ENSURING THE
EXPERTISE TO GROW
SOUTH AFRICA

Discipline Specific Training Guide (DSTG) for Registration as a Professional Engineer in Agricultural Engineering

R-05-AGR-PE

REVISION 2: 16 November 2017

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ECSA

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

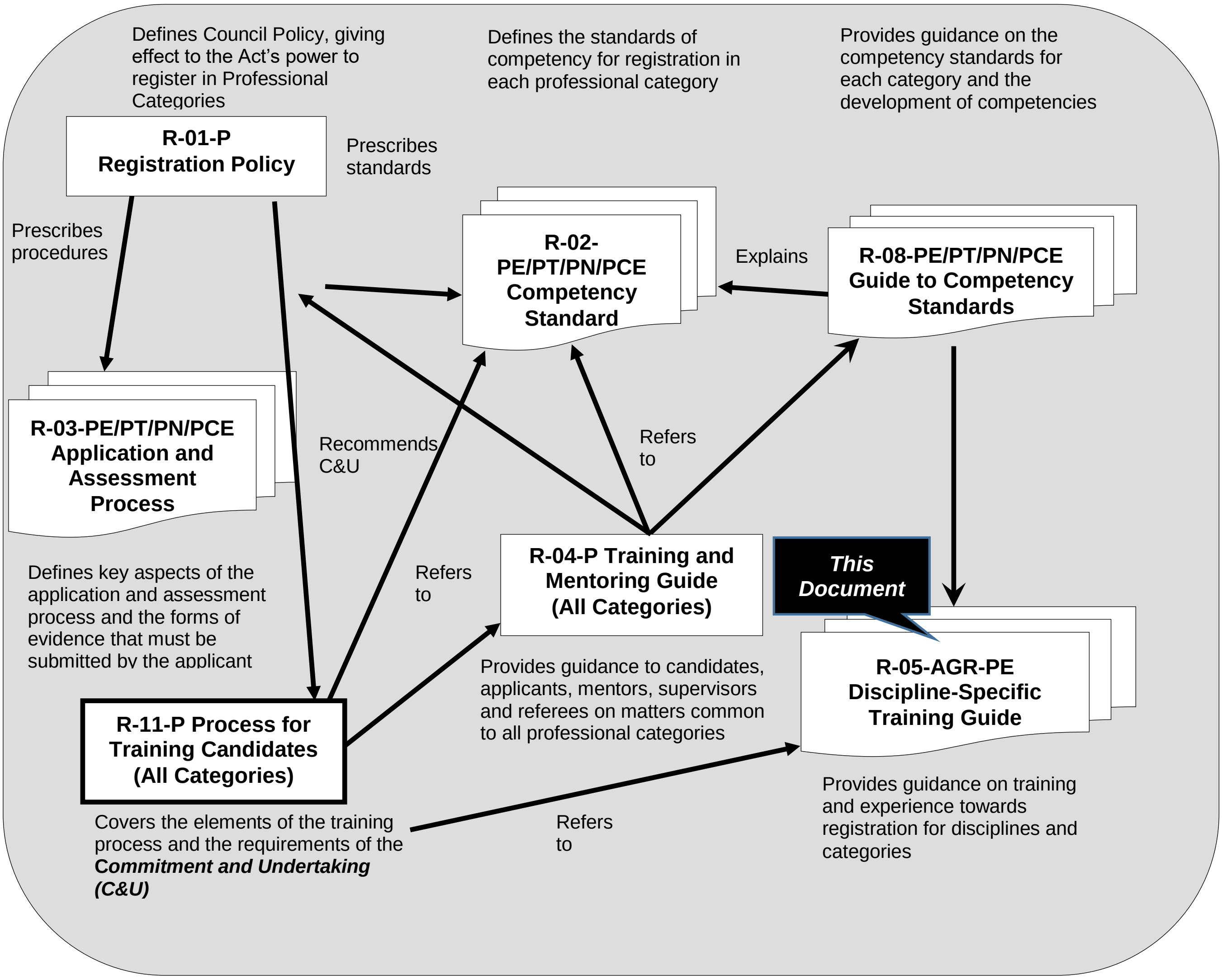

Figure 1: Documents defining the ECSA Registration System

2. PURPOSE

All persons applying for registration as Professional Engineers are expected to demonstrate the competencies specified in document R-02-PE through work performed at the prescribed level of responsibility, irrespective of the trainee's discipline.

