Subject: Discipline-specific Training Guideline for Candidate Engineering Technicians in Aeronautical Engineering

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ENSURING THE EXPERTISE TO GROW SOUTH AFRICA

Discipline-specific Training Guideline for Candidate Technicians in Aeronautical Engineering

R-05-AER-PN

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DEFINITIONS

Engineering science: A body of knowledge based on the natural sciences that uses mathematical formulation where necessary, which extends knowledge and develops models and methods to support its application, to solve problems and to provide the knowledge base for engineering specialisations.

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

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

Integrated performance: An overall satisfactory outcome of an activity requires several outcomes to be satisfactorily attained. For example, a design will require analysis, synthesis, analysis of impacts, checking of regulatory conformance and judgement in decisions.

Level descriptor: A measure of performance demands at which outcomes must be demonstrated.

Management of engineering works or activities: The co-ordinated activities required to:

(a) direct and control everything that is constructed or results from construction or manufacturing operations;

(b) operate engineering works safely and in the manner intended;

(c) return the engineering works, the plant and the equipment to an acceptable condition by the renewal, replacement or mending of worn, damaged or decayed parts;

(d) direct and control the engineering processes, systems, commissioning, operation and decommissioning of equipment; and

(e) maintain engineering works or equipment in a state in which it can perform its required function.

Over-determined problem: A problem for which the requirements are defined in excessive detail, making the required solution impossible to attain in all of its aspects.
Outcome: A statement of the performance that a person must demonstrate to be judged competent at the professional level.

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

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

Specified Category: A category of registration for persons registered through the Engineering Profession Act or through a combination of the Engineering Profession Act and external legislation with specific engineering competencies at NQF Level 5 regarding an identified need to protect the safety, health and interest of the public and the environment in the performance of an engineering activity.
BACKGROUND

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

Figure 1: Documents defining the ECSA Registration System

1. PURPOSE OF THIS DOCUMENT

All persons applying for registration as a Professional Engineering Technician are expected to demonstrate the competencies specified in document R-02-PN 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 Engineering Technicians (document R-08-PN).

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

- Duration of training and length of time working at level required for registration;
- Principles of planning, training and experience;
- Progression of training programme;
- Documenting training and experience;
- Demonstrating responsibility.

Document R-08-PN provides a high-level and outcome-by-outcome understanding of the competency standards that form an essential basis for this Discipline-Specific Training Guide (DSTG).

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

1. AUDIENCE

This DSTG is specifically directed towards candidates who have studied Aeronautical Engineering and are undergoing in-service training as Aeronautical Engineering Technicians. The guide is also applicable to engineering technicians who studied in other engineering disciplines, but whose work is primarily in the aeronautical field and who wish to be assessed for professional registration based on their work in an aeronautical environment.

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 education requirements in Aeronautical Engineering by obtaining either an accredited Dip (Engineering), Dip (Eng Tech), Adv Cert (Engineering) type qualification from a recognised university in South Africa, or a Dublin-Accord Recognised qualification or through evaluation/assessment;
• registered as Candidate Engineering Technicians;
• embarked on a process of acceptable training under a registered Commitment and Undertaking (C&U) with a Mentor guiding the professional development process at each stage.

2. PERSONS NOT REGISTERED AS CANDIDATES OR NOT BEING TRAINED UNDER C&U

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 Engineering Technician is permitted without being registered as a Candidate Engineering Technician and without training under a C&U. Mentorship and adequate supervision are, however, key factors in effective development to the level required for registration.

If the trainee’s employer has no C&U, the trainee should establish the level of mentorship and supervision 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 (VA) for the discipline should be consulted for assistance in locating an external mentor. A mentor should be in place at 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 applications for registration.

3. ORGANISING FRAMEWORK FOR OCCUPATIONS

Aeronautical Engineering Technician (Organising Framework for Occupations (OFO) 214403)

An Aeronautical Engineering Technician performs and supervises well-defined engineering work concerned with the design, development, manufacture, operation and maintenance of
aircraft and spacecraft of all types based on the engineering sciences underlying flight dynamics, aerospace structures and propulsion systems.

Aeronautical Engineering Technicians are generally appointed in one or more of the following positions:

- Aeronautical Design Engineering Technician
- Aeronautical Systems Engineering Technician
- Aeronautical Certification Engineering Technician
- Aeronautical Flight Test Engineering Technician
- Aeronautical Research Engineering Technician
- Aeronautical Engineering Academic.

Practising Aeronautical Engineering Technicians generally specialise in one or more of the following expert fields:

- Aircraft design
- Aircraft structures
- Aircraft propulsion systems
- Aerodynamics
- Avionics
- Aero-elasticity
- Stability and control
- Aircraft systems including hydraulic, pneumatic and avionics systems
- Wind tunnel testing
- Flight testing
- Aircraft performance monitoring
- Airport/Airfield management
- Certification and system safety programmes
- Flight Operations and technical support.

4. **TRAINING IMPLICATIONS OF INDUSTRY STRUCTURE**

Many engineering technicians in the aerospace industry, particularly those working in a technical environment, tend to become specialists. Those working in areas such as
manufacture, maintenance and project management tend to be generalists. Specialists, through their interaction on projects with persons from other specialist areas, should therefore also gain practical experience also outside their specialist area.

Aeronautical engineering technicians whose training has been more general should demonstrate that they have acceptable experience in a number of specialist areas (typically five) for a minimum period of three years. Specialist aeronautical engineering technicians, however, should demonstrate that they have had five years of in-depth experience in at least one area of aerospace engineering and acceptable experience in a number of other areas.

Because of the complex nature and long lifecycles of aeronautical systems, any given product or system will usually have components designed by engineers assisted by engineering technicians in many of the specialist areas. Work done by any engineering technicians in the field may cross the boundaries between disciplines and specialist areas or at least will be influenced by interfaces with other disciplines.

Candidate Engineering Technicians are expected typically to have gained experience in at least one of the lifecycle phases of aeronautical systems such as development, design, manufacturing or operation and maintenance. Even though all Candidate Engineering Technicians are not required to have had design experience, all Candidates must have demonstrated their ability to solve well-defined aeronautical problems, as explained in document R-08-PN. Solving such problems would typically require the application of aeronautical engineering sciences and the application of engineering judgement.

