

Identification of Engineering Work Steering Committee

FRAMEWORK

for the
Identification of Work for Persons Registered
in terms of the
Engineering Profession Act, 2000

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Preface

Section 26(1) of the Engineering Profession Act (Act 46 of 2000) requires ECSA to consult with voluntary bodies, persons, bodies and industries that may be affected by any laws regulating the built environment professions regarding the identification of the type of engineering work which may be performed by persons registered in any categories provided for in the Act, including work which may fall into the scope of any other profession regulated by the professions' act referred to in the Council for the Built Environment Act (Act 43 of 2000). Section 26(2) of the Act requires ECSA to submit recommendations to the Council for the Built Environment (CBE) following such consultation.

Section 20 of the Council for the Built Environment Act requires the CBE to identify the scope of work for every category of registered persons after receipt of the recommendations of the councils for professions prepared in terms of their respective acts. Thereafter, a person who is not registered by ECSA may not perform any work identified for any category provided for in the Engineering Profession Act.

The **Baseline Report** developed by ECSA's Identification of Work Steering Committee:

- sets out the reasons for the identification of engineering work;
- proposes a procedure to specify engineering work that needs to be reserved for Registered Engineering Persons making use of competency standards;
- provides a preliminary list of Identified Engineering Work functions to be reserved; and
- documents the process which has been followed by the Steering Committee.

This **Framework for the Identification of Engineering Work**:

- sets out the approach to the identification of work;
- establishes the manner in which work for categories of persons registered with ECSA may be identified; and
- provides the logical framework for the development of regulations.

1. Introduction

A profession may be regarded as:

'an occupation in which an individual uses an intellectual skill based on an established body of knowledge and practice to provide a specialised service in a defined area, exercising independent judgement in accordance with a code of ethics and in the public interest.' The purpose of regulating a profession is *'to assure the quality of professional services in the public interest. The regulation of a profession involves the setting of standards of professional qualifications and practice; the keeping of a Register of qualified persons and the award of titles; determining the conduct of registrants, the investigation of complaints and disciplinary sanctions for professional misconduct.'*¹

¹ UK Inter Professional Group defines a Profession

There are a number of international approaches for the regulation of a profession, including²:

- (a) **Licensing:** *Licensing can be statutory or non-statutory. An area of work restricted by statutory licensing cannot be undertaken by an unlicensed person. Non-statutory licensing provides the public with lists of approved persons competent to work in a particular area, which can also be undertaken by non-licensed persons.*
- (b) **Registration:** *Regulation of a profession involves the setting of standards, the keeping of a register of qualified persons and the award of titles. Regulation may be statutory (regulations set by Parliament) or non statutory (regulations set by the governing body of the profession). If non-statutory registration, governing bodies can only use civil action to prevent non-registrants from using the title and cannot restrict any area of work to registrants. Statutory regulation normally involves a statutory register and the protection of title by law and sometimes, but not always, the statutory reservation of an area of work to registrants i.e. to work in the area without being on the register would be an offence in law. If statutory regulation reserves an area of work it has the same effect as statutory licensing which seeks to restrict an area of work to those who are approved persons.*
- (c) **Specialist Lists:** *The non-statutory voluntary listing of professionals who have met a defined standard of competence in a specialist area, typically administered by a professional or trade body.*

In essence, licensing authorises eligible persons to practise in a specific area, registration recognizes demonstrated achievement of a defined standard of competency, while specialist lists indicate peer recognized competence in a particular area.

With the full implementation of the Engineering Profession Act of 2000, statutory regulation of the practice of engineering in South Africa uses the mechanisms described in paragraph b) above, namely registration and the prohibition of performance of identified work by persons who are not registered.

The regulation of a profession in any form is by nature restrictive. However, the main purpose in South Africa is to ensure that professional functions are performed only by persons with the necessary competence in a manner that is consistent with government's competition policy and which protects the public and environment and provides recourse in relation to aspects of professional conduct.

The Council for the Built Environment (CBE) Framework, issued by the Council for the Built Environment, seeks to demarcate functions in the professions and professional categories of registration - it utilises competencies as a single source of defining minimum entry standards and to address overlaps and duplications between the professions in the built environment. This document is ECSA's response to this CBE Framework.

