ENSURING THE
EXPERTISE TO GROW
SOUTH AFRICA

Training Academy Certification Criteria

A-02-STA

REVISION 1: 16 November 2017

ECSA

TABLE OF CONTENT

LIST OF FIGURES

BACKGROUND: THE ECSA ACADEMY SYSTEM DOCUMENTS

The documents that define the Engineering Council of South Africa (ECSA) system for the establishment and certification of an academy are shown in **Figure 1** which also locates the current document.
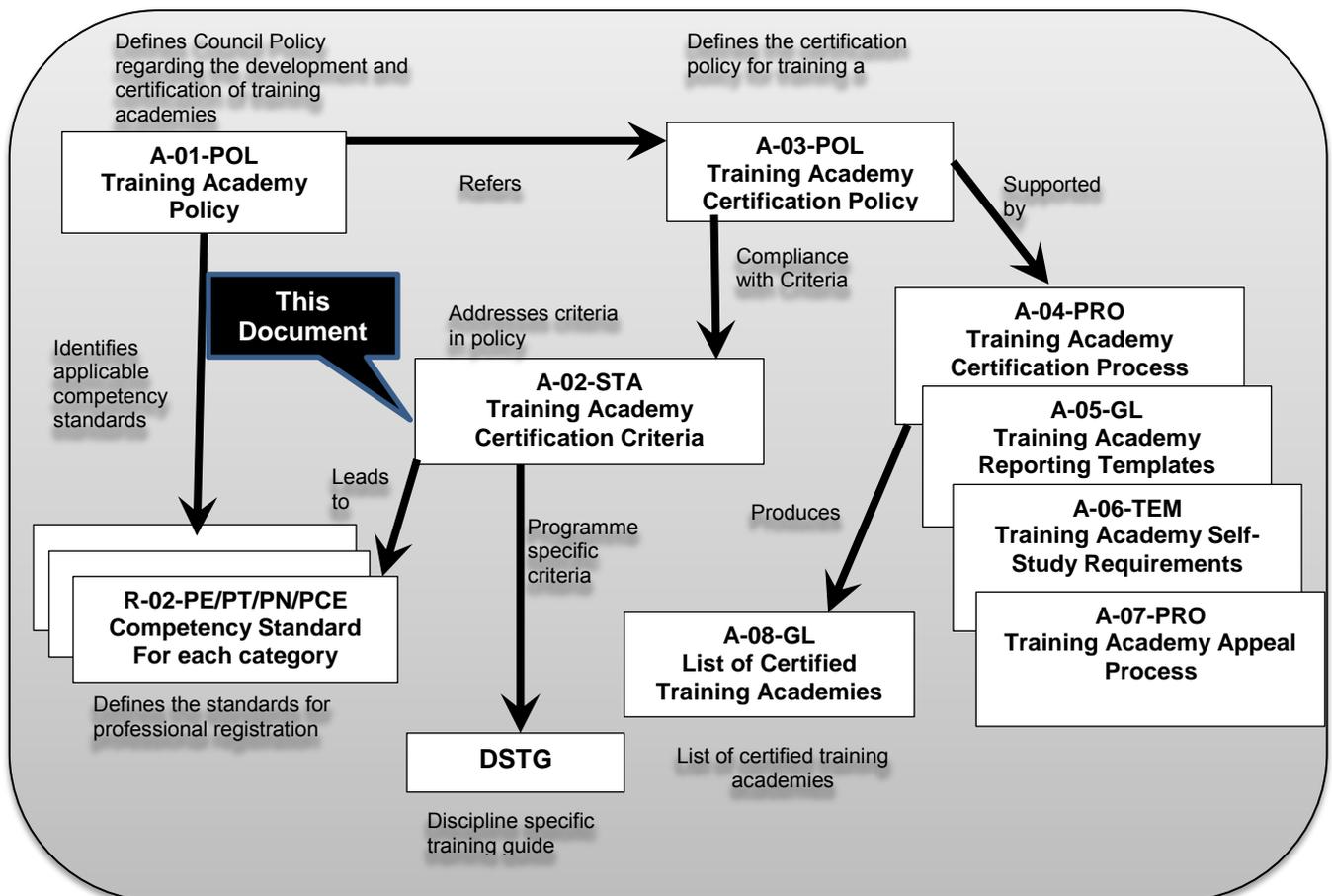

