may, in conjunction with a person registered in terms of section 18(1)(a) of the Landscape Architectural Profession Act 45 of 2000 if the education, training and experience of that person have specifically rendered him or her competent to perform that work and the work is performed within the context of the Landscape work.

5. A person registered in a category referred to in section 18(1)(a) of the Act may, in conjunction with a person registered in terms of section 18(1)(a) of the Architectural Profession Act, 2000 (Act No. 45 of 2000) perform the scope of work identified in Notice No. 43495 of 2020 issued by the Council for the Built Environment, if the qualification, training and experience of that person have specifically rendered him or her competent to perform those services and the services are performed within the framework of Architectural engineering work.

14. APPEAL

Any person who feels aggrieved by an action of ECSA as a result of the work identified in this Standard or due to ECSA's refusal to grant a transitional authorisation, special consent or category adjustment contemplated in items 8, 9 or 10 may lodge an appeal against such an action with ECSA and section 35 of the Act applies with the necessary changes.

15. IMPROPER CONDUCT

Any registered person who is not permitted to undertake work identified in items 6.1 to 6.11 or who has not obtained a transitional authorisation, special consent or category adjustment to do so in terms of item 8, 9 or 10, is in breach of ECSA's code of conduct and the provisions of the Act.

16. TRANSITIONAL PROVISIONS

1. Any person who is not registered in terms of the Act, and who is required to be registered as a professional or in a specified category in terms of this Standard, must within 36 months of the date on which IDoEW Gazette comes into operation, after necessary consultation with stakeholders, apply for registration in the appropriate category referred to in section 18(1)(a) or (c) of the Act.

2. Any person whose registration in a category referred to in section 18(1)(a) or (c) was cancelled in terms of the Act within one year prior to the date on which this Standard commences must be re-registered in the appropriate professional category within 6 months from the date on which this Standard commences, unless he or she is not required to be so registered in terms of this Standard

17. GUIDELINE TO IDENTIFY RESERVED ENGINEERING WORK FOR REGISTERED PERSONS

17.1 Identify the complexity required for reserved engineering work

The complexities of engineering activities for the different categories of the registered persons are described in item 5.4 and Table 1.

17.2 The core services of reserved engineering work

The core services which the different categories of registered persons are expected to demonstrate and apply are described in item 6.

17.3 Tests for the complexity of reserved engineering work

The tests for the different complexities of engineering activities in the work environment are given in Table 2 to 5.

Table 2: Illustrating the test for a complex engineering activity required in the work environment

Step	Main question	Criteria
Step 1 Identify the engineering activity	Is this activity complex?	Does the activity have two or more of the following? a) The scope of activities may encompass entire complex engineering systems or complex subsystems.

Step	Main question	Criteria
		b) it has a context that is complex and varying, is multidisciplinary, requires teamwork, unpredictable, may need to be identified. c) It requires diverse and significant resources: including people, money, equipment, materials and technologies. d) Significant interactions exist between wide- ranging or conflicting technical, engineering or other issues. e) It is constrained by time, finance, infrastructure, resources, facilities, standards and codes and applicable laws. f) It has significant risks and consequences in a range of contexts. g) It includes but is not limited to design; planning; investigation and problem resolution; improvement of materials, components, systems or processes; implementation, manufacture or construction; engineering operations; maintenance; closure or disposal; project management; research, development and commercialisation.

Table 3: Illustrating the test for a broadly defined engineering activity

Step	Main question	Criteria
Step 1 Identification of the engineering activity	Is the activity broadly defined?	Does the broadly defined activity have two or more of the following? a) The scope of the practice area is linked to technologies used and changes from adopting new technology into current practice. b) The practice area is located within a wider, complex context, requires teamwork, and has interfaces to other parties and disciplines. c) It involves the use of a variety resources, including people, money, equipment, materials, and technologies. d) It requires resolution of occasional problems arising from interactions between wide-ranging or conflicting technical, engineering and other issues. e) It is constrained by available technology, time, finance, infrastructure, resources, facilities, standards and codes and applicable laws. f) It has significant risks and consequences in a practice area and related areas. g) It includes but is not limited to design; planning; investigation and problem resolution; improvement of materials, components, systems or processes; implementation,

Step	Main question	Criteria
		manufacture or construction; engineering operations; maintenance; closure or disposal; project management; research, development and commercialisation.