Since the aeronautical industry routinely involves significant risks, it is a highly regulated industry. All Candidate Engineering Technicians are therefore expected to have gained exposure to the regulatory aspects relevant to the work they have been involved in. Candidates are further expected to have demonstrated making sound judgements to address and mitigate risks in an aeronautical environment, and thereby not unnecessarily endanger users of their systems or the general public. Such considerations of risks should particularly include situations where technologies (e.g. materials and control systems) are rapidly developing and the software used for design and operations is increasingly complex.

Candidates are expected to demonstrate appreciation that practising as a professional engineering technician is a life-long process of learning and improvement. Candidates are
therefore expected to show how, during their training period, they improved their ability to make sound judgements and manage risks in the presence of rapidly developing technologies.

In assessing the suitability of Candidates, the cross-disciplinary nature of their work will be examined, as well as the degree to which they have been able to work effectively in such contexts. The degree to which they have demonstrated that they are able to know their own limits and call in the help of specialists, for example, illustrates their ability. Candidates must demonstrate that they also know enough about other disciplines/specialist areas influencing their work to properly understand and manage the risks arising from those influences.

To assist Candidates to gain the necessary training and experience/exposure, the following guidelines present the types of activity that should be conducted prior to registration.

These guidelines are illustrative and candidates are not expected to engage in all of the suggested training activities before registration but should participate in many of them to ensure that adequate experience is obtained.

4.1 Aeronautical Design Engineering Technicians

Aeronautical Design Engineering Technicians are those involved with the well-defined aspects of design of aircraft or aircraft systems. Engineering technicians would perform actual design, such as preliminary design, performance predictions, aerodynamic design, structural design, power plant trade-off studies, control system design, etc. Products/systems are designed to meet particular needs/specifications/standards.

The following types of activities are recommended for Aeronautical Design Engineering Technicians’ training:

<table>
<thead>
<tr>
<th>Type of experience</th>
<th>Specific well-defined activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem/Requirements definition</td>
<td>• Formulation of User Requirement Statements (URS) – Generate performance specifications (Specs)</td>
</tr>
<tr>
<td></td>
<td>• Qualification/verification matrix design</td>
</tr>
<tr>
<td></td>
<td>• (Use Standards/Specifications/Handbooks to guide in preparation of above documents.)</td>
</tr>
<tr>
<td>Project planning (for design)</td>
<td>• Resource planning (computing/drafting/manufacturing, etc.)</td>
</tr>
<tr>
<td>Type of experience</td>
<td>Specific well-defined activities</td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Examination of alternatives</td>
<td>• Literature study</td>
</tr>
<tr>
<td></td>
<td>• Identifying potential techniques/technologies/materials</td>
</tr>
<tr>
<td></td>
<td>• Generation of concepts</td>
</tr>
<tr>
<td></td>
<td>• Elimination of unsuitable alternatives</td>
</tr>
<tr>
<td></td>
<td>• Preliminary performance prediction</td>
</tr>
<tr>
<td>Trade-off studies</td>
<td>• Using decision-making tools to select between viable alternatives</td>
</tr>
<tr>
<td></td>
<td>• Examining impacts of alternatives on ability to meet URS/Specs</td>
</tr>
<tr>
<td></td>
<td>• Negotiate with customers w.r.t. requirement trade-offs and reformulation of URS/Specs</td>
</tr>
<tr>
<td>Detailed design</td>
<td>• Material selection</td>
</tr>
<tr>
<td></td>
<td>• Aerofoil and high lift devices selection</td>
</tr>
<tr>
<td></td>
<td>• Selection of components/sub-systems</td>
</tr>
<tr>
<td></td>
<td>• Structural/aerodynamic/mechanical design</td>
</tr>
<tr>
<td></td>
<td>• Performance prediction</td>
</tr>
<tr>
<td></td>
<td>• Stress analysis</td>
</tr>
<tr>
<td></td>
<td>• Aerodynamic analysis</td>
</tr>
<tr>
<td></td>
<td>• Stability and control analysis and design</td>
</tr>
<tr>
<td></td>
<td>• Hazard and operability (HAZOP) studies</td>
</tr>
<tr>
<td></td>
<td>• Failure modes effects and criticality analysis (FMECA)</td>
</tr>
<tr>
<td></td>
<td>• Updating of specifications</td>
</tr>
<tr>
<td></td>
<td>• Maintenance requirements design</td>
</tr>
<tr>
<td>Design documentation</td>
<td>• Generation of drawings</td>
</tr>
<tr>
<td></td>
<td>• Generation of design reports</td>
</tr>
<tr>
<td></td>
<td>• Updating of documents/specifications as design progresses</td>
</tr>
<tr>
<td></td>
<td>• Configuration control</td>
</tr>
<tr>
<td>Supervision of production</td>
<td>• Design of processes/tests</td>
</tr>
<tr>
<td></td>
<td>• Handling of engineering queries/concessions/ deviations</td>
</tr>
<tr>
<td></td>
<td>• Design and implementation of quality control methods</td>
</tr>
<tr>
<td></td>
<td>• Handling of materials</td>
</tr>
<tr>
<td></td>
<td>• Handling of scrap/reworkable items, etc.</td>
</tr>
<tr>
<td>Verification testing</td>
<td>• Qualification/verification test planning</td>
</tr>
</tbody>
</table>
4.2 Aeronautical System Engineering Technicians

Aeronautical System Engineering Technicians are those involved with the specification, in-service management and fleet engineering of aircraft or aircraft systems. These would typically be engineering technicians in organisations that operate fleets of aircraft and that are responsible for ensuring the continued airworthiness of the fleet and addressing obsolescence issues. These engineering technicians operate subject to regulations and regulating bodies such as the Civil Aviation Authority.