Figure 1: Documents defining the ECSA Training Academy System

1. PURPOSE

This document (**A-02-STA**) defines the criteria required for certification for which an organisation may make an application for the initial desktop evaluation of new training programmes and subsequent certification of training programmes to become a certified training academy.

The process of registering professional engineers/technologists/technicians requires the development of competencies prescribed in the ECSA Policy Document **R-02-PE/PT/PN** and the key building blocks of these competencies are:

- B. Eng/BTech/ND qualifications obtained from ECSA accredited academic programmes or foreign/local qualifications that have been collectively assessed by SAQA and ECSA as substantially equivalent to qualifications obtained from accredited programmes at universities in South Africa;

- Structured, formal workplace experience that provides the engineering graduates with an opportunity to apply their educational knowledge that has been obtained from the university at exit level outcome as defined in the Council's policy document on university programme accreditations;

- Participation in work-related career development and training courses and sessions that are offered either internally in the organisation or by external service providers;

- Informal learning through active participation in routine organisational work processes;

- Increasing the level of involvement and responsibility in organisational activities that enable the graduates to utilise the academic knowledge obtained at exit level outcome;

- Sufficient variety in work experience to enable the graduates to articulate the exit level outcomes that were met in their education to work environment.

The ECSA recognised exit level outcomes in engineering education are:
- Problem solving
- Application of scientific and engineering knowledge
- Engineering design
- Investigations, experiments and data analysis
- Engineering methods, skills and tools, including information technology
- Professional and technical communication
- Impact of engineering activity
- Individual, team and multidisciplinary working

- Independent learning ability

- Engineering professionalism

- Engineering management.

2. DEMONSTRATION OF COMPETENCE

All 11 exit level outcomes in engineering education feed directly into the development of 11 competency based outcomes for professional engineering registration. It is therefore of critical importance that the demonstration of competence in professional registration outcomes is compatible and directly links with exit level outcomes associated with engineering education.

The educational exit level outcomes, combined with the building blocks of competencies as described under section 1, lays a robust foundation for the satisfactory achievement of professional registration outcomes. In brief, **R-02-PE/PT/PN** defines competence as the ability to provide sufficient evidence of having obtained applied theoretical or academic knowledge outcomes at exit level from the university to a wide range of organisational activities, including engineering activities.

It is therefore essential that while graduates participate in organisational activities that are focused on attaining the strategic and business objectives of the organisation, an effort must be made to involve them sufficiently with an increasing level of responsibility in tasks that are required to enhance their level of competence required to make them eligible for professional registration in the appropriate engineering category. In other words, the candidates must be trained as follows:

- Candidate engineers must be trained for the category of professional engineers

- Candidate technologists must be trained for the category of professional technologists

- Candidate technicians must be trained for the category of professional technicians.

The underlying factors in engineering competence as defined in **R-02-PE/PT/PN** are the concept of complex, broadly and well defined engineering activities that are applicable to all graduates who are the holders of the accredited engineering qualifications. This means that, while the engineering graduates must be involved in all organisational activities, they must also be afforded an opportunity to sufficiently engage in some of the following areas of complex/broadly defined/well defined engineering activities respectively, as appropriate:

- Manipulation and analysis of a large amount of data using suitable and preferably advanced computer software;

- Conceptual studies, trade-off studies and optimisation studies;

- Life cycle planning of operations, systems and processes;

- New technology development and application of new technology in business process improvement;

- Innovative methods of work that sets the industry benchmark;

- Integration of standards and codes with an independent first principle approach to solving operational problems;

- Research work that commercialises new products and services, and enhances the standard of engineering education; and

- Development and review of operating parameters, design specifications and performance measurements with an objective to enhance performance.