2. The Engineering Profession Act of 2000

2.1 Overview

The Engineering Profession Act (Act 46 of 2000) permits the Engineering Council of South Africa to consider and decide on application for registration, prescribe the period of validity of registration of a registered person and keep a register of registered persons. It also permits the Council to determine competency standards for the purpose of registration and the nature and extent of continuing professional development and to take any steps it considers necessary for the protection of the public and the environment in their dealings with registered persons for the maintenance of the integrity, and the enhancement of the status of the engineering profession.

² Institution of Civil Engineers, 2005.

The Act provides for categories of registration (professional engineer and candidate engineer, professional engineering technologist and candidate engineering technologist, professional certificated engineer and candidate certificated engineer, and professional engineering technician and candidate engineering technician), and specified categories determined by the Council (e.g. registered lift inspectors) and prohibits non-registered persons from practising within a category without being registered in that category.

The Act prescribes the registration process, namely that the Council must be satisfied that the applicant in the case of a:

- (a) **professional:** has demonstrated his or her competence as measured against standards determined by the Council for the relevant category of registration, and has passed any additional examinations that may be determined by the Council; or
- (b) **candidate:** has satisfied the relevant educational outcomes determined by the council for this purpose, by having passed accredited or recognized examinations at any educational institution offering educational programmes in engineering and having passed any other examination that may be determined by the council or presenting evidence of acceptable prior learning in engineering.

The Council is required to draw up a code of conduct for registered persons, may draw up codes of practice and is responsible for administering such codes and investigates breaches of these codes as improper conduct.

2.2 Prohibitions and Permissions

Sections 18(2) and 18(3) of the Engineering Profession Act:

- Prohibits a person who is not registered in a category from practicing in that category of registration; and
- Permits a person registered in a category to consult³ in that category.

Section 18.(4)(c) of the Act further requires that a Candidate in a category *must perform work in the engineering profession under the supervision and control of a professional in a category as prescribed*⁴. Consequently, a Candidate may not consult.

Sections 26(3) of the Act prohibits a person who is not registered in terms of the Act from performing any kind of work identified for any category of registered persons. The Act in Section 26(4) allows one exception to this prohibition. The unregistered person may work under the supervision and control of a registered person who must take the responsibility for the work. Accordingly, a registered person taking responsibility for the work of unregistered persons must do so from a fully informed position, must exert active supervision and control and must approve all critical decisions. It would be unethical for the registered person simply to accept a recommendation from the unregistered person.

3. Implementing the Engineering Profession Act 2000

3.1 Practical considerations

The Act prohibits the practice in a category by unregistered persons and prohibits an unregistered person from performing identified work in a category. To “*practise in a category*” and “*perform identified work in a category*” need to be defined.

³ It is reasonable to interpret *consult in a category* as to practise in the category where work is undertaken for another party resulting in the provision of advice, designs and other solutions.

⁴ *Work in the engineering profession* may be interpreted as engineering work or contribution to engineering work.

The usages of the terms in the Act are close and the two prohibitions almost duplicate one another. If “**practise in a category**” is defined identically to “**perform identified work in a category**”, the simplest form of regulation is obtained.

Identify the scope of work for every category of registered persons, a phrase which appears in the Council for the Built Environment Act, also needs to be defined. The wording to this section of the Act indicates that it must be interpreted in the light of *policy with regard to the identification of work for the different categories of registered persons*. Such policy must address how the overlaps between professions are addressed.

The scope of work is linked to **identified work in a category** and the performance of work in the overlap between professions and between categories. It also requires that the categories of registration be defined.

Practise in a category may be interpreted as to **perform engineering work thus reserved**, irrespective of whether or not it is for remuneration, requiring at least the competencies defined for registration in a **category**.

Work identified for a category of registered persons is engineering work that:

- (a) requires at least the competencies defined for the category in the competency standards; and
- (b) involves elements of specific **engineering works**.

Engineering work in addition to a) and b) above embraces work that may be common to other professions such as project management, construction management, the design of buildings, the advice on cost and contractual arrangements and preparation of contract documents, controlling of cost of construction projects, project financing etc, or linked to government certificates of competence in specific contexts.