The following types of activities are recommended for Aeronautical System Engineering Technicians' training:

<table>
<thead>
<tr>
<th>Type of experience</th>
<th>Specific well-defined activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintaining airworthiness</td>
<td>• Identification and implementation of relevant service bulletins</td>
</tr>
<tr>
<td></td>
<td>• Implementation of airworthiness directives</td>
</tr>
<tr>
<td></td>
<td>• Implementation of ageing aircraft programmes</td>
</tr>
<tr>
<td></td>
<td>• Health and utilisation monitoring</td>
</tr>
<tr>
<td></td>
<td>• Failure reporting and corrective action (e.g. FMECA/FRACAS)</td>
</tr>
<tr>
<td>Maintenance optimisation</td>
<td>• Staggering (fleet utilisation &amp; maintenance scheduling)</td>
</tr>
<tr>
<td></td>
<td>• Negotiation with Original Equipment Manufacturers (OEMs) to adapt servicing for fleet specific requirements</td>
</tr>
<tr>
<td></td>
<td>• Trend monitoring and maintenance adaptation</td>
</tr>
<tr>
<td></td>
<td>• Engineering management of suppliers and sub-contractors</td>
</tr>
</tbody>
</table>
4.3 Certification Engineering Technicians

Certification Engineering Technicians are those involved with ensuring that aircraft systems meet the requirements of Airworthiness Regulations. These would typically be engineering technicians employed by the Civil Aviation Authority or within companies requesting certification of their products and whose responsibility is to ensure compliance with certification requirements.

The following types of activities are recommended for Certification Engineering Technicians’ training:

<table>
<thead>
<tr>
<th>Type of experience</th>
<th>Specific well-defined activities</th>
</tr>
</thead>
</table>
| Compliance testing      | • Consultation with clients and other aviation authorities with regards to airworthiness requirements and regulations  
                          | • Setting up compliance matrices                                                                 |
|                          | • Oversight of flight test and other acceptance testing activities                                |
|                          | • Oversight of suppliers during development activities (e.g. weapons)                            |
### Type of experience | Specific well-defined activities
--- | ---
**Systems background** | - Training in systems on one or more aircraft types  
- Troubleshooting and fault analysis  
- Use of design specifications during design or certification planning  
- Floor level exposure to all aspects of aircraft maintenance  
- Participation in software development and certification

**System safety analysis** | - Training in and application of the system safety process  
- Application of fault tree, HAZOP, FMEA / FMECA and equivalent safety procedures

**Organisational audits** | - Advising organisations in creating and implementing their manuals of procedures  
- Quality systems and special process audits  
- Periodic auditing of approved manufacturing and maintenance organisations

**Monitoring compliance with airworthiness directives, etc.** | - Ensuring approved organisations and fleet operators implement applicable airworthiness directives  
- Auditing/monitoring correct implementation of Service Bulletins/ Ageing Aircraft Programmes

**Accident investigations** | - Serving as part of accident investigation teams  
- Overseeing accident investigations  
- Reviewing and analysing previous accident investigation reports for similarities/trends  
- Writing accident investigation reports

**Generation of regulations** | - Reviewing existing regulations  
- Generating or updating regulations

---

### 4.4 Flight Test Engineering Technicians

Flight Test engineering is a specialist field requiring an engineering qualification and then additional training as Flight Test Engineering Technician at one of the Test Pilot/Engineering schools. Flight testing forms part of product development as well as verification testing towards certification of aircraft and systems.

The following types of activities are recommended for Flight Test Engineering Technicians’ training:

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QM-TEM-001 Rev 0 – ECSA Policy/Procedure
The following types of activities are recommended for
technologies and teaching students.

Research Engineering Technicians and Academics are those employed by universities and research organisations. Their focus is the development of new knowledge / techniques / technologies and teaching students.

The following types of activities are recommended for Aeronautical Research Engineering Technicians' and Engineering Academics' training:

<table>
<thead>
<tr>
<th>Type of experience</th>
<th>Specific well-defined activities</th>
</tr>
</thead>
</table>
| Flight testing and ground testing | • Determination of relevant and necessary tests  
                                    • Compilation of test objectives and test plans  
                                    • Development of new testing techniques and equipment  
                                    • Modifications to test aircraft  
                                    • Performance testing and data analysis  
                                    • Flutter clearance testing and data analysis  
                                    • Cockpit evaluation |
| Client liaison           | • Negotiations with regards to flight testing  
                                    • Writing of flight test report  
                                    • Presentation of test results |

4.5 Research Engineering Technicians and Engineering Academics

Research Engineering Technicians and Academics are those employed by universities and research organisations. Their focus is the development of new knowledge / techniques / technologies and teaching students.

The following types of activities are recommended for Aeronautical Research Engineering Technicians' and Engineering Academics' training:

<table>
<thead>
<tr>
<th>Type of experience</th>
<th>Specific well-defined activities</th>
</tr>
</thead>
</table>
| Teaching                 | • Reading in applicable fields of knowledge  
                                    • Curriculum development  
                                    • Selection and development of teaching materials  
                                    • Compilation of lecture notes  
                                    • Compilation of examination papers  
                                    • Demonstration of application of theory in practice  
                                    • Serve as supervisor for student projects |
| Study and Research       | • Literature study  
                                    • Obtaining higher qualifications  
                                    • Advancement of the current state of the art of technology  
                                    • Theoretical research/development of analytical techniques  
                                    • Practical/experimental research  
                                    • Participating in international collaborative research |
5. DEVELOPING COMPETENCY: DOCUMENT R-08-PN

 Applicants are required to demonstrate insight and the ability to use and interface various design aspects through verifiable work carried out in providing engineered and innovative solutions to practical problems experienced in their operating work environments. In addition, applicants must develop the skills required to demonstrate the advanced use of aeronautical engineering knowledge in optimising the efficiency of operations or the constructability of projects.

 Candidates must be able to demonstrate that they have been actively involved in an aeronautical workshop environment and have participated in the execution of practical work to the extent that they have learnt sufficient detail regarding procedures pertaining to aircraft/spacecraft to be able to exercise judgement in the workplace. Applicants must also show evidence of adequate training in this function through well-defined project work carried out in the analysis of problems and the synthesis of solutions.

 Evidence is required in the form of a separate and comprehensive engineering or design report that must accompany the application. This report should describe synthesised solutions to sufficiently well-defined problems to demonstrate that applicants have had the opportunity to apply their technical knowledge and engineering expertise gained through university education and practical work experience.

