

ENGINEERING COUNCIL OF SOUTH AFRICA <i>Standards and Procedures System</i>			 E C S A
Criteria and Processes for Recognition of Educational Qualifications for Specified Categories			
Status: Approved by Council			
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1. Purpose

- 1.1 This document defines the criteria and evaluation processes for recognition of educational qualifications and assessment of the level of educational achievement by applicants as Specified Category Candidates and Specified Category Practitioners. This document is structured as follows:
- Section 2: Reviews the statutory requirements and policy for educational achievement for registration and methods of satisfying the education requirements;
- Section 3: Expands on policy for holders of accredited qualifications or qualifications recognised under an international education agreement (Benchmark Route);
- Section 4: Details the evaluation of qualifications other than accredited or recognised qualifications and the evaluation of individual academic standing (Alternative Route);
- Section 5: Describes practice in the case of applicants who do not meet the educational requirements (Alternative Route).

2. Background

- 2.1 *The Engineering Profession Act (Act No. 46 of 2000) requires that applicants who desire to register in one of the categories must satisfy Council that they have:*
- (a) *demonstrated their competence as measured against standards determined by the Council for the relevant category of registration; and*
- (b) *passed any additional examinations that may be determined by the Council. The latter is referred to as the educational requirement for registration. The determination of standards by Council is embodied in the policy in document R-01-SC. The various ways of meeting the educational requirements are summarised below.*
- 2.2 The educational requirement for registration as a candidate or a Specified Category Practitioner is usually an accredited qualification or a qualification recognised under an international agreement. This policy provides further detail on meeting the requirements via accredited or recognised qualifications and the mechanism for meeting the educational requirement for registration as a Specified Category Candidate or Specified Category Practitioner by persons without accredited or recognised qualifications.

- 2.3 ECSA's policy on registration, document R-01-SC, recognises four methods, denoted (i) to (iv), for meeting the educational requirement applicable prior to applying for Specified Category Candidate or Specified Category Practitioner registration. In the first two, an applicant satisfies the educational requirement if he/she:
- (i) holds an accredited qualification or acceptable combination of accredited qualifications prescribed for the category and sub discipline; or
 - (ii) holds a qualification or combination of qualifications recognised under an international academic agreement relevant to the Specified Category.
- 2.4 The third and fourth methods provide means for an applicant to demonstrate educational standing that is substantially equivalent to an accredited qualification for the category of Specified Category Candidate or Specified Category Practitioner registration by one or more of the following. The applicant:
- (iii) holds a qualification or combination of qualifications that have been determined by case-by-case evaluation to satisfy criteria for substantial equivalence to an accredited qualification for the category and sub discipline by virtue of:
 - (a) the qualification(s) being awarded in a jurisdiction or by a provider that has a record of quality or a quality assurance system known to ECSA; or
 - (b) examination of detailed documentation on the qualification(s) reflecting substantial equivalence; or
 - (iv) presents a combination of evidence determined by Council for the category and sub discipline that indicates an *individual level of educational* achievement against criteria that is substantially equivalent to an accredited qualification; evidence may include:
 - (a) qualification(s) or credits towards qualifications not presented under (iii);
 - (b) completion of examinations or other forms of assessment set or prescribed by Council; or
 - (c) portfolio(s) of evidence of work and other outputs presented for assessment; or
 - (d) other evidence of prior learning presented for assessment.
- 2.5 An applicant who seeks to meet the educational requirement by method (i), (ii) or (iii) above and who provides evidence that he or she has been in training and practice for ten years since graduation must be evaluated in terms of section 4.5 of R-01-SC.
- 2.4 Detailed requirements for the various methods of satisfying the educational requirements are laid out in subsequent sections.