The list is by no means exhaustive, but provides an indication of the areas in an organisation where the engineering graduates will be able to obtain experience in undertaking sufficiently complex/broadly defined/well defined engineering work, as appropriate, in addition to all other mandatory engineering and organisational activities.

3. COMPETENCY BASED OUTCOMES FOR PROFESSIONAL REGISTRATION

The 11 outcomes have been classified into five groups to facilitate easy and more convenient matching of the outcomes with an operational structure of business organisations. Policy document **R-02-PE/PT/PN** provides a comprehensive description of these outcomes in the context of their relevance to the work environment.

3.1 Group A: Synthesis of engineering solutions

Without all of these three outcomes being satisfactorily met, registration is not possible. These outcomes represent the core of engineering and the training of academics must be structured such

that it enables the respective graduates to develop the competencies required to meet this group of outcomes.

While engineering graduates are expected to supply evidence of having achieved this group of outcomes in all or most of their engineering work, it is critical that they also demonstrate capability in achieving these outcomes in the type of work that involves complex/broadly defined/well defined engineering activities.

Outcome 1: Define, investigate and analyse complex/broadly defined/well defined engineering problems as appropriate.

Outcome 2: Design or develop solutions to complex/broadly defined/well defined engineering problems.

Outcome 3: Comprehend and apply advanced knowledge, principles and specialist knowledge as well as jurisdictional and local knowledge.

These outcomes are the manifestation of the first 3 of the 11 exit level outcomes associated with academic learning at the university. They constitute the core of all engineering disciplines. They have to be demonstrated in both general engineering practice and discipline specific training experience. For example, while the workplace may require that graduates undertake general engineering work as part of the suite of services or products that the organisation is offering, it is important that graduates must also become involved in a sufficient amount of engineering work at the level defined by **R-02-PE/PT/PN.**

3.2 Group B: Management of organisational activities including stakeholder management

This group of outcomes requires the engineering graduate to be actively involved in as many organisational activities as possible and be an advocate of merging and aligning the engineering activities with other activities in the business value chain. Management of activities transcends just the management of people and resources. It requires graduates to be particularly involved in the management of external and internal stakeholders such as clients, regulators, suppliers and departments or functional divisions within the organisation.

Effective communication and presentation skills form a critical element of the management of activities. It is therefore important for the engineering graduates to develop competencies required for Group A activities so that they are able to articulate these competencies well in their organisational

activities through the effective management and communication skills developed in the following Group B outcomes.

Outcome 4: Manage part or all of the organisational activities including engineering activities as well as individual, team and multidisciplinary working.

Outcome 5: Communicate clearly with others in the course of his or her engineering activities.

3.3 Group C: Risk and sustainable development

Engineering work is associated with enormous risk to the safety and health of the public. Engineering activities are also associated with environmental degradation and thus pose a threat to the continued existence of natural resources required to sustain future generations. It is therefore very important that engineering graduates be knowledgeable about all matters of safety, health and environmental protection that are applicable to their work environment. The following outcomes have been developed to meet this objective.

Outcome 6: Recognise and address the reasonably foreseeable social, cultural and environmental effects of complex/broadly defined/well defined engineering activities.

Outcome 7: Meet all legal and regulatory requirements and the health and safety of persons in the course of his or her engineering activities.

3.4 Group D: Due diligence and accountability

The engineering work may have huge safety, health, environmental and financial ramifications if it is not undertaken with due diligence and accountability for the beneficial value of all the stakeholders involved. This means that, in the course of undertaking their engineering work, the engineering graduates must be meticulous, methodical and systematic in their approach. The following outcomes have been developed to equip the engineers with skills required to demonstrate the sense of due diligence and accountability in their work.

Outcome 8: Conduct organisational activities ethically with due regard to corporate governance issues.

Outcome 9: Exercise sound judgement in the course of complex/broadly defined/well defined engineering activities.