 In applying technical and scientific knowledge gained through academic training, the applicant must also demonstrate the financial and economic benefits of engineered solutions synthesised from scientific and engineering principles at a sufficiently advanced level.

 What is a sufficiently well-defined engineering problem?

 According to the ECSA, the definition of ‘well-defined engineering problems’ can be defined as activities that are characterised by several or all of the following:
• Scope of practice area is defined by the techniques that are applied and the techniques that are changed through the adoption of new techniques into current practice.

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

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

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

• Constrain by operational context, defined work packages, time, finance, infrastructure, resources, facilities, applicable laws, and standards and codes.

• Demonstrate risks and consequences that are locally important but are not generally far reaching.

Aeronautical Engineering forms an integral part of broader engineering systems and infrastructure in technologically complex designs, manufacturing and processing techniques, aircraft and spacecraft product development and research environments. Applicants are required to undertake aeronautical engineering projects that significantly enhance integrated engineering systems and related infrastructure. Such project work should not be stand-alone assignments but should form part of the solutions to integrated engineering systems that require a broad application of various theoretical aspects of Aeronautical Engineering.

In demonstrating advanced application of theoretical knowledge with respect to these systems, applicants must incorporate calculations with clearly defined inputs of the formulae used and detailed interpretation of the results obtained. Applicants must demonstrate how the calculated results have been used to provide the solution to the problem at hand and indicate the economic benefit to the project or the operating work environment (e.g. improved efficiency, reduced environmental footprint, capacity enhancement, simplification of system).

Problems that require a scientific and engineering approach in their solution may be encountered in any engineering work environment that consists of integrated engineering systems, equipment, machinery and infrastructure. Candidate Engineering Technicians must obtain experience in solving a variety of problems in their work environment. The solutions to these problems should involve the use of the fundamental and advanced aeronautical engineering knowledge obtained at university. From early in their training years, Candidates...
must actively seek opportunities to obtain experience in the area of synthesising solutions to real-life engineering problems encountered in the workplace.

5.1 Contextual knowledge

Candidates must be aware of the engineering profession's requirements. The VAs applicable to the Aeronautical Engineering Technician and their functions and services to members provide a broad range of contextual knowledge for the Candidate Engineering Technician that continues through the full career path of the Registered Engineering Technician.

The profession identifies specific contextual activities considered essential to the development of the Aeronautical Engineering Technician’s competence. These include awareness of basic workshop, manufacturing and fabrication activities and awareness of the competencies required of the technologist, technician and artisan. Exposure to practice in these areas is identified in each programme within the employer environment.

5.2 Functions performed

Special consideration in the discipline, sub-discipline or specialty must be given to the competencies specified in the following groups:

- Group A: Knowledge-based problem-solving (this should be a strong focus)
- Group B: Management and communication
- Group C: Identifying and mitigating the impacts of engineering activity
- Group D: Judgement and responsibility
- Group E: Independent learning.

It is useful to measure the progression of the candidate’s competency by using the scales for Degree of Responsibility, Problem Solving and Engineering Activity, as specified in the relevant documentation.

It should be noted that Candidates working at Responsibility Level E carry the responsibility appropriate to that of a Registered Engineering Technician except that the Candidate's supervisor is accountable for the Candidate's recommendations and decisions.
5.3 Statutory and regulatory requirements

Candidates are expected to have a working knowledge of the following regulations and Acts and how the legislation affects their working environment:

- Engineering Profession Act, 46 of 2000 (EPA), its rules and the Code of Conduct;
- Occupation Health and Safety Act, as amended by Occupation Health and Safety Act, 181 of 1993 (OHSA);
- Civil Aviation Act, 13 of 2009;
- International Regulations on Aircraft Safety and Airworthiness:
  - Federal Aviation Authority (FAA) Regulations (USA) – FAR 14 CFR (Code of Federal Regulations);
  - European Aviation Safety Agency (EASA) Regulations on airworthiness (EU No. 748/2012 Part 21; 640/2015 Part 26; 1321/2014 Parts -M; -T; -66; -145; -147);
  - Def Stan 00-970: Requirements for Design and Airworthiness for Service Aircraft
  - Military Standards (Mil. Std.);
- Labour Relations Act, 66 of 1995;

Other Acts not listed here may also be pertinent to a Candidate’s specific work environment. Candidates are expected to have a basic knowledge of the relevant Acts and to investigate whether any Acts are applicable to their particular work environment.

5.4 Recommended formal learning activities

The following includes useful courses for formal learning:

- Continuing professional development (CPD) courses on specific disciplines
- Project management
- Value engineering
- Engineering change process
- Standard conditions of contract
• Preparation of specifications
• Negotiation skills
• Finance risk analysis
• Quality assurance systems
• Occupational health and safety
• System optimisation in efficiency
• Configuration management and control
• Maintenance engineering
• Environmental impact management
• Technical report writing.

6. PROGRAMME STRUCTURE AND SEQUENCING

6.1 Best practice

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 that are assigned to the Candidate by the employer.

It is suggested that Candidates work with the appointed mentors to determine appropriate projects to gain exposure to elements of the asset cycle and to ensure that their designs are able to be constructed, operable and designed considering lifecycle costing and long-term sustainability.

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

The Mentor and the Candidate must identify the level of responsibility required for an activity to be compliant and demonstrate the various Exit Level Outcomes (ELOs). Evidence of the Candidate’s activities and their acceptance by the Mentor are recorded on the appropriate system to meet the Training Elements requirements in Appendix A.

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6.2 Realities

ECSA stated that the minimum period for the Candidacy Phase is 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.

Each candidate must undertake a unique programme in which the various activities carried out at the discipline-specific level are linked to the generic competency requirements stated in document R-08-PN.

6.3 Guideline for orientation requirements

For the Candidate Engineering Technician starting a career with an employer, the basic introduction to the company’s functions is usually performed during the first months of employment. The induction process usually includes the following aspects:

- Introduction to the company
- Company safety regulations
- Company code of conduct
- Company staff code and regulations
- Typical functions and activities
- Hands-on experience and orientation in each of the major company divisions.