3. Implementation of policy for methods (i) and (ii)

Method (i) Accredited Programme(s)

- 3.1 To satisfy the educational requirement by method (i), the applicant must hold an accredited qualification or acceptable combination of accredited qualifications prescribed for the specified category and sub discipline. The qualification accredited by ECSA as meeting the minimum education requirement for specified categories is the Higher Certificate in Engineering; the programme is listed in the document

E-07-PN. A graduate is recognised as meeting the education requirements for the category if he/she completed the programme in a year within the period of validity of the accreditation indicated on the list.

The Higher Certificate in Engineering programme prescribed in E-07-PN is subject to satisfying subject combinations specified in 3.2 for Candidate or Specified Category Practitioner applicants.

- 3.2 Recognition of an accredited Higher Certificate in Engineering as meeting the education requirements toward Specified Category Practitioner registration is contingent on the subjects contained in the curriculum. The criteria for an acceptable curriculum include credit requirements in engineering subjects relevant to the designation of the sub discipline-specific certificate subject to variations permitted by Technology Programme Accreditation Committee from time to time.
- 3.3 Alternatively, a completed apprenticeship in an acceptable trade (up to 4 years) will be recognised as equivalent to an accredited qualification in satisfying the educational requirement stipulated in 3.1 and 3.2 above.

Method (ii) Recognised Programme(s)

- 3.3 To satisfy the educational requirement, the applicant must hold a qualification or combination of qualifications recognised under an international academic agreement relevant to the categories and sub disciplines of Candidate and Specified Category Practitioner.
- 3.4 The signatories to all Accords will be identified on the International Engineering Alliance website (www.ieagrements.org). Each signatory will maintain its list of accredited programmes. A graduate will be recognised as meeting the education requirements if he/she completed the programme in a year within the period of validity of the accreditation after the admission date of the signatory to the relevant accord.
- 3.5 Programmes that will be accredited by organisations holding provisional status in an Accord will not be recognised by ECSA. Applicants holding such qualifications will have to follow the qualification or individual evaluation methods (iii) or (iv).
- 3.6 Where a qualification or combination of qualifications that will be accredited by a signatory prior to the entry of the signatory to the Accord is considered to be substantially equivalent to an accredited qualification, such qualifications will be listed as qualifications for accelerated processing provided for in section 4.9.1.

4. Process and Criteria for Applicants under Methods (iii) (Qualification Evaluation) and (iv) (Individual Assessment)

- 4.1 An applicant for specified category candidate or specified category practitioner registration who does not hold an accredited qualification or a recognized qualification must apply for educational evaluation before applying for registration.
- 4.2 The criteria for substantial equivalence to an accredited qualification for specified category candidate or specified category practitioner are defined in Table 1 below.

- 4.3 Applicants proceeding under Methods (iii) or (iv) may be interviewed to establish more information about the qualification. This form of interview is not an examination.
- 4.4 Evaluation of an applicant's qualification and individual evaluation of an applicant's educational standing by ECSA is an advisory service.
- 4.5 Applications must be prepared in the English language and all interviews and assessments will be conducted in English.
- 4.6 After evaluation, a statement of full or partial recognition of educational achievement will be issued to the applicant stating the criteria satisfied and the category for which each criterion is satisfied.
- 4.7 An applicant for educational evaluation who satisfies all criteria for specified category candidate or specified category practitioner registration may apply for registration, provided that assessment against criteria 6, 7 and 8 in Table 1 may be deferred to the assessment of specified category practitioner competence when applying for specified category practitioner registration.
- 4.8 An applicant whose educational achievement is found to be deficient against particular criteria may within thirty days of notification submit further evidence for a review of the evaluation.
- 4.9 An applicant retains credit for those criteria that have been satisfied for three years after the last day on which recognition of one or more credit is notified to the applicant.
- 4.10 An applicant for educational evaluation may undertake further learning and assessment to satisfy the outstanding criteria to obtain recognition. Such an applicant must submit a proposal for the form of learning and assessment to be undertaken for approval.