Outcome 10: Be responsible for making decisions on a part or all of the complex/broad defined/well defined engineering activities.

3.5 Group E: Initial Professional Development

The engineering profession is continually evolving with frequent cycles of introduction of lines of new products, systems, processes and services. It is therefore important that engineering graduates must keep themselves at the cutting edge of knowledge with regard to the development and activities taking place in the engineering profession. They must actively engage in new learning at their work places and through the network of open learning offered by voluntary professional associations and bodies, service providers and/or academic institutions. Through the process of continuous learning and training, engineering professionals will have access to the latest developments in the knowledge economy and will therefore be able to utilise this knowledge to introduce innovative and more efficient work practices.

Outcome 11: Undertake professional development activities sufficient to maintain and extend his or her competency.

4. CRITERIA FOR ACCREDITATION

The training programme for training academies must be structured in the context of supporting the engineering graduates to meet the requirements of all the 11 outcomes required for professional registration. There are four stages in this training process of enabling the engineering graduates to develop all the competencies necessary to meet the requirements of all the outcomes. These four stages are:

- Workplace learning by involvement in organisational activities
- Initial professional development as prescribed in the policy document **R-02-PE/PT/PN:**
    - Attending lectures
    - Participating in work-based courses and classes
    - Involvement in various workshops
    - Enrolment in academic institutions
    - Involvement in the activities of voluntary associations and other professional bodies
    - Attending seminars, conferences, colloquiums, symposiums, etc.
- Mentoring and coaching
- Performance monitoring and measurement.

4.1 Workplace Learning

This is by far the most important part of professional development because the nature of the work that the graduates perform in their respective organisations contributes enormously to the development of their professional registration competencies. It is therefore very important that academies must ensure that the work activities and assignments of the graduates mostly fall in line with the training programmes that have been developed by the organisation to enable them to register with ECSA. The essential elements of this training programme follow:

- It must ensure that there is a reasonably sufficient variety of tasks that graduates perform.
- The nature of the tasks must progressively increase the level of competence in addition to all other mandatory work activities that the organisation requires the graduates to perform.
- It must provide the graduates with an opportunity to become involved in an increasing level of responsibility in their execution of tasks.

Workplace learning and training forms the foundation underlying the building of competencies required to meet all or most of the outcomes, depending on the nature of business that an organisation may be involved in. In the case where some of the outcomes may not be achieved satisfactorily due to the limited scope of the organisation's line of business, the other stages of the training process, namely, continuous professional development and mentoring including secondment, may be used to augment this shortfall.

However, the emphasis must be first placed on saturating the training programme with all the required activities for professional development that the organisation is able to offer. For this reason, as part of the accreditation process by ECSA, the organisation will be required to provide the list of activities that occur within its work environment and to subsequently demonstrate how these activities have been incorporated in the training programme of the graduates. This is discussed in further detail under the structure of the programme.

It is therefore important that when structuring the workplace training programme, the academies must ensure that this programme forms an integral part of the work activities and not an isolated process. It is only through this integrated approach that the graduates will be able to progressively take over

increasing levels of responsibility in their work place because they would develop confidence with time as they become directly involved with organisational activities.

4.2 Initial Professional Development

The Initial Professional Development (IPD) is aimed at assisting the graduate to access additional competencies that form an essential part of graduate attributes but are continuously evolving and redefining the essence of the engineering profession in the business sector and other sectors where engineering is practised. During the training period of the graduates, it is critical that a reasonable effort is made to identify and schedule IPD type activities for graduates. The primary objective of this identification is to select the developmental activities that will assist the graduates to develop the competencies required to meet the registration outcome and perform better in their work by contributing additional knowledge obtained from the sessions which they attended to enhance and benefit the organisational objectives. Therefore, evidence of the inclusion of an adequate level of IPD type activities in the training programme is a requirement for accreditation.