6.4 Moving into or changing candidacy training programmes

This DSTG 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. 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. As a minimum, the mentor and supervisor should plan the next phase of the candidate’s programme.
The Discipline-Specific Training Guide (DSTG) for

Candidate Engineering Technician in Aeronautical Engineering

Revision 2 dated 25 July 2019 and consisting of 22 pages was reviewed for adequacy by the Business Unit Manager and is approved by the Executive: Research, Policy and Standards (RPS).

___________________________
Business Unit Manager

22/11/2019

___________________________
Executive: RPS

26/11/2019

This definitive version of the policy is available on our website

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Appendix A: Training Elements

Synopsis: Candidate Engineering Technicians should achieve specific competencies at the prescribed level during their development towards professional registration, at the same time accepting more and more responsibility as experience is gained. The outcomes achieved and established during the candidacy phase should form a template for all engineering work performed after professional registration regardless of the level of responsibility at any particular stage of an engineering career:

1. Confirm understanding of instructions received and clarify if necessary.
2. Use theoretical training to develop possible solutions: select the best and present to the recipient.
3. Apply theoretical knowledge to justify decisions taken and processes used.
4. Understand role in the work team, and plan and schedule work accordingly.
5. Issue complete and clear instructions and report comprehensively on work progress.
6. Be sensitive about the impact of the engineering activity and take action to mitigate this impact.
7. Consider and adhere to legislation applicable to the task and the associated risk identification and management.
8. Adhere strictly to high ethical behavioural standards and ECSA’s Code of Conduct.
9. Display sound judgement by considering all factors, their interrelationship, consequences and evaluation when all evidence is not available.
10. Accept responsibility for own work by using theory to support decisions, seeking advice when uncertain and evaluating shortcomings.
11. Become conversant with your employer’s training and development programme and develop your own lifelong development programme within this framework.

Well-defined engineering work is usually restricted to applying standard procedures, codes and systems, i.e. work that was done before.

Responsibility Levels: A = Being Exposed; B = Assisting; C = Participating; D = Contributing; E = Performing
### Competency Standards for Registration as a Professional Engineering Technician

**1. Purpose**
This standard defines the competence required for registration as a Professional Engineering Technician. Definitions of terms having particular meaning within this standard is given in text in Appendix D.

DSTGs gives context to the purpose of the Competency Standards. Professional Engineering Technicians operate within the nine disciplines ECSA recognises. Each discipline can be further divided into sub-disciplines and finally into specific workplaces as given in Clause 4 of the specific DSTG. DSTGs are used to facilitate experiential development towards ECSA registration and assist in compiling the required portfolio of evidence (specifically the Engineering Report in the application form).

**NOTE:** The training period must be utilised to develop the competence of the trainee towards achieving the standards below at a responsibility level E, i.e. Performing. (Refer to 7.1 of the specific DSTG.)

### 2. Demonstration of Competence

Competence must be demonstrated within well-defined engineering activities, defined below, by integrated performance of the outcomes defined in section 3 at the level defined for each outcome. Required contexts and functions may be specified in the applicable DSTGs.

**Level descriptor:** Well-defined engineering activities (WDEAs) have several of the following characteristics:

- a) Scope of practice area is defined by techniques applied; change by adopting new techniques into current practice;
- b) Practice area is located within a wider, complex context, with well-defined working relationships with

Engineering activities can be divided into (approximately):

- 5% Complex (Professional Engineers)
- 5% Broadly Defined (Professional Engineering Technologists)
- 10% Well-defined (Professional Engineering Technicians)
- 15% Narrowly Well-defined (Registered Specified Categories)
- 20% Skilled Workman (Engineering Artisan) 55% Unskilled Workman (Artisan Assistants)

The activities can be in-house or contracted out; evidence of integrated performance can be submitted irrespective of the situation.

**Level descriptor:** WDEAs in the various disciplines are characterised by several or all of:

- a) Scope of practice area does not cover the entire field of the discipline (exposure limited to the sub-discipline and specific workplace). Techniques applied are largely well established and change by adopting new techniques into current practice is the exception.
other parties and disciplines;
c) Work involves familiar, defined range of resources, including people, money, equipment, materials, technologies;
d) Require resolution of interactions manifested between specific technical factors with limited impact on wider issues;
e) Are constrained by operational context, defined work package, time, finance, infrastructure, resources, facilities, standards and codes, applicable laws;
f) Have risks and consequences that are locally important but are generally not far reaching.

**Activities** include but are not limited to design; planning; investigation and problem resolution; improvement of materials, components, systems or processes; manufacture or construction; engineering operations; maintenance; project management; research; development and commercialisation.

b) Practice area varies substantially with unlimited location possibilities and an additional responsibility to identify the need for complex and/or broadly defined advice to be included in the well-defined working relationships with other parties and disciplines.
c) The bulk of the work involves familiar, defined range of resources, including people, money, equipment, materials, technologies.
d) Most of the impacts in the sub discipline are on wider issues, and although occurring frequently, are well-defined and can be resolved by following established procedures.
e) The work packages and associated parameters are constrained by operational context with variations limited to different locations only. (Cannot be covered by standards and codes.)
f) Even locally important minor risks can have far reaching consequences.

**Activities** include but are not limited to design; planning; investigation and problem resolution; improvement of materials, components, systems or processes; engineering operations; maintenance; project management. For Engineering Technicians, research, development and commercialisation happen more frequently in some disciplines but are seldom encountered in others.
3. Outcomes to be satisfied:

<table>
<thead>
<tr>
<th>Group A: Engineering Problem Solving</th>
<th>Explanation and Responsibility Level</th>
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</thead>
<tbody>
<tr>
<td><strong>Outcome 1:</strong> Define, investigate and analyse well-defined engineering problems</td>
<td><strong>Responsibility Level E</strong></td>
</tr>
<tr>
<td><strong>Well-defined engineering problems have the following characteristics:</strong></td>
<td>Analysis of an engineering problem means the “separation into parts possibly with comment and judgement”.</td>
</tr>
<tr>
<td>a) can be solved mainly by practical engineering knowledge, underpinned by related theory; and one or more of:</td>
<td>a) Practical problems for Engineering Technicians mean the problem encountered cannot be solved by artisans because theoretical calculations and engineering decisions are necessary to substantiate the solution proposed.</td>
</tr>
<tr>
<td>b) are largely defined but may require clarification;</td>
<td>b) Further investigation to identify the nature of the problem is seldom necessary.</td>
</tr>
<tr>
<td>c) are discrete, focused tasks within engineering systems;</td>
<td>c) Discrete means individually distinct: the problem is easily recognised as part of the larger engineering task, project or operation.</td>
</tr>
<tr>
<td>d) are routine, frequently encountered, may be unfamiliar but in familiar context; and one or more of:</td>
<td>d) Recognised that the problem occurred in the past or the possibility exists that it might have happened before – definitely not something new.</td>
</tr>
<tr>
<td>e) can be solved by standardised or prescribed ways;</td>
<td>e) Solving the problem does not require the development of a new solution – find out how it was solved before.</td>
</tr>
<tr>
<td>f) are encompassed by standards, codes and documented procedures; requires authorisation to work outside limits;</td>
<td>f) Encompassed means encircled: the standards, codes and documented procedures must be obtained to solve the problem and; authorisation from the Engineer or Technologist in charge must be obtained to wave the stipulations.</td>
</tr>
<tr>
<td>g) information is concrete and largely complete, but requires checking and possible supplementation;</td>
<td>g) The responsibility lies with the Engineering Technician to check the information received as part of the problem encountered is correct and added to as is necessary to ensure the correct and complete execution of the work.</td>
</tr>
<tr>
<td>h) involve several issues but few of these imposing conflicting constraints and a limited range of</td>
<td>h) The problem handled by an Engineering Technician must be limited to well-known matters preferably needing standardised solutions without possible complications.</td>
</tr>
</tbody>
</table>
interested and affected parties; and one or both of:

i) requires practical judgment in practice area in evaluating solutions, considering interfaces to other role players;

ii) have consequences which are locally important but not far reaching (wider impact is dealt with by others).

i) Practical solutions to problems include knowledge of the skills displayed by Practical Specialists and Engineering Artisans without sacrificing theoretical engineering principles and / or cutting corners to satisfy parties involved.

ii) Engineering Technicians must realise that their actions might seem to be of local importance only but may develop into further problems where support from Engineers and Technologists might be needed to deal with these consequences.

<table>
<thead>
<tr>
<th><strong>Assessment criteria:</strong></th>
<th><strong>Range statement:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>A structured analysis of well-defined problems typified by the following performances is expected:</td>
<td>The problem may be part of a larger engineering activity or may stand alone. The design problem is amenable to solution by established techniques practised regularly by the Candidate. This outcome is concerned with the understanding of a problem: Outcome 2 is concerned with the solution.</td>
</tr>
<tr>
<td>1.1 State how you interpreted the work instruction received, checking with your client or supervisor if your interpretation is correct</td>
<td>Please refer to clause 4 of the specific DSTG.</td>
</tr>
<tr>
<td>1.2 Describe how you analysed, obtained and evaluated further clarifying information, and if the instruction was revised as a result</td>
<td></td>
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</table>

To perform an engineering task an Engineering Technician will typically receive an instruction from a senior person (customer) to do this task, and must:

1.1 Make very sure that the instruction is complete, clear and within his/her capability and that the person who issued the instruction agrees with his/her interpretation.

1.2 Ensure that the instruction and information to do the work is fully understood and is complete, including the engineering theory needed to understand the task and to carry out and/or check calculations, and the acceptance criteria. If needed supplementary information must be gathered, studied and understood.
### Outcome 2: Design or develop solutions to well-defined engineering problems.

#### Responsibility Level C and D

Design means “drawing or outline from which something can be made”. Develop means “come or bring into a state in which it is active or visible”.

#### Assessment criteria:

This outcome is normally demonstrated after a problem analysis as defined in Outcome 1. Working systematically to synthesise a solution to a well-defined problem, typified by the following performances is expected:

- **2.1** Describe how you designed or developed and analysed alternative approaches to do the work. Impacts checked. Calculations attached.

- **2.2** State what the final solution to perform the work was, client or your supervisor in agreement.

#### Range statement:

The solution is amenable to established methods, techniques or procedures within the Candidate’s practice area.

After the task received is fully understood and interpreted, a solution to the problem posed can be developed (designed). To synthesise a solution means “the combination of separate parts, elements, substances, etc. into a whole or into a system” by the following:

- **2.1** The development (design) of more than one way to solve an engineering task or problem should always be done, including the costing and impact assessment for each alternative. All the alternatives must meet the requirements set out by the instruction received, and the theoretical calculations to support each alternative must be done and submitted as an attachment.

- **2.2** The Engineering Technician will in some cases not be able to support proposals with the complete theoretical calculation to substantiate every aspect and must in these cases refer his / her alternatives to an Engineer or Technologist for scrutiny and support. The alternatives and alternative recommended must be convincingly detailed to win customer support for the alternative recommended. Selection of alternatives might be based on tenders submitted with alternatives submitted deviating from those specified.

Applying theory to well-defined engineering work is done in a way that has been used before, probably developed by Engineers or Technologists in the past and documented in written procedures, specifications, drawings, models, examples, etc. Engineering Technicians must seek approval for any deviation from these established methods.
Outcome 3: Comprehend and apply knowledge embodied in established engineering practices and knowledge specific to the jurisdiction in which he/she practices.

Responsibility Level E

Comprehend means “to understand fully”. The jurisdiction in which an Engineering Technician practices is given in Clause 4 of the specific DSTG.

Assessment criteria: This outcome is normally demonstrated in the course of design, investigation or operations.

3.1 State what NDip level engineering standard procedures and systems you used to execute the work, and how NDip level theory was applied to understand and/or verify these procedures;

3.2 Give your own NDip level theoretical calculations and/or reasoning on why the application of this theory is considered to be correct (Actual examples).

Range statement: Applicable knowledge includes:

a) Technical knowledge that is applicable to the practice area irrespective of location, supplemented by locally relevant knowledge, for example established properties of local materials.

b) A working knowledge of interacting disciplines. Codified knowledge in related areas: financial, statutory, safety, management.

c) Jurisdictional knowledge includes legal and regulatory

Design work for Engineering Technicians is mostly to utilise and configure manufactured components and repetitive design work using an existing design as an example. Engineering Technicians apply existing codes and procedures in their design work. Investigation would be on well-defined incidents and condition monitoring and operations mostly on controlling, maintaining and improving engineering systems and operations.