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

Is this activity a well-defined activity?	Does the well-defined activity have two or more of the following? a) The scope of the practice area is defined by techniques applied, change by adopting new techniques into current practice. b) The practice area is located within a wider, complex or broadly defined context, with well-defined working relationships with other parties and disciplines. c) The work involves familiar, defined range of resources (including people, money, equipment, materials and technologies). d) It requires resolution of interactions manifested among specific technical factors with limited impact on wider issues e) It is constrained by operational context, defined work package, time, finance, infrastructure, resources, facilities, standards and codes and applicable laws. f) It has risks and consequences that are locally important but generally not far reaching. g) It includes but is not limited to design; planning; investigation and problem resolution; improvement of materials, components, systems or processes; implementation, manufacture or construction; engineering operations; maintenance; closure or disposal; project management; research, development and commercialisation.

Table 5: Illustrating the test for a specifically defined engineering activity

Is the activity a specifically defined activity?	1. Is it prescribed by legislation that the engineering activity must be performed by a specified category practitioner, or 2. Does the specifically defined engineering activity have an activity or task that has two or more of the following characteristics: a) The scope of the specific practice area is defined by specific techniques applied, and changes from adopting new specific techniques into current narrow practice. b) The practice area is located within a wider, complex context, with specifically defined working relationships with other parties and disciplines. c) The work involves specific familiar resources, including people, money, equipment, materials and technologies.

	d) It requires resolution of interactions manifested between specific technical factors with limited impact on wider issues. e) It is constrained by operational context, defined work package, time, finance, infrastructure, resources, facilities, standards and codes and applicable laws. f) It has risks and consequences that are locally important but are specifically defined. g) It includes but is not limited to planning; investigation and problem resolution; improvement of materials, components, systems or processes, engineering operations, maintenance, project management, development and commercialisation.

REVISION HISTORY

Revision number	Revision date	Revision details	Approved by
Rev. 0 Draft A	29 October 2021	First draft from the working Group	RPS BU
Rev. 0 Draft B	10 November 2021	Review and Recommendation for broader consultation	Executive RPS: EL Nxumalo
Rev. 0 Draft C	30 November 2021	Recommendation for broader consultation	RPSC
Rev. 0 Draft D	11 March 2022	The Working Group considered all comments received from broader consultation and finalised the document	RDD&R and Working Group
Rev. 0 Draft E	30 March 2022	Review and Recommendation for Approval	Executive RPS: EL Nxumalo
Rev. 0	12 April 2022	Approval	RPSC
Rev. 0	23 June 2022	Ratification	Council

The **Standard** for:

The identification of Engineering Work

Revision 0 dated 12 April 2022, and consisting of 51 pages, has been reviewed for adequacy by the Business Unit Manager and is approved by the Executive: Research Policy and Standards **(RPS)**.

.....
Business Unit Assistant Manager

19 July 2022
.....
Date

.....
Acting Executive: RPS

19 July 2022
.....
Date

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

ANNEXURE A

Work identified by the Council for the Built Environment in the context of an engineering project or a construction works project includes the scope of services in the following stages:

1. The engineering work performed by a person registered in terms of section 18(1)(a) of the Act in the context of an engineering project or a construction works project includes the standard services set out in Table A to the extent that the registered person's education, training, experience and contextual knowledge render him or her competent to perform.

2. A person registered in terms of section 18(1)(a) of the Act may, in the performance of engineering work in the context of an engineering project or the mechanical and electrical engineering work components of a construction works project, perform the work of a principal consultant or principal agent, if appointed as such by the client or employer, to the extent that the registered person's education, training, experience and contextual knowledge render him or her competent to perform.

3. Stages 7, 8 and 9 in Table A 1 below are only applicable to engineering projects.

Table A 1: Scope of services for a person registered in terms of section 18(1)(a) of the Act in the context of an engineering project or a construction works project

STAGE 1: INCEPTION	
1	Assist in developing a clear project brief.
2	Attend the project initiation meetings.
3	Advise on policies, among others, procurement, logistics, indigenisation, standards and specifications.
4	Advise on rights, constraints, consents and approvals.
5	Define the services and scope of work required.
6	Conclude the terms of the agreement with the client.
7	Inspect the site and advise on the necessary surveys, analyses, tests and site or other investigations where such information will be required for Stage 2, including the availability and location of infrastructure and services.
8	Determine availability of data, drawings and plans relating to the project.
9	Advise on appropriate financial design criteria.
10	Advise on other criteria that could influence the project life cycle cost significantly.
11	Provide necessary information within agreed scope of the project to the other consultants involved.