This document supplements the generic *Training and Mentoring Guide* (document R-04-P) and the *Guide to the Competency Standards for Professional Engineers* (document R-08-PE).

In document R-04-P, attention is drawn to the following sections:

- 7.3.2 Duration of training and length of time working at level required for registration
- 7.3.3 Principles of planning, training and experience
- 7.3.4 Progression of training programme
- 7.3.5 Documenting training and experience
- 7.4 Demonstrating responsibility

The second document (document R-08-P) provides a high-level, outcome-by-outcome understanding of the competency standards that form an essential basis for this Discipline-Specific Training Guide (DSTG).

This guide and the documents R-04-P and R-08-PE are subordinate to the Policy on Registration (document R-01-P), the Competency Standard (document R-02-PE) and the application process definition (document R-03-PE).

3. AUDIENCE

This DSTG is directed towards candidates and their supervisors and mentors in the discipline of Agricultural Engineering. The guide is intended to support a programme of training and experience through incorporating good practice elements.

This guide applies to persons who have

- completed the tertiary educational requirements in Agricultural Engineering
  - by obtaining an accredited B.Eng.-type qualification from a recognised tertiary university in South Africa,

  - by obtaining a Washington Accord recognised qualification, or
  - through evaluation/assessment;
- registered with ECSA as a Candidate Engineer; and/or
- embarked on a process of acceptable training under a registered Commitment and Undertaking (C&U) programme under the supervision of an assigned mentor guiding the professional development process at each stage.

4. PERSONS NOT REGISTERED AS A CANDIDATE AND/OR NOT TRAINED UNDER COMMITMENT AND UNDERTAKING

Irrespective of the development path followed, all applicants for registration must present the same evidence of competence and be assessed against the same standards. Application for registration as a Professional Engineer is permitted without being registered as a Candidate Engineer and without training under C&U. Mentorship and adequate supervision are, however, key factors in effective development to the level required for registration.

If the employer of the trainee does not offer C&U, the trainee should establish the level of mentorship and supervision that the employer is able to provide. In the absence of an internal mentor, the services of an external mentor should be secured. The Voluntary Association for the discipline may be consulted for assistance in locating an external mentor. A mentor should keep abreast of all stages of the development process.

This guide is written for the recent graduate who is training and gaining experience towards registration. Mature applicants for registration may apply the guide retrospectively to identify possible gaps in their development.

Applicants who have not enjoyed mentorship are advised to request an experienced mentor (internal or external) to act as an application adviser while they prepare their application for registration.

5. ORGANISING FRAMEWORK FOR OCCUPATIONS

Agricultural Engineering (Organising Framework for Occupations (OFO) 214905)

Agricultural Engineers have unique skills to connect the living world of plants, soil, water and animals with the technology of engineering (i.e. systems, structures and machines). Agricultural Engineers are required to ensure sustainable environments with adequate energy, water supplies and food production and processing systems. Agricultural Engineers thus operate at the interfaces between engineering science and practice, agricultural production and processing and rural environmental management. The implication is that Agricultural Engineers must be aware of the factors that are important in agricultural production and processing and environmental sustainability. This is promoted by including introductory agricultural courses in the tertiary education of the Agricultural Engineer. Candidates who have degrees in engineering specialities other than Agricultural Engineering will have to show that they have attained this knowledge through practical experience in at least one of the many diverse areas of sustainable agricultural production and processing if they are to be registered as Agricultural Engineers.

An Agricultural Engineer plans, performs and supervises engineering work related to the development and/or improvement of infrastructure, machinery and processes for agricultural production. In addition, the Agricultural Engineer is responsible for post-harvest handling and processing of agricultural produce and similar engineering processes in associated environmental and biological contexts. This may include the use and development of agricultural land, the environment, infrastructure (buildings, roads, river crossings, dams, irrigations systems, electrification, etc.), machines, equipment and processes.