3.1 The understanding of well-defined procedures and techniques must be based on fundamental mathematical, scientific and engineering knowledge. Specific procedures and techniques applied to do the work accompanied by the underpinning theory must be given.

3.2 Calculations confirming the correct application and utilisation of equipment listed in Clause 4 of the specific DSTG must be done on practical well-defined activities. Reference must be made to standards and procedures used and how it was derived from NDip theory.

a) The specific location of a task to be executed is the most important determining factor in the layout design and utilisation of equipment. A combination of educational knowledge and practical experience must be used to substantiate decisions taken including a comprehensive study of materials, components and projected customer requirements and expectations.

b) In spite of having a working knowledge of interacting disciplines, Engineering Technicians must appreciate the importance of working with specialists like Civil Engineers on structures and roads, Mechanical Engineers on fire protection equipment, Architects on buildings, Electrical Engineers on communication equipment, etc. The
Group B: Managing Engineering Activities

**Outcome 4:** Manage part or all of one or more well-defined engineering activities.

**Assessment criteria:** The display of personal and work process management abilities is expected:
- 4.1 State how you managed yourself, priorities, processes and resources in doing the work (e.g. bar chart);
- 4.2 Describe your role and contribution in the work team.

**Responsibility Level D**
- Manage means “control”.

**Explanation and Responsibility Level**
- In engineering operations and projects Engineering Technicians will typically be given the responsibility to carry out specific tasks and/or complete projects.
- 4.1 Resources are usually subdivided based on availability and controlled by a work breakdown structure and scheduling to meet deadlines. Quality, safety and environment management are important aspects.
- 4.2 Depending on the task, Engineering Technicians can be the team leader, a team member or can supervise appointed contractors.

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

**Assessment Criteria:** Demonstrates effective communication by the following:
- 5.1 State how you presented your point of view and compiled reports after completion of the work.
- 5.2 State how you compiled and issued instructions to...

**Responsibility Level C**
- 5.1 Refer to Range State for Outcome 4 and 5 below. Presentation of point of view mostly occurs in meetings and discussions with immediate supervisor.
- 5.2 Refer to Range State for Outcome 4 and 5 below.
entities working on the same task

| Range statement for Outcomes 4 and 5: Management and communication in well-defined engineering involves: | a) Planning means “the arrangement for doing or using something, considered in advance”.
| b) Organising means “put into working order; arrange in a system; make preparations for”.
| c) Leading means to “guide the actions and opinions of; influence; persuade”.
| d) Controlling means the “means of regulating, restraining, keeping in order; check”.
| Communication relates to technical aspects and wider impacts of professional work. Audience includes peers, other disciplines, client and stakeholder audiences. Appropriate modes of communication must be selected. The Engineering Technician is expected to perform the communication functions reliably and repeatedly. |

Engineering Technicians write or participate in writing specifications for the purchase of materials and/or work to be done, make recommendations on tenders received, place orders and variation orders, write work instructions, report back on work done, draw, correct and revise drawings, compile test reports, use operation and maintenance manuals to write work procedures, write inspection and audit reports, write commissioning reports, prepare and present motivations for new projects, compile budget reports, report on studies done and calculations carried out, report on customer requirements, report on safety incidents and risk analysis, report on equipment failure, report on proposed system improvement and new techniques, report back on cost control, etc.

Group C: Impacts of Engineering Activity

| Outcome 6: Recognise the foreseeable social, cultural and environmental effects of well-defined engineering activities generally. | Explanation and Responsibility Level |
| Responsibility Level B |
| Social means “people living in communities; of relations between persons and communities”. Cultural means “all the arts, beliefs, social institutions, etc. characteristic of a community”. Environmental means “surroundings, circumstances, influences”.

Assessment criteria: This outcome is normally displayed in the course of analysis and solution of problems, by typically doing the following:

6.1 Describe the social, cultural and environmental impact

6.1 Engineering impacts heavily on the environment, e.g. servitudes, expropriation of land, excavation of trenches with associated inconvenience, borrow pits, dust and obstruction, street and other crossings, power dips and interruptions, visual and noise pollution, malfunctions, oil and other leaks, electrocution of human beings, detrimental
6.2 State how you communicated mitigating measures to affected parties and acquired stakeholder engagement.

6.2 Mitigating measures taken may include environmental impact studies, environmental impact management, community involvement and communication, barricading and warning signs, temporary crossings, alternative supplies (ring feeders and bypass roads), press releases, compensation paid, etc.

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

Responsibility Level E

7.1 The OHS Act is supplemented by a variety of parliamentary acts, regulations, local authority by-laws, standards and codes of practice. Places of work may have standard procedures, instructions, drawings and operation and maintenance manuals available. These documents, depending on the situation (emergency, breakdown, etc.) are consulted before work is commenced and during the activity;

7.2 It is advisable to attend a Risk Management (Assessment) course, and to investigate and study the materials, components and systems used in the workplace. The Engineering Technician seeks advice from knowledgeable and experienced specialists if the slightest doubt exist that safety and sustainability cannot be guaranteed.

Range statement for Outcomes 6 and 7: Impacts and regulatory requirements include the following:

a) Impacts to be considered are generally those identified within the established methods, techniques or procedures used in the practice area.

b) Regulatory requirements are prescribed.

c) Apply prescribed risk management strategies.

a) The impacts will vary substantially with the location of the task, e.g. the impact of laying a cable or pipe in the main street of town will be entirely different to construction in a rural area. The methods, techniques or procedures will differ accordingly, and is identified and studied by the Engineering Technician before starting the work.

b) The Safety Officer and/or the Responsible Person appointed in accordance with the OHS Act usually confirms or checks that the instructions are in line with regulations. The Engineering Technician is responsible to see that this is done, and if not, establish which
d) Effects to be considered and methods used are defined; e) Prescribed safe and sustainable materials, components and systems.  
f) Persons whose health and safety are to be protected are both inside and outside the workplace.

c) Risks are mostly associated with elevated structures, subsidence of soil, electrocution of human beings and moving parts on machinery. Risk management strategies are usually done by more senior staff but are understood and applied by the Engineering Technician. d) Effects associated with risk management are mostly well known if not obvious, and methods used to address, clearly defined. e) Usually the safe and sustainable materials, components and systems are prescribed by Engineers, Technologists or other professional specialists. It is the Engineering Technician’s responsibility to use his/her knowledge and experience to check and interpret what is prescribed and report anything that he/she is not satisfied with. f) Staff working on the task or project as well as persons affected by the engineering work being carried out.