3.2 The characteristics of **engineering work**

Engineering work has the following five characteristics:

Characteristic 1:

It encompasses initiatives, services and the solution of problems that are of **importance to the society and the economy**.

Characteristic 2:

It has one or more of the following activities and, in consequence, has associated **benefits and risks**:

- (a) exploitation of natural resources;
- (b) harnessing of energy for useful purposes;
- (c) use of materials and substances with useful physical or chemical properties;
- (d) use of machinery and equipment;
- (e) transfer, storage and processing of information;
- (f) construction, maintenance, refurbishment and deconstruction of buildings and engineering infrastructure⁵; and
- (g) organization and control of systems or processes.

Because of the risks involved in the above activities, work must be performed without compromising safety, health and environmental standards and taking sustainable development imperatives into account.

⁵ Engineering infrastructure includes infrastructure associated with:

- a) the functioning of a community or society, such as transportation and communications systems, water supply, storm water control, sanitation and power generation and distribution; and
- b) industrial, chemical, marine and mining processes and the like.

Characteristic 3:

It involves one or more of the following **functions**:

- (a) design of materials, components, systems, plant or processes;
- (b) planning the capacity and location of infrastructure.
- (c) investigating, advising, costing and reporting on engineering problems;
- (d) improvement or optimization of materials, components, systems or processes;
- (e) management of, procurement within or the implementation of engineering projects and maintenance of engineering infrastructure;
- (f) implementation of engineering designs and solutions;
- (g) research, development and commercialization of projects and products other than that relating to business aspects such as marketing, branding and sales;
- (h) management of risks associated with engineering processes, systems, equipment, plant and infrastructure;
- (i) effective communication with a wide range of stakeholders; and
- (j) the education, training and mentoring of engineering personnel, including Candidates and students at higher education institutions in programmes that have been accredited by ECSA.

Characteristic 4

Its work functions divide naturally into the **categories** defined in the Act, namely Professional Engineer, Professional Engineering Technologist, Professional Certificated Engineer and Professional Engineering Technician, and specific categories identified by ECSA.

This division is made according to the nature of the activities, the level of problem solving, the required underpinning knowledge and the scope of responsibility.

Characteristic 5

It requires **distinctive competencies** to perform work associated with a category that include⁶:

- (a) investigating and solving engineering problems and designing solutions;
- (b) applying knowledge and technology based on mathematics, basic sciences and engineering sciences, information technology as well as specialist and contextual knowledge;
- (c) managing engineering activities and communicating effectively within such activities;
- (d) addressing the impacts of engineering work, meeting legal, financial and regulatory requirements; and
- (e) acting ethically, exercising judgment and taking responsibility.

Engineering knowledge and practice expand and change continually. Professionals must therefore continually maintain and extend their own competency.

3.3 Specific types of engineering works

Specific types of **engineering works**, based on characteristics 1 and 2 above involve:

1. Transportation systems including roads, railways, waterways, ports, harbours, airports, gas transmission and distribution systems, pipelines, and all associated works such as yards, docks, lighthouses, rolling stock, vessels, aircraft, lifts, hoists and escalators, pumping plant and traffic engineering.
2. Civil works including township services, water treatment and supply, sewerage works, sanitation, soil conservation works, irrigation works, stormwater and drainage works, coastal engineering and solid waste disposal.

⁶ This summarised list is consistent with the actual competency statements. It should be noted that these competencies are in the so-called "Higher Education and Training Band" (Levels 5 to 8 on the NQF). Consequently, persons such as machine operators and artisans performing engineering-related work in the "Further Education and Training Band (i.e. Levels 1 to 4 on the NQF) are excluded from the engineering work to be reserved for registered persons unless the work they perform is covered by an appropriate specified category prescribed by the Council in terms of Section 18.(1)(c) of the Engineering Profession-Act 2000".