Due to the multi-disciplinary nature of Agricultural Engineering, practising Agricultural Engineers generally concentrate on one or more of the following areas:

- Agricultural Energy Engineering
- Agricultural Renewable Energy Engineering
- Agricultural Product Processing Engineering
- Agricultural Structure and Facility Engineering
- Agricultural Waste Handling and Management
- Aquaculture Engineering

- Mechanisation Engineering
- Irrigation Engineering
- Hydrology and Agricultural Water-Use Management
- Natural Resources Engineering (soil and water conservation)
- Food Engineering
- Environmental Engineering
- Rural Infrastructure Engineering

Potential fields of work for Agricultural Engineers include

- advising on and/or conducting research and developing new or improved theories and methods relating to Agricultural Engineering (i.e. soil and water, power and machinery, the processing and handling of agricultural/biological products, structures, the environment, energy, particularly renewable energy, and biological systems);
- designing, managing and/or advising on technology for food, fibre- and energy-production systems, including the design, sizing, selection and management of agricultural machinery, implements and equipment for field operations (e.g. soil preparation, planting, harvesting, storage and transport of produce);
- testing and evaluating new agricultural machinery and equipment;
- using precision agriculture technologies (e.g. GIS, GPS) to ensure optimal and sustainable agricultural production systems that consider the environment;
- designing and overseeing the operation of transportation systems that move produce from fields to storage facilities, factories and consumers;
- designing and managing irrigation systems to irrigate plants efficiently in order to obtain optimal yield per unit of water applied;
- designing and installing drainage systems for land conservation and optimal crop production;
- designing and managing agricultural and rural water-resource systems through the design of dams, canals, boreholes, extraction works and pipe networks for water supply to agriculture and society;
- assessing the availability of water resources in order to meet the demands for water in the

variable climate of South Africa;

- managing water resources by reconciling demands for water with the available supply;
- designing soil and water conservation systems to control runoff, thus minimising erosion, maximising agricultural production and sustaining the environment through minimising the negative impacts of agricultural practices;
- designing and overseeing the operation of agricultural structures and infrastructure (e.g. farm buildings, farm roads, minor river crossings and bridges, animal handling facilities, agricultural waste handling and management facilities, spray races and dips);
- designing and managing food processing and storage systems (e.g. structures, cold stores, pack houses, factories and plants for agricultural-produce value addition, cooling, heating, dehydration and pasteurisation facilities, grain handling, storage and silo facilities, fish processing plants, abattoirs, marketing structures) in order to add value to raw products through the use of technology to preserve and process food and animal feed, thus ensuring products are safe for human consumption;
- designing and managing intensive animal handling and plant production structures and control systems that may have controlled environments for optimal plant production (e.g. greenhouses), animal breeding (e.g. housing structures, broiler units) and generation of animal products (dairy plants, milking parlours);
- using renewable sources of energy through the design and development of technology to grow and utilise sustainable sources of energy (e.g. hydro, bio-fuels, solar, wind) and processing agricultural products and biomass into bio-energy (e.g. anaerobic digesters);
- designing, managing and advising on power and energy systems for agricultural production, including the design, sizing, selection and management of agricultural machinery and equipment (e.g. engines, motors, pumps, fans, pipes) together with testing and evaluating new agricultural machinery and equipment;
- determining and specifying construction methods, materials and quality standards and directing construction work;
- establishing control systems to ensure efficient functioning of infrastructure and safety and environmental protection;
- organising and directing the operation, maintenance and repair of agricultural production structures and facilities; and

- analysing the stability of structures, machinery and implements and testing the behaviour and durability of the materials used in their construction.