The organisation must then allocate a reasonably affordable portion of the training budget to the IPD type activities. It is also recommended that graduates be scheduled to participate in professional activities such as conferences, seminars, and so forth, wherever it is practically possible to provide them with an opportunity to build formal and informal professional networks that will provide them with the reliable source of benchmarking with industry best practices. It is therefore to the advantage of the academies, as far as accreditation is concerned, to build this networking portion of professional development into their training programme.

4.3 Mentoring, Coaching / Supervision

As defined in **A-01-POL**, a mentor is a professionally registered person who guides the competency development of a candidate in an appropriate category, and the supervisor/coach is a person who oversees and controls engineering work performed by a candidate and coaches the candidate to fulfil the requirements for registration.

A person or persons must be assigned to guide the graduates to develop appropriate competencies that are aligned with the outcomes. The company must identify either within or outside the

organisation or both, whichever option is preferable, persons to act as mentors for the graduates in training. The persons should be professionally registered persons with ECSA or other persons identified by the academies to be suitable for the role of mentoring. Mentors who are not registered with ECSA must attend a minimum of a one-day training session on ECSA policy requirements for the registration of engineers.

The mentors must ensure that the candidates are exposed to real world projects, dealing with clients and design teams as well as working to real deadlines defined in the contracts.

4.4 Performance Monitoring and Measurements

The training programme must have a system to measure the performance of the graduates in all the areas of their work and career development towards professional registration. This performance measurement must also include the monitoring of the performance of the mentors and supervisors towards the development of their graduate protégés and subordinates. Therefore, the academies are required to implement performance measuring systems for graduates in their training programmes as part of the accreditation process. The mandatory requirements of the system must include:

- A database system that captures all the training and learning activities as they are completed.

- An evaluation process that determines the level of competence achieved.

- Work based key performance indicators that are integrated to a reasonable extent with the competencies required by the ECSA registration outcomes.

- A functional performance management system. The performance of the supervisors and internal mentors must be built into this system.

5. STRUCTURE OF THE PROGRAMME

The programme structure must be set up such that as much of the learning and training as possible takes place in functional departments or areas of work where the graduates are placed. To ensure that effective learning through direct participation in organisational activities takes place in each of these areas, the following lists must be established:

- Organisational mission

- A list of areas of work

- A list of key organisational activities per work area

- A list that identifies work activities that are suitable for satisfying each ECSA outcome

- A programme of training activities that is aligned with the lists above

- An estimated or flexible schedule of the training programme activities.

Based on the above, the training and learning programme structure must mirror the professional registration outcomes through the work methods, processes and normal work routines of the organisations where the graduates are placed. The outcomes that may not be mirrored in the normal work processes have to be mitigated through other means, including continuous professional development activities. Records of these activities and evidence of the organisational commitment towards the IPD process must be kept. In the end, the programme must be able to satisfy all the requirements of each outcome for it to qualify for accreditation.

A blended approach of continuous professional development activities, together with organisational activities that match the professional registration outcomes, is the fundamental requirement for the accreditation of academies to train engineering graduates.

6. CONTENT OF THE PROGRAMME

It is important that the programme has a database or paper trail of the organisation's intellectual property that the graduates can access in order to acquaint themselves with the organisational competencies required to perform their work.

This collection of intellectual property must be of such a nature that it can be used by the academy to demonstrate the organisation's capacity and capability to deliver on the competency requirements for professional registration. This evidence is fundamental to meeting the requirements for accreditation and it has to be available for evaluation during the accreditation visit.

The policy documents (**R-02-PE/PT/PN**) on the competency standards for professional registration provide a comprehensive list of suitable functions (design, planning, investigation, resolution, research and development) for each outcome that graduates should be involved in for them to meet

the requirements of each of these outcomes. It is thus important for the academies to identify those functions from the list that match their intellectual property and organisational activities. The resources must then be rallied to provide the graduates with exposure and experience in these areas of work to enable them to develop the competencies required by the registration outcomes.

Overall, the content of the programme must consist of the following components:

- A selection of all the outcomes that the organisation is capable of satisfactorily meeting by the sheer nature of the current setup of its functions and operations.