3. Structural works 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 or fluids.
4. Mechanical systems including materials handling, lifting machinery, heating, ventilation and cooling, prime movers, pumps, internal combustion engines, hydraulic, compressed air and other motive power machinery, agricultural machinery and accessories.
5. Works for the harnessing of energy including that derived from fossil fuel combustion, nuclear fission or fusion and solar radiation and other renewable sources, yielding energy suitable for commercial application.
6. Electrical power systems for the generation, transmission and distribution of electrical energy and the application thereof.
7. Electronic systems including that employed in telecommunication, measurement, control and computation.
8. Process systems including chemical works, metallurgical works, manufacturing, food processing such as that in concentrator machinery and apparatus, oil and gas wells, smelters, cyanide plants, acid plants, metallurgical machinery, equipment and apparatus, and works necessary for the beneficiation of metals, minerals, rocks, petroleum and organic substances or other chemical processes.
9. Mining operations or activities for the purposes of winning any mineral on, in or under the earth, water or any residue deposit, whether by underground or open working or otherwise.
10. The mechanical, electrical, chemical, electrochemical, metallurgical or heat treatment of any substance, whether organic or inorganic, and combinations thereof for any purpose.
11. Overseeing the planning, design and delivery of programmes accredited by ECSA at the exit level.
12. The mentoring of persons in their preparation for registration with ECSA.
13. Building services such as water supply, drainage, fire protection measures, electrical and electronic systems
14. Lightning protection

3.4 Distinguishing between the different categories of registration

Engineering activities with respect to characteristics 4 and 5 are encapsulated for the four categories as follows:

- For the Engineer, activities and problem solving are described as **complex**;
- For the Engineering Technologist, activities and problem solving are described as **broadly defined**;
- For the Certificated Engineer, activities and problem solving are described as **broadly defined** with some specific legal aspects;
- For the Engineering Technician, activities and problem solving are described as **well defined**.

4. Dealing with the overlaps between categories of persons and professions

There are unavoidably overlaps between professions. Persons registered in various categories are required at the entry level (i.e. at the point of registration) to demonstrate their competence against standards set by the Council. Their experience and training (both pre and post registration) may render them competent to perform aspects of work identified for other professions. Accordingly, the migration across the boundaries to the professions is not governed by competency standards developed for the purposes of entry to the profession, but rather by professional codes of practice i.e. "undertake only those tasks for which they are competent".

Accordingly quality will be assured and the public interests protected should professionals who are registered in terms of any Built Environment Act and any other Acts which regulate professions⁷ be permitted in the pursuit of their profession to perform any overlapping functions which their

⁷ Such Acts include Planning Professions Act, 2002; National Scientific Professions Act, 2003; and Professional and Technical Surveyors' Act, 1984

education, training and experience have specifically rendered them competent to perform. Likewise candidates may be permitted to perform any overlapping work provided they do so under the direction of a person registered in terms of that Act.

This approach will remove the necessity for dual or multiple registrations and leave it to market forces to determine which professionals will opt for dual registration.

A similar argument may be put forward to govern work undertaken by the different categories of engineering, depending upon the context. Obviously work requiring specific competencies and certifications cannot be undertaken by those not registered within a category.

Competence to perform a particular task in the exercise of specialist expertise and judgement e.g. design of dams, should be controlled through a different process such as a peer recognition process or the obtaining of additional qualifications or specific licensing.

5. A framework for work identification for persons registered in terms of the Engineering Profession Act

Work identified for persons registered with the Engineering Council of South Africa can be identified by answering the following three questions:

1. Does the works fall within the **scope** of any of the types of works set out in column 1 of Table 1?
2. Does the work require any of the **functions** in column 2 of Table 1 to be performed?
3. Does the work require any of the **abilities** acquired through prior learning, experience and training in column 3 of Table 1 in its execution?

If the answer to **all** three questions is yes, the work is identified for persons registered with ECSA.

For example, a person who operates a bulldozer need not be registered person although he performs civil works (column 1) in the execution of his duties as he does not perform any of the functions listed in column 2. The manager of the power control section of a municipality must, on the other hand, be a registered person as he performs work relating to electrical power systems (column 1), performs functions listed in column 2 and requires some of the competencies outlined in column 3.