6. NATURE AND ORGANISATION OF THE INDUSTRY

The close association of Agricultural Engineering with biological and environmental systems requires specific attention to risk and impact mitigation, which requires the Candidate Engineer to develop a good working knowledge of specific laws and regulations. These include

- Atmospheric Pollution Prevention Act, No. 45 of 1965
- Conservation of Agricultural Resources Act, No. 43 of 1983 (CARA)
- Land Reform legislature
- Land Use Planning Ordinance, No. 15 of 1985 (LUPO)
- National Environmental Management Act, No. 107 of 1998
- National Environmental Management Biodiversity Act, No. 10 of 2004
- National Environmental Management Waste Act, No. 59 of 2008
- National Water Act, No. 36 of 1998
- Occupational Health and Safety Act, No. 85 of 1993.

Candidate Engineers should ensure that the work in which they engage during the training period gradually increases their degree of responsibility and is relevant to their progression towards registration. Candidate Engineers should further ensure that they gain experience in all the typical tasks that present in the lifecycle of agricultural engineering projects and specifically include practical site work and engineering design. The tasks in the engineering project lifecycle listed below are elaborated upon in Appendix: Training Elements (QCTO Curriculum):

- solving complex engineering problems using engineering and contextual knowledge;
- planning, implementing and operating engineering projects, systems, products and processes;
- mitigating risk and impact; and
- managing engineering activities.

The Candidate Engineer can develop further insight into the typical stages that are involved in the implementation of engineering projects by studying the Guideline Scope of Services and Tariff of Fees for Persons Registered in terms of the Engineering Profession Act, No. 46 of 2000. (See the ECSA Board Notice, No 208 of 2011 in the *Government Gazette*, No. 34875 of 20 December 2011).

The six stages for implementation of normal services in an engineering project are

Stage 1 – Inception (including assessment of needs and resources)

Stage 2 – Concept and Viability (often called Preliminary Design)

Stage 3 – Design Development (also termed Detail Design)

Stage 4 – Documentation and Procurement (development of tender documentation, including drawings, specifications, quantities and tenders/contracts, and procurement, including tendering process)

Stage 5 – Contract Administration and Inspection (requiring adequate, first-hand, practical experience in site work such as fabrication, construction, manufacturing, installation, construction administration and inspection)

Stage 6 – Close-Out (project close-out and hand-over, including commissioning, operating documentation and as-built plans)

For continuing projects in an operational environment, the Agricultural Engineer may be responsible for project management involving ongoing operation and maintenance, optimisation and asset management and renewal:

- post-implementation / operation / management;
- shut-down, preventative maintenance;
- ongoing optimisation;
- repair, refurbishment, upgrading; and
- decommissioning, safe disposal / re-use / recycling.

Both practical experience in site work (Stage 5) and engineering design (Stage 2 and Stage 3) are essential in the training of an Agricultural Engineer. It should be noted that design is not restricted to physical infrastructure and artefacts and may involve new processes and operating systems.

Agricultural Engineering encompasses a diverse range of fields, and it would be unrealistic to expect a Candidate Engineer to achieve exposure to the full range of fields during the training period. However, it is important that Candidate Engineers

- are exposed to and demonstrate a good understanding of the context within which they are applying their knowledge, skills and engineering judgement;
- gain experience across the full spectrum of tasks in the typical lifecycle of engineering projects; and
- are familiar with the statutory requirements related to their field of operation.

7. DEVELOPING COMPETENCY: ELABORATING ON SECTIONS IN THE GUIDE REGARDING COMPETENCY STANDARDS (DOCUMENT R-08-PE)

Candidate Engineers can demonstrate competency in their field by compiling a portfolio of evidence that is structured according to the 11 outcomes mentioned in document R-02-PE and further described in document R-08-PE. The 11 outcomes are organised into five groups (groups A–E) and nested as shown below:

Group A: Knowledge-based problem-solving (this should be a strong focus)

The Candidate Engineer may develop and demonstrate competency in outcomes 1, 2 and 3 by providing evidence of problem identification and analysis that successfully interprets a diversity of factors affecting possible engineering solutions in farming, rural development or agro-industrial contexts. Examples of evidence for competency include identification, evaluation, selection, design, implementation of suitable engineering solutions (may include infrastructure and/or processes) and application of engineering and non-engineering knowledge and insight to achieve workable solutions.