Method (iii) Qualification Evaluation

- 4.11 Recognition of educational achievement is granted for individual criteria. Criteria may be satisfied by demonstrating compliance of qualifications with qualifications evaluation (QE) criteria stated in Table 1, column 2
- 4.12 The following mechanisms may be applied for qualifications evaluation as appropriate to individual cases:
 - 4.12.1 An accelerated procedure is available for evaluating a fully documented qualification whose quality is known to ECSA (method (iii) (a)) and listed for accelerated processing. Here the applicant is required to supply only certified copies of the qualification certificate(s) and academic transcript(s). The evaluation process verifies that the qualification is of the listed type and that the subjects completed are consistent with being an engineering qualification. Such qualifications would usually be accredited by a body which is not a signatory to one of the recognised Accords or come from an education system or institution known to ECSA to have substantially equivalent standards.

- 4.12.2 A fully documented qualification that does not conform to a listed known type (method (iii) (b)) may also be considered for substantial equivalence in accordance with to the criteria in Table 1. In this case, the applicant must provide full information listed in Annexure 1.

Method (iv) Individual Assessment

- 4.13 Recognition of educational achievement is granted for individual criteria. Criteria may be satisfied by assessment of the applicant against the individual assessment (IA) criteria stated in Table 1, column 3.
- 4.14 Qualifications evaluation mechanisms 4.12.1 and 4.12.2 are normally applied first before invoking individual assessment mechanisms 4.15.1 to 4.15.6.
- 4.15 The following mechanisms may be applied for individual assessment as appropriate to individual cases:
- 4.15.1 Written examination(s), set or prescribed by ECSA, in the fundamentals of the discipline relevant to the category, with embedded assessment of mathematics and underpinning natural sciences;
 - 4.15.2 Written essay-type examination, set or prescribed by ECSA, on social, environmental, professional and ethical issues, with integral assessment of written communication ability relevant to the category;
 - 4.15.3 Examinations at the exit level of the accredited qualification set by higher education providers or specified category practitioner examining bodies in engineering specialist areas;
 - 4.15.4 Oral examinations, provided that this is not the sole mechanism used;
 - 4.15.5 Assessment of evidence presented by the applicant of prior learning against criteria in Table 1.
 - 4.15.6 Evidence of work experience against criteria in Table 1.
- 4.16 Applicants proceeding under methods (iii) or (iv) need an extended period of training to the period indicated in section 7.3 of R-01-SC and as prescribed in Table 2.

Table 1: Criteria for substantial equivalence of a qualification and individual performance to a qualification accredited as meeting the educational requirements for Specified Category Candidate and Specified Category Practitioner in engineering.

	Qualifications Evaluation Criteria	Individual Assessment Criteria
1.1	<p>The programme covers fundamentals of mathematics and natural science appropriate to a sub-discipline with at least the equivalent of one third of a semester of mathematical sciences and one quarter of a semester of natural sciences</p> <p><i>Apply knowledge of mathematics, natural science and engineering sciences to wide practical procedures and practices to solve specifically-defined engineering problems.</i></p>	<p>The applicant displays understanding of and the ability to apply a coherent range of discipline specific fundamental principles in engineering science and technology supported by established mathematical formulas to solve <i>specifically-defined</i> engineering problems.</p> <p><i>An appropriate mix of knowledge of mathematics, natural and engineering science at a fundamental level and in a specialised area is brought to bear on the solution of specifically-defined engineering problems. Applicable principles and laws are applied. Appropriate engineering materials, components or processes are selected. Concepts and ideas are communicated effectively. Reasoning about engineering materials, components, systems or processes is performed. Work is performed within the boundaries of the practice area.</i></p>
1.2	<p>The programme adequately covers the engineering fundamentals appropriate to the specific discipline</p>	<p><i>Work is performed within the boundaries of the practice area.</i></p>
1.3	<p>The programme contains studies of the engineering technologies relevant to the specific discipline</p>	<p>The applicant displays proficiency in discipline specific engineering techniques at exit level.</p>
2	<p>The level of problem solving demanded at the exit level corresponds to specifically-defined engineering problems defined in ECSA document E-07-PN</p> <p><i>Apply engineering principles to systematically diagnose and solve specifically-defined engineering problems.</i></p>	<p><i>The problem is defined and the criterion for an acceptable solution is identified. Relevant information and engineering knowledge and skills are identified for solving the problem. Various approaches are considered and formulated that would lead to workable solutions. Solutions are identified in terms of strengths and weaknesses for the overall solution. Solutions are prioritised in order of suitability. The preferred solution is formulated and presented in an appropriate form.</i></p>