STAGE 2: CONCEPT AND VIABILITY	
1	Agree the documentation programme with the principal consultant, client and the other consultants.
2	Attend design and consultants' meetings.
3	Establish concept and project design criteria.
4	Prepare initial concept design and related documentation.
5	Advise the client regarding further surveys, analyses, tests and investigations that may be required.
6	Refine and assess concept design to ensure conformance with all regulatory requirements and consents.
7	Establish regulatory authorities' requirements and incorporate into the design.
8	Establish access, utilities, services and connections required for the design.
9	Co-ordinate design interfaces with the other consultants.
10	Prepare preliminary process designs, preliminary designs and related documentation for approval by authorities and the client and suitable for costing.
11	Prepare cost estimates and comment on life cycle costs, as required.
12	Liaise, co-operate and provide necessary information to the client, principal consultant and other consultants involved.
13	Undertake preliminary risk assessments.
STAGE 3: DESIGN DEVELOPMENT	
1	Review the documentation programme with the principal consultant and the other consultants.
2	Attend design and consultants' meetings.
3	Incorporate the client's and authorities' detailed requirements into the design.
4	Incorporate the other consultants' designs and requirements into the design.
5	Prepare design development drawings, including draft technical details and specifications.
6	Review and evaluate design and outline specifications and exercise cost control and project control, including planning and scheduling
7	Prepare detailed estimates of construction costs and other costs.
8	Liaise, co-operate and provide necessary information to the client, principal consultant and others.
9	Submit necessary design documentation to local and other authorities for approval.
10	Conduct relevant risk assessments.

STAGE 4: DOCUMENTATION AND PROCUREMENT	
1	Chair or attend design and consultants' meetings.
2	Prepare specifications and preambles for the works.
3	Accommodate services design.
4	Check cost estimate with the quantity surveyor and adjust designs and documents if necessary to remain within budget.
5	Chair or assist the principal consultant in formulating or formulate the procurement strategy for contractors.
6	Review working drawings for compliance with the approved budget and scope.
7	Prepare documentation for contractor procurement.
8	Review designs, drawings and schedules for compliance with approved budget.
9	Assist the principal consultant with calling for tenders and negotiation of prices, if required calling for tenders and/or negotiation of prices and/or assist the principal consultant where relevant
10	Liaise, co-operate and provide necessary information to the principal consultant and the other consultants, as required.
11	Assist with evaluating tenders.
12	Assist with preparing the contract documentation for signature.
13	Assist in pricing, documentation and tender evaluation as required when the detailed services for these activities are provided by others.
14	Assess samples and products for compliance and design intent.
STAGE 5: CONSTRUCTION	
1	Attend the site handover.
2	Issue construction documentation in accordance with the documentation programme including, in the case of structural engineering, reinforcing bending schedules and detailing and specifications of structural steel sections and connections.
3	Carry out contract administration procedures delegated by the principal agent in terms of the contract.
4	Prepare schedules of predicted cash flow.
5	Prepare pro-active estimates for proposed variations for client decision-making.
6	Attend regular site, technical and progress meetings.
7	Inspect the works for quality and conformity to approved contract documentation.
8	Adjudicate and resolve financial claims by contractor.
9	Assist in resolving contractual claims by the contractor.
10	Establish and maintain a financial control system.

11	Clarify details and descriptions during construction, as required.
12	Prepare valuations for payment certificates to be issued by the principal agent.
13	Instruct, witness and review of all tests and mock-ups carried out both on and off the site.
14	Check and approve subcontract shop contractor drawings for design intent.
15	Update and issue drawings register.
16	Issue contract instructions as and when required.
17	Review and comment on operation and maintenance manuals, guarantees, certificates and warranties.
18	Inspect the works and issue practical completion and defects lists.
19	Arrange for the delivery of all test certificates, statutory (regulatory) and other approvals, as built drawings and operating manuals.
20	Compile the required safety information.
21	Prepared final accounts for electrical and mechanical engineering works on a progressive basis.
STAGE 6: CLOSE-OUT OF THE CONSTRUCTION PHASE	
1	Inspect and verify rectification of defects.
2	Receive, comment and approve relevant payment valuations and completion certificates.
3	Facilitate and/or prepare and/or procure operations and maintenance manuals, guarantees and warranties as-built drawings and documentation.
4	Prepare and/or procure as-built drawings and documentation.
5	Conclude the final accounts where relevant.
6	Obtain final handover and acceptance from the client
STAGE 7: OPERATE IN ACCORDANCE WITH PURPOSE STATEMENT FOR LIFE OF PROJECT	
STAGE 8: MAINTAIN THE AS-BUILT-STATE FOR LIFE OF PROJECT	
STAGE 9: SHUTDOWN PERMANENTLY, DECOMMISSION, DEMOLISH AND REINSTATE	

ANNEXURE B

Work identified by the Council for the Built Environment that falls within the scope of the engineering profession that is regulated by the Engineering Profession Act which may be performed by a person registered in a category referred to in section 18(1)(a) of the Architectural Profession Act.