Group B: Management and communication

Evidence for competency of the Candidate Engineer in outcomes 4 and 5 (management and communication in Agricultural Engineering) includes examples of planning and organising and human resource management plus funds, machinery, methods and materials in site work and Agricultural Engineering office contexts. Also included is professional and effective communication with farmers, rural communities, contractors, persons engaged in the agro-industry, relevant government departments, clients and peers.

Group C: Identifying and mitigating the impacts of engineering activity

Examples demonstrating competency in Outcome 6 (identifying and mitigating the impacts of agricultural engineering activity) include responsible development, utilisation and protection of natural resources related to agriculture, including water, soil, bio-diversity and air quality. Competency may further include mitigation of non-regulated impacts such as disturbances to social and economic stability through ill-considered engineering developments, particularly in remote rural areas.

Evidence of competency in Outcome 7 includes examples of human, animal and plant health protection in farming and agro-industrial contexts and compliance with the relevant regulatory requirements in the design of engineering solutions.

Group D: Judgement and responsibility

For outcomes 8, 9 and 10, Candidate Engineers should demonstrate they are willing and able to take responsibility for decisions and are competent in judgement and responsible conduct in accordance with the ECSA Code of Conduct.

Group E: Independent learning

Towards achievement of Outcome 11, the Candidate Engineer should develop the ability and habit of independent and lifelong learning. Using the Continuous Professional Development (CPD) guidance documentation available on the ECSA website, candidates should provide evidence of relevant CPD activities completed during the training period.

7.1 Contextual knowledge

By nature, work in the Agricultural Engineering sector is very closely integrated with biological systems and the natural environment. Thus, an Agricultural Engineer requires a thorough understanding of the people and circumstances when devising a suitable agricultural engineering solution. Circumstances may vary from ultramodern, agro-industrial factories and complex, multi-faceted, commercial farming enterprises to robust, pro-poor, rural food security systems within complex multi-user social structures.

The strong contextual nature of agricultural engineering solutions holds specific implications for the training of the Candidate Engineer. It is strongly recommended that the Candidate Engineer also acquires first-hand exposure and experience of the non-engineering context (farms, rural communities, agri-businesses) within which agricultural engineering solutions need to be relevant. Adequate first-hand exposure will enable Candidate Engineers to

- understand that they are working with the uncertainties of economy, climate, social contexts and farming environments;
- understand, respect and be able to collaborate with related disciplines in a complex environment, including specialists in crops, soils, food science and health in addition to chemical suppliers and environmental experts and authorities; and
- appreciate the economic realities in agriculture, including low margins and resource-poor communities plus the socio-economic impacts of and on engineering interventions.

7.2 Functions performed, statutory and regulatory requirements and desirable formal learning

The following formal learning activities and objectives are recommended for inclusion in the training period for the Candidate Engineer in Agricultural Engineering:

- gaining practical exposure to non-engineering skills and achieving underlying background experience in farming, rural development and/or agro-processing industry contexts – it is strongly recommended that Candidate Agricultural Engineers work in a farming or agro-processing industrial environment for at least three months to a year upon graduation;
- acquiring the habit of CPD in functions related to the discipline plus networking and becoming acquainted with peers and related disciplines;
- developing targeted soft skills to act effectively in social realities and management contexts;
- attending industry-related conferences, presentations, seminars and workshops;
- applying IT/software relevant to the discipline (e.g. CAD programmes, Modelmaker);
- encompassing project planning and management; and

- incorporating engineering management and entrepreneurship and business management.

8. PROGRAMME STRUCTURE AND SEQUENCING

8.1 Best practices

There is no ideal training programme structure or unique sequencing that constitutes best practice. The training programme for each candidate depends on the available work opportunities at the time that are assigned to the candidate by the employer.

It is suggested that candidates work with their mentors to determine appropriate projects to gain exposure to the elements of the asset lifecycle and to ensure that their designs are constructible and operable and are designed considering lifecycle costing and long-term sustainability. A regular reporting structure with suitable recording of evidence of achievement against the competency outcomes and responsibility levels needs to be in place.