- A selection of the outcomes that the company can adequately meet through other interventions such as IPDs and external secondment/mentoring.

- Matching of the outcomes with intellectual property and organisational activities.

- Generating a matrix system that represents the details of the match.

- A compilation of a database or production of documentation that supports the matrix.

- The matrix system must be expanded to match the outcomes with areas of work and with the officials or managers responsible for organisational activities that meet the competencies required by various outcomes.

- Credentials of the responsible officials and managers must match their credentials against the requirements of the outcomes that they represent.

With respect to the outcomes that can be met through IPD and secondment/external mentoring interventions, the following requirements must be met.

The IPD courses, classes and lectures selected must be offered by the following providers:

- Accredited service providers
- SAQA accredited academic institutions
- ECSA recognised voluntary associations
- Professional bodies recognised by the Council for Built Environment (CBE)
  o External mentors must be registered professional engineers or nominated by

ECSA-recognised voluntary associations.

    o   Academies must enter into a performance contract agreement with the external mentor/s.

7. RESOURCES OF THE PROGRAMME

The training and learning programme must be managed and directed from the executive management level with a well-defined delegated line of responsibilities within the programme structure. An organogram that explains this delegated line of responsibility must be available and must clearly indicate how cross-functional responsibilities are linked to the organogram. In addition to the organogram, the programme must have the following mandatory resources assigned to it for it to qualify for certification:

- An operational budget.

- Training and/or learning material for graduates.

- An operating system that is largely integrated with primary organisational activities.

- A performance management system for graduates/candidates, supervisors and mentors.

- Succession planning strategies for graduates/candidates to progress through the organisational layers of functional authority.

- An internal and external stakeholder management plan.

The resource allocation must be executed such that they can adequately and effectively support and maintain the activities in the programme content so that the programme structure can be a true representation of the programme's ability to produce graduate engineers that are fully eligible for professional registration.

The resources allocated to the training programme must be capable of facilitating the relevant technical training.

8. METHODS OF ORGANISATIONAL LEARNING AND TRAINING

Academies must be able to demonstrate how learning and training is being administered and managed to ensure that graduates are being involved in a variety of engineering work with increasing

CONTROLLED DISCLOSURE

When downloaded for the ECSA Document Management System, this document is uncontrolled and the responsibility rests with the user to ensure that it is in line with the authorised version on the database. If the "original" stamp in red does not appear on each page, this document is uncontrolled.

QM-TEM-001 Rev 0 – ECSA Policy/Procedure

levels of complexity and a corresponding increase in their level of responsibilities. It is mandatory that the academies have in place a system that ensures effective use of programme resources in line with the structure and the content of the program to enable graduates to meet each and every outcome through the prescribed duration of their training. It is therefore required that the following processes be established:

- Mentoring and/or coaching sessions

- Performance feedback sessions to the graduates by their supervisors

- Progress feedback sessions by the Academy to the graduates

- Training programme performance evaluation feedback sessions by the graduates to the training academy

- Performance feedback reports to the management of the organisation

- System of ensuring compliance with the programme objectives.

REVISION HISTORY

Revision Number	Revision Date	Revision Details	Approved By
Rev-0.1	6/09/2017	Adapted from E-20-PE for Academies	JH Cato
Rev-0.2	16/09/2017	Additions and changes	Working Group
Rev-0.3	19/09/2017	Minor changes	Working Group
Rev-0.4	28/09/2017	Incorporation of workshop comments	John Cato
Rev-1	09/10/2017	Approved	PDSGC
Rev-1	16/11/2017	For ratification	Council

The Standard for:
Training Academy Certification Criteria

Revision 1 dated 16 November 2017 and consisting of 16 pages has been reviewed for adequacy by the Business Unit Manager and is approved by the Executive: Policy Development and Standards Generation (**PDSG**).

....
Business Unit Manager

31/07/2018
....
Date

....
Executive: **PDSG**

01/08/2018
....
Date

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