It should be noted that the aforementioned approach suggests that the person who makes informed engineering decisions at the highest level needs to be registered. This in practice means that the structure of a company will determine who is to be registered. For example, a CEO or MD will need to be registered if such a person makes engineering decisions. On the other hand, if such person actions or acts upon engineering decisions made by others, he or she need not be registered,

Having identified what engineering work is, the next question that needs to be answered is in what is **nature** of engineering work that each category of registered person may perform. Table 2 sets out the broad nature of work performed by each category of registered person. Competency standards may need to be used if the broad criteria do not adequately resolve an individual case. Alternatively, discipline specific codes of practice could be used to more clearly define the overlaps between categories (see Annexure A).

Persons who are not registered in terms of any acts which regulate their profession may not perform any of the work identified for the engineering profession. Persons who are registered in terms of an act which governs their profession may do so provided that their education, training and experience render them competent to perform such work. Likewise persons registered in a category with ECSA may perform work in a different category should their education, training and experience render them competent to do so.

6. Strategic issues requiring further investigations

Appendix A sets out two strategic issues that have come to light in the identification of work for persons registered in terms of the Engineering Profession Act that Council should consider.

Table 1: Criteria for Identifying Work for persons Registered with ECSA

1	2	3
Specific Type of Engineering Work	Functions Performed	Abilities
<ul style="list-style-type: none"> • Transportation systems including roads, railways, waterways, ports, harbours, airports, gas transmission and distribution systems, pipelines, and all associated works such as yards, docks, lighthouses, rolling stock, vessels, aircraft, lifts, hoists and escalators, pumping plant and traffic engineering. • Civil works including township services, water treatment and supply, sewerage works, sanitation, soil conservation works, irrigation works, stormwater and drainage works, coastal engineering and solid waste disposal. • Structural works 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 or fluids. • Mechanical systems including materials handling, lifting machinery heating, ventilation and cooling, prime movers, pumps, internal combustion engines, hydraulic, compressed air and other motive power machinery, agricultural machinery and accessories. • Works for the harnessing of energy including that derived from fossil fuel combustion, nuclear fission or fusion and solar radiation and other renewable sources, yielding energy suitable for commercial application. • Electrical power systems for the generation, transmission and distribution of electrical energy and the application thereof. • Electronic systems including that employed in telecommunication, measurement, control and computation. • Process systems including chemical works, metallurgical works, manufacturing, food processing such as that in concentrator machinery and apparatus, oil and gas wells, smelters, cyanide plants, acid plants, metallurgical machinery, equipment and apparatus, and works necessary for the beneficiation of metals, minerals, rocks, petroleum and organic substances or other chemical processes. • Mining operations or activities for the purposes of winning any mineral on, in or under the earth, water or any residue deposit, whether by underground or open working or otherwise. • The mechanical, electrical, chemical, electrochemical, metallurgical or heat treatment of any substance, whether organic or inorganic, and combinations thereof for any purpose. • Overseeing the planning, design and delivery of programmes accredited by ECSA at the exit level. • The mentoring of persons in their preparation for registration with ECSA. • Building services such as water supply, drainage, fire protection measures, electrical and electronic systems • Lightning protection 	<ul style="list-style-type: none"> • design of materials, components, systems, plant or processes; • planning the capacity and location of infrastructure. • investigating, advising, costing and reporting on engineering problems; • improvement or optimization of materials, components, systems or processes; • management of, procurement within or the implementation of engineering projects and maintenance of engineering infrastructure; • implementation of engineering designs and solutions; • research, development and commercialization of projects and products; • management of the risk associated with engineering processes, systems, equipment, plant, and infrastructure; • effective communication with a wide range of stakeholders; and • the education, training and mentoring of engineering personnel, including Candidates and students at higher education institutions in programmes that have been accredited by ECSA. 	<ul style="list-style-type: none"> • investigate and solve problems and design solutions; • apply knowledge and technology based on mathematics, basic sciences and engineering sciences, information technology as well as specialist and contextual knowledge; • manage engineering activities and communicate effectively within such activities; • address the impacts of engineering work, meet legal, financial and regulatory requirements; and • act ethically, exercise judgment and take responsibility in relation to engineering work.