The training programme should be such that the candidate progresses through the levels of work capability as described in 7.3.4 of document R-04-P so that by the end of the training period, the candidate exhibits a Level E degree of responsibility and is able to perform individually and as a team member at the level of problem-solving and engineering activity that is required for registration.

Value Improved Practices (VIPs) are out-of-the-ordinary practices used to improve cost, schedule and/or reliability of capital construction projects. Value Improved Practices

- are used primarily during front-end-loading;
- are formal, documented practices involving a repeatable work process; and
- are mainly facilitated by specialists outside the project team.

Examples are as follows:

- Technology selection
- Process simplification
- Classes of facility quality
- Waste minimisation

- Energy optimisation
- Process reliability modelling
- Customisation of standards and specifications
- Predictive maintenance
- Design to capacity
- Value engineering
- Constructability

8.2 Realities

The minimum period for the Candidacy Phase is stated by the ECSA as three years. The likelihood, however, is that the period of training will be longer. This time frame is determined by the availability of opportunities and the exposure to various functions in the actual work environment.

Irrespective of the route followed, the overriding consideration is that the applicant must provide evidence of competence against the standard and provide objective evidence of meeting the 11 specified outcomes.

8.3 Generalists, specialists, researchers and academics

Document R-08-PE adequately describes what is expected of persons whose formative development has not followed a conventional path, for example, academics, researchers and specialists.

Irrespective of the route followed, the overriding consideration is that the applicant must provide evidence of competency against the standard.

8.4 Multi-disciplinary exposure

Interface management between various disciplines needs to be formalised. Details of signed-off interface documents between different disciplines are essential.

8.5 Orientation requirements

The requirements comprise

- introduction to company safety regulations;
- introduction to the company code of conduct;
- introduction to the company staff code and regulations;
- typical functions and activities of the company; and
- hands-on experience and orientation in each of the major company divisions.

8.6 Moving into or changing candidacy training programmes

This guide assumes that the candidate enters a programme after graduation and continues with the programme until ready to submit an application for registration. It also assumes that the candidate is supervised and mentored by persons who meet the requirements stated in document R-04-P, section 7.2. In the case of a person changing from one candidacy programme to another or moving into a candidacy programme from a less structured environment, it is essential that the following steps are completed:

- The candidate must complete the Training and Experience Summary (TES) and the Training and Experience Reports (TERs) for the previous programme or unstructured experience. In the latter case, it is important to reconstruct the experience as accurately as possible. The TERs must be signed off by the relevant supervisor or mentor.
- On entering the new programme, the mentor and supervisor should review the candidate's development while being mindful of the past experience and the opportunities and requirements of the new programme. At minimum, the mentor and supervisor should plan the next phase of the candidate's programme.

8.7 Degree of responsibility

Together with their supervisors and mentors, Candidate Engineers should ensure that their work is structured and sequenced to enable systematic progression towards registration. Progress can be planned and measured using the scales for degree of responsibility, engineering activity and engineering problem-solving as described in document R-04-P: Training and Mentoring Guide and in document R-08-PE: Guide to Competency Standards.

Table 4: Progression throughout the candidacy period presented in document R-04-P specifically refers to the gradual increase in the degree of responsibility that Candidate Engineers are expected to acquire and exhibit during their engineering training. Specific examples and outcomes appropriate to training in Agricultural Engineering are given below:

Degree of responsibility	Nature of work	Activities/duties to be undertaken during training
A: Being exposed	The candidate undergoes induction and observes processes and work of competent practitioners	While working under the close supervision of a competent Professional Engineer and senior colleagues in the firm/organisation, trainees should • be directed to read the various Acts and regulations that affect the work of a Professional Engineer; • be exposed to the firm/organisation's work environment, including the organisational structure; • read materials concerning the firm/organisation; • be exposed to field work and the engineering office-work environment and culture; • attend and participate in meetings, including office meetings, field/site meetings, seminars and workshops; • be sensitised to the importance of CPD and relevant vocational society meetings; • be exposed and/or trained in the use of both the general and the specialised computer software packages used by the firm/organisation in its delivery of day-to-day work; • be part of a team comprising competent engineers(s) and Candidate Engineer(s) working on engineering projects in a sub-discipline of Agricultural Engineering; • if possible, be attached/exposed to different projects in the known sub-disciplines of Agricultural Engineering; and • be personally committed to their development and training by gaining experience in the full range of engineering activities available in the firm/organisation.