A person registered in terms of section 18(1)(a) of the Architectural Profession Act, 2000 may perform the following work which falls within the scope of the engineering profession which is regulated by the Act to the extent that the education, training, experience and contextual knowledge of the registered person renders such person competent to perform:

1. The design of any building or building component using the deemed-to-satisfy requirements given in SANS 10400: The application of the National Building Regulations, excluding the application of rational design or rational assessment as defined in SANS 10400-A.

ANNEXURE C

Work identified by the Council for the Built Environment which falls within the scope of the project and Construction Project Management Profession regulated by the Project and Construction Project Management Profession Act, 2000 which may be performed by a professional registered in the category referred to in 18(1)(a)(i) of the Act.

1. A person registered in terms of section 18(1)(a)(i) of the Act may perform the scope of services indicated in Table A 2 below that falls within the scope of services identified by the CBE for a professional registered in terms of the Project and Construction Management Professions Act, 2000, to the extent that the education, training, experience and contextual knowledge of the registered person renders such person competent to perform:

2. The work referred to in the table below is the work contemplated in Notice No. 43495 of 2020 issued by the CBE.

Table A 2: Scope of services for a person registered in terms of section 18(1)(a) of the Act in the context of the stages below

STAGE 1 – PROJECT INITIATION AND BRIEFING
Standard Services
1.1 Assist the client to procure the necessary and appropriate consultants, including the clear definition of their roles, responsibilities and liabilities.
1.2. Establish in conjunction with the client, consultants and all relevant authorities the site characteristics necessary for the proper design and approval of the intended project.
1.3. Manage the integration of the preliminary design to form the basis for the initial viability assessment of the project.
STAGE 2 – CONCEPT AND FEASIBILITY
Standard Services
2.1 Assist the client to procure the necessary and appropriate consultants including the clear definition of their roles, responsibilities and liabilities.
2.2 Advise the client on the requirement to appoint a Health and Safety Consultant.
2.3 Manage and integrate the concept documentation for presentation to the client for approval

STAGE 3 – DESIGN DEVELOPMENT
Standard Services
3.1 Assist the client to procure the balance of the consultants, including the clear definition of their roles, responsibilities and liabilities.
3.2 Manage, co-ordinate and integrate the design by the consultants.
3.3 Conduct and record the co-ordination meetings.
3.4 Manage and monitor the timeous submission by the design team of all plans and documentation to obtain the necessary statutory approvals.
3.5 Establish responsibilities and monitor the information flow among the design team.
3.6 Facilitate and monitor the timeous technical co-ordination of the design by the design team.
STAGE 4 – TENDER DOCUMENTATION AND PROCUREMENT
Standard Services
4.1 Manage the tender process in accordance with agreed procedures.
STAGE 5 – CONSTRUCTION DOCUMENTATION AND MANAGEMENT
Standard Services
5.1 Appoint contractors on behalf of the client, including the finalisation of all agreements.
5.2 Instruct the contractor on behalf of the client to appoint subcontractors.
5.3 Receive, co-ordinate, review and obtain approval of all contract documentation provided by the contractor, subcontractors and suppliers for compliance with all the contract requirements.
5.4 Facilitate the handover of the site to the contractor.
5.5 Regularly conduct and record the necessary site meetings.
5.6 Monitor the compliance by the contractors of the requirements of the Health and Safety Consultant.
5.7 Monitor the preparation by the Environmental Consultants of the Environmental Management Plan.
5.8 Establish the construction information distribution procedures.
5.9 Agree and monitor the Construction Documentation Schedule for timeous delivery of required information to the contractors.
5.10 Manage the review and approval of all necessary shop details and product propriety information.
5.11 Agree to the quality assurance procedures and monitor the implementation thereof by the consultants and contractors.
5.12 Monitor, review, approve and certify monthly progress payments.
5.13 Receive, review and adjudicate any contractual claims.
5.14 Issue the Practical Completion Lists and the Certificate of Practical Completion.

5.15 Issue of the Works Completion List by the consultants to the contractors.
5.16 Check the defects items to achieve Works Completion.
STAGE 6 – PROJECT CLOSE OUT
Standard Services
6.1 Issue the Works Completion Certificate.
6.2 Preparation of all as-built drawings and design documentation.
6.3 The procurement of all statutory compliance certificates and documentation.
6.4 Issue the Final Completion Defects list and Certificate of Final Completion.