Table 2: Broad Nature of Work performed by each Category

<p>Professional Engineers</p>	<p>complex engineering work is characterized by:</p> <ul style="list-style-type: none"> (a) the application of a significant range of fundamental principles, enabling the development and application of new technologies, the promotion of advanced designs and design methods, the introduction of new and innovative production techniques and construction concepts; (b) the pioneering of new engineering services and management methods; (c) advanced design, research and field engineering; (d) the management of the high level risks associated with engineering processes, systems, equipment, and infrastructure; (e) activities that are essentially intellectual in nature, requiring discretion and judgement.
<p>Professional Engineering Technologist</p>	<p>broadly defined engineering work is characterized by:</p> <ul style="list-style-type: none"> (a) the application of current engineering technology; (b) the management and operation of modern engineering solutions and processes; (c) the introduction of modern 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 level of risks associated with engineering processes, systems, equipment and infrastructure.
<p>Professional Certificated Engineer</p>	<p>broadly defined engineering work with some specific legal aspects is characterised by the application of current engineering technology and the management of moderate to high levels of risk, and proficiency in specific contexts linked to government certificates of competence in factories, installations generating, converting, transmitting and consuming all forms of energy, mines and works and on ships.</p>
<p>Professional Engineering Technician</p>	<p>well defined engineering work is characterised by:</p> <ul style="list-style-type: none"> (a) the application of established procedures, practices, standards and codes of practice in support of engineering activities; (b) the management and operation of routine engineering operations and processes; (c) the implementation of standard engineering systems and solutions; or (d) management of the implementation of straightforward and simple engineering projects and the routine maintenance of engineering infrastructure; (e) management of the relatively low level risks associated with engineering processes, systems, equipment and infrastructure.
<p>Specified Categories</p>	<p>activities associated with the performance of tasks specified by ECSA. Lift inspectors – the management of risks associated with lifts, escalators and passenger conveyors.</p>

Issues which the Engineering Council of South Africa may have to address

Dealing with Small Construction Works

Small contractors perform civil, mechanical and electrical engineering works within the construction industry. Such works falls within the scope of work activities that may be identified for persons who are professionally registered in terms of the Engineering Profession Act. Such contractors will be required to employ professionally registered persons should engineering works, as described in section 5, be reserved for registered persons. This may present a significant barrier to entry to such enterprises.

Government in terms of its Expanded Public Works Programme requires that contractors who are registered with the Construction Industry Development Board in contractor grading designations 1, 2, 3 and 4, i.e. those contractors who may be awarded contracts having a value inclusive of VAT not exceeding R3,0 million Rand, need to have in their employ person who have completed NQF level 4 labour intensive unit standards. All other contractors are required to have in their employ persons who have completed NQF level 5 labour intensive unit standards. Accordingly, ECSA should consider the introduction of specified categories for the registration of site supervisors and site managers pitched at NQF levels 4 and 5 respectively. This will ensure that all work identified as engineering work is executed by registered persons.

Dealing with Small Scale Mining Operations

Currently small-scale mining operations with less than 50 persons and less than 2500 kW installed power are currently exempt in terms of mining legislation from requirements relating to the certificated managers and engineers. Such work, however, falls within the scope of work activities that may be identified for persons who are professionally registered in terms of the Engineering Profession Act. This may impose an onerous burden on such operations e.g. quarries or small diamond mining operations. This issue needs to be considered by ECSA ahead of the implementation of the identification of work.

Codes of Practice

Section 27 of the Engineering Professions Act empowers the Council to draw up codes of practice in addition to codes of conduct and requires all registered persons to comply with such codes. Failure to do so would constitute improper conduct and be dealt with the Council as such.

Codes of conduct regulate behavior. Codes of practice regulate engineering practice. The publication of discipline specific codes of practice could provide clarity and substance to the following two issues which should be included in any code of conduct regulating the behaviour of registered persons:

- undertake only those tasks for which they are competent; and
- exercise appropriate skill and judgement.

Accordingly, ECSA should consider the supplementing of a code of conduct with discipline specific codes of practice to ensure the quality of work performed by registered persons within each type of engineering works and category of registration and to maintain integrity. This approach may better regulate the overlaps between categories of registered persons and will set standards of acceptable professional practice. It could also address specific requirements for sectors of industry which may not be captured in the generic framework, e.g. consulting engineers.

Rationalisation between various pieces of Legislation

There is a need to rationalize the overlap between various pieces of legislation that impact on the identification of work in order to avoid the duplication of requirements.