B: Assisting	The candidate performs specific processes under close supervision.	While working under close supervision of a Professional Engineer, trainees should • be engaged in engineering tasks under close supervision of a competent engineer; • develop and display an appreciation of the numerous resources at the disposal of an Agricultural Engineer; • be engaged in conducting special studies or research to solve customer-service problems; • assist in the selection of outside consultants and contractors; • assist in the preparation and issuance of proposals to consultants and contractors; • be assigned the responsibility of assisting and supervising new staff at the 'A: Being Exposed' level and other lower-level technical staff; • assist in the review of bid proposals, make recommendations and forward their report to the supervising Professional Engineer; and • be personally committed to their development and training by gaining experience in the entire range of engineering activities available in the firm/organisation.

C: Participating	The candidate performs specific processes as directed with limited supervision.	While working under less supervision than candidates exhibiting levels A and B in degree of responsibility, trainees should • administer assigned contracts and provide administrative support in the preparation of construction and maintenance contracts; • participate in the preparation of budgets for assigned projects, submit budget recommendations and monitor expenditure; • assist in monitoring outside consultants' work and assist in monitoring the progress of projects and the disbursement of payments; • compile engineering data and other relevant data for assigned projects to be used by other engineering project team members; and • participate in minor engineering work design as directed by a competent engineer.

D: Contributing	The candidate performs specific work with detailed approval of work outputs.	While working under minimum supervision, trainees apply engineering technology and knowledge of biological sciences to agricultural problems concerned with power and machinery, electrification, structures, soil and water conservation and processing of agricultural products in order to • develop criteria for design, manufacture or construction of equipment, structures and facilities; • design and use sensing, measuring and recording devices and instrumentation to study problems such as effects of temperature, humidity and light on plants or animals or to study the relative effectiveness of the different methods for applying insecticides; • design and direct the manufacture of equipment for land tillage and fertilisation, plant and animal disease control, insect control, harvesting and transport of commodities; • design and supervise the erection of structures for crop storage, animal shelter and human dwelling, including light, heat, air-conditioning, water supply and waste disposal; • plan and direct the construction of irrigation, drainage and flood-control systems for soil and water conservation; • design and supervise the installation of equipment and instruments used to evaluate and process farm products and automate agricultural operation groups and related farm cooperatives; and • remain committed to CPD. Because the firm/organisation may not be involved in engineering work that covers all the agricultural engineering sub-disciplines, it should be noted that trainees do not need to contribute/work in all the said areas.

E: Performing	The candidate works in a team without supervision, recommends work outputs and is responsible but not accountable.	While working under no supervision, trainees apply engineering technology and knowledge of biological sciences to agricultural problems concerned with power and machinery, electrification, structures, soil and water conservation and processing of agricultural products in order to • develop criteria for design and manufacture or develop criteria for construction of equipment, structures and facilities; • develop and implement production, processing and management systems; • design and use sensing, measuring and recording devices and instrumentation to study problems such as effects of temperature, humidity and light on plants or animals or to study the relative effectiveness of different methods for applying insecticides; • design and direct the manufacture of equipment for land tillage and fertilisation, plant and animal disease control, insect control, harvesting and transport of commodities; and • design and supervise the erection of structures for crop storage, animal shelter and human dwelling, including light, heat, air-conditioning, water supply and waste disposal. • Plan and direct construction of irrigation, drainage, and flood-control systems for soil and water conservation;design and supervise the installation of equipment and instruments used to evaluate and process farm products and automate agricultural operation groups and related farm cooperatives; • assume technical responsibility and coordinate the work of their juniors; • manage multi-disciplinary engineering projects; • exercise engineering judgement and take responsibility for the project, the output of which must be confirmed by a Professional Engineer; and • remain committed to CPD. Because the firm/organisation may not be involved in engineering work that covers all the agricultural engineering sub-disciplines, it should be noted that trainees do not need to contribute/work in all the said areas.