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<tr>
<th>Group D: Exercise judgment, take responsibility, and act ethically</th>
<th>Explanation and Responsibility Level</th>
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<tbody>
<tr>
<td><strong>Outcome 8</strong>: Conduct engineering activities ethically.</td>
<td><strong>Responsibility Level E</strong></td>
</tr>
<tr>
<td>Ethically means “science of morals; moral soundness”.</td>
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<tr>
<td>Moral means “moral habits; standards of behaviour; principles of right and wrong”.</td>
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<tr>
<td><strong>Assessment criteria</strong>: Sensitivity to ethical issues and the adoption of a systematic approach to resolving these issues is expected, typified by the following:</td>
<td><strong>Systematic means “methodical; based on a system”</strong>.</td>
</tr>
<tr>
<td>8.1 State how you identified ethical issues and affected parties and their interest and what you did about it when a problem arose.</td>
<td>8.1 Ethical problems that can occur include tender fraud, payment bribery, alcohol abuse, sexual harassment, absenteeism, favouritism, defamation, fraudulent overtime claims, fraudulent expenses claimed, fraudulent qualifications, misrepresentation of facts, etc.</td>
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<tr>
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<tr>
<td>8.2 Confirm that you are conversant and in compliance with ECSA’s Code of Conduct and why this is important in your work.</td>
<td>8.2 ECSA’s Code of Conduct, as per ECSA’s website, is known and adhered to. Applicable examples given.</td>
</tr>
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### Outcome 9: Exercise sound judgement in the course of well-defined engineering activities.

**Responsibility Level E**
Judgement means “good sense: ability to judge”.

**Assessment criteria:** 
Judgement is displayed by the following performance:

| 9.1 State the factors applicable to the work, their interrelationship and how you applied the most important factors.; |
| 9.2 Describe how you foresaw work consequences and evaluated situations in the absence of full evidence. |

**Range Statement for Outcomes 8 and 9:** Judgement in decision making involves the following:

| a) Taking limited risk factors into account some of which may be ill-defined; |
| b) Consequences are in the immediate work contexts; or |
| c) Identified set of interested and affected parties with defined needs to be taken into account. |

In engineering about 10% of the activities can be classified as well-defined where the Engineering Technician uses standard procedures, codes of practice, specifications, etc. Judgement must be displayed to identify any activity falling outside the well-defined range, as defined above by the following:

| a) Seeking advice when risk factors exceed his/her capability. |
| b) Consequences outside the immediate work contexts, e.g. long-term, not normally handled. |
| c) Interested and affected parties with defined needs outside the well-defined parameters to be taken into account. |
### Outcome 10: Be responsible for making decisions on part or all of all of one or more well-defined engineering activities.

**Responsibility Level E**

Responsible means “legally or morally liable for carrying out a duty; for the care of something or somebody in a position where one may be blamed for loss, failure, etc.”

**Assessment criteria:** Responsibility is displayed by the following performance:

10.1 Show how you used NDip theoretical calculations to justify decisions taken in doing engineering work. Attach actual calculations.

10.2 State how you took responsible advice on any matter falling outside your own education and experience.

10.3 Describe how you took responsibility for your own work and evaluated any shortcoming in your output.

10.1 The calculations, for example fault levels, load calculations, losses, etc. are done to ensure that the correct material and components are utilised.

10.2 The Engineering Technician does not operate on tasks at a higher level than well-defined and consults professionals at engineer and/or technologist level if elements of the tasks to be done are beyond his/her education and experience, e.g. power system stability.

10.3 This is in the first instance continuous self-evaluation to ascertain that the task given is done correctly, on time and within budget. Continuous feedback to the originator of the task instruction and corrective action if necessary form an important element.

**Range statement:** Responsibility must be discharged for significant parts of one or more well-defined engineering activities.

The responsibility is mostly allocated within a team environment with an increasing designation as experience is gathered.

**Note 1:** Demonstrating responsibility would be under supervision of a competent engineering practitioner but is expected to perform as if he/she is in a responsible position.
<table>
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<tr>
<th>Group E: Initial Professional Development (IPD)</th>
<th>Explanation and Responsibility Level</th>
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</thead>
<tbody>
<tr>
<td><strong>Outcome 11:</strong> Undertake independent learning activities sufficient to maintain and extend his or her competence.</td>
<td><strong>Responsibility Level D</strong></td>
</tr>
</tbody>
</table>
| **Assessment Criteria:** Self-development managed by typically:  
11.1 Provide your strategy adopted independently to enhance professional development. (IPD report).  
11.2 Be aware of the philosophy of employer in regard to professional development. | 11.1 If possible, a specific field of the sub-discipline is chosen, available developmental alternatives established, a programme drawn up (in consultation with employer if costs are involved), and options open to expand knowledge into additional fields investigated.  
11.2 Record keeping must not be left to the employer or anybody else. The trainee must manage his/her own training independently, taking initiative, and be in charge of experiential development towards Professional Engineering Technician level. Knowledge of the employer’s policy and procedures on training is essential. |
| **Range Statement:** Professional development involves:  
a) taking ownership of own professional development;  
b) planning own professional development strategy;  
c) selecting appropriate professional development activities;  
d) recording professional development strategy and activities, while displaying independent learning ability. | This is your professional development, not the organisation you are working for.  
a) In most places of work training is seldom organised by some training department. It is up to the Engineering Technician to manage his/her own experiential development.  
b) Engineering Technicians frequently end up in a 'dead-end street' being left behind doing repetitive work. If self-development is not driven by him/herself, success is unlikely.  
c) Preference must be given to engineering development rather than developing soft skills.  
d) Developing a learning culture in the workplace environment of the Engineering Technician is vital to success. Information is readily available and most senior personnel in the workplace are willing to mentor, if approached. |