REVISION HISTORY

Revision Number	Revision Date	Revision Details	Approved By
Rev 0: Concept A	15 Sep 2012	Initial attempt by task Ag. Eng. PAC team	
Rev 0: Concept B	19 Oct 2012	Draft to SAIAE Council	
Rev 0: Concept C	25 Oct 2012	Approved SAIAE to ECSA	
Rev 1	12 Mar 2013		Reg. Committee for Professional Eng.
Rev 2	22 Sept 2017	Reviewed in line with approved DSTG framework	P Moodley
Rev 2	9 Oct 2017	For approval via round robin	PDSGC
Rev 2	23 Oct 2017	Reviewed and checked	B Collier-Reed, TP Maphumulo, J Cato
Rev 2	16 Nov 2017	Approval	PDSG

The Discipline-Specific Training Guide (DSTG) for:
Registration as a Professional Engineer in Agricultural Engineering

Revision 2 dated 16 November 2017 and consisting of 22 pages has been reviewed for adequacy by the Business Unit Manager and is approved by the Executive: Policy Development and Standards Generation (PDSG).

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Business Unit Manager

30/05/2018
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Date

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Executive: **PDSG**

30/5/2018
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Date

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

APPENDIX: TRAINING ELEMENTS (QCTO CURRICULUM)

	Occupational		Work experience	Scope of work experience
	Tasks	Contexts		
1	Solving problems based on engineering and contextual knowledge			
1.1	Conceptualisation of complex engineering problems			
1.1.1	Receive brief			
1.1.2	Investigate/evaluate requirements			
1.1.3	Develop preliminary solutions			
1.1.4	Justify the preliminary design			
1.2	Design or development processes for complex engineering problems			
1.2.1	Detailed design or development processes			
1.2.2	Documentation development for Implementing Complex Engineering Solutions			
2	Implementing or operating engineering projects, systems, products or processes			
2.1	Planning processes for Implementation or Operations			
2.1.1	Developing business and stakeholder relationships			
2.1.2	Scope and plan			
2.2	Organising processes for Implementation or Operations			
2.2.1	Managing resources			
2.2.2	Optimising resources and processes			
2.3	Controlling processes for Implementation or Operations			
2.3.1	Site work: Monitoring progress and delivery			
2.3.2	Monitoring quality			
2.4	Close-out processes for Implementation or Operations			
2.4.1	Commissioning processes			
2.4.2	Developing operational documentation			
2.4.3	Hand-over processes			
2.5	Maintenance and repair processes			
2.5.1	Maintenance planning and scheduling			
2.5.2	Monitoring quality			
2.5.3	Overseeing repairs and/or implementing remedial processes			
3	Risk and impact mitigation			
3.1	Impact and risk assessments			
3.1.1	Impact assessments			
3.1.2	Risk assessments			
3.2	Regulatory compliance processes			
3.2.1	Health and safety			
3.2.2	Legal and regulatory			
4	Managing engineering activities			
4.1	Self-management processes			
4.1.1	Manages own activities			
4.1.2	Communicates effectively			
4.2	Team environment			
4.2.1	Participates in and contributes to team planning activities			
4.2.2	Manages people			
4.3	Professional communication and relationships			
4.3.1	Establishes and maintains professional and business relationships			
4.3.2	Communicates effectively			

4.4	Exercising judgement and taking responsibility
4.4.1	Ethical practices
4.4.2	Exercises sound judgement in the course of complex engineering activities
4.4.3	Is responsible for decision-making regarding part or all of the complex engineering activities
4.5	Competency development
4.5.1	Plans own development strategy
4.5.2	Constructs initial professional development record