3	<p>The programme contains a selection of engineering tools and IT support appropriate to the specific discipline</p> <p><i>Use established techniques, resources, and modern engineering tools including information technology for the solution of specifically-defined engineering problems, with an awareness of the limitations.</i></p>	<p>The applicant displays proficiency in the use of engineering tools and IT support appropriate to the discipline for the solution of <i>specifically-defined</i> engineering problems.</p> <p><i>The appropriate method, skill or tool is selected and applied to achieve the required result. Results produced by the method, skill or tool are verified against requirements. Computer applications are selected and used as required.</i></p>
4	<p>Design proficiency is demonstrated through practical work. The design problem meets the requirements of a <i>specifically-defined engineering problem</i> and the design approach is properly structured.</p> <p><i>Perform procedural design of specifically-defined components or processes to meet desired needs within applicable standards, codes of practice and legislation.</i></p>	<p>The applicant demonstrates procedural design proficiency through practical work. The design problem meets the requirements of a <i>specifically-defined</i> engineering problem and the design approach is properly structured</p> <p><i>The design problem is formulated to satisfy user needs, applicable standards, codes of practice and legislation.</i></p> <p><i>The design process is planned and managed to focus on important issues and recognises and deals with constraints.</i></p> <p><i>Knowledge, information and resources are acquired and evaluated in order to apply appropriate principles and design tools to provide a workable solution.</i></p> <p><i>Design tasks are performed that include component testing to relevant premises, assumptions and constraints.</i></p> <p><i>Alternatives are evaluated for implementation and a preferred solution is selected on an elementary, technical and cost basis.</i></p> <p><i>The design logic and relevant information is communicated in a report.</i></p> <p><i>Occupational health and safety and environmentally related risks are identified and appropriate measures considered</i></p>

5	<p>Proficiency in experimental procedures and data-handling methodology is demonstrated</p> <p><i>Conduct tests, experiments and measurements of specifically-defined problems by applying relevant codes and manufacturer guidelines.</i></p>	<p>The applicant demonstrates proficiency in standardised experimental and research methodology</p> <p><i>Tests, experiments and measurements are conducted within an appropriate discipline. Available literature is identified and selected for suitability to the task. Equipment is used in accordance with original equipment manufacture's specifications. Information is interpreted and derived from available data. Conclusions are drawn from an evaluation of all available evidence. The purpose, process and outcomes of the task are recorded in a report. Occupational health and safety and environmentally related risks are identified and appropriate measures taken.</i></p>
6	<p>The curriculum requires oral and written communication using prescribed formats</p> <p><i>Communicate effectively, both orally and in writing within an engineering context.</i></p>	<p>The applicant communicates in writing at the exit level of a H Cert programme</p> <p><i>The structure, style and language of written and oral communication are appropriate for the purpose of the communication and the target audience. Graphics used are appropriate and effective in enhancing the meaning of text. Visual materials used enhance oral communications. Information is provided in a format that can be used by others involved in the engineering activity. Oral communication is delivered with the intended meaning being apparent</i></p>
7	<p>The curriculum contains elements that give an understanding of the impact of the engineering procedures of the specific discipline</p> <p><i>Demonstrate knowledge and understanding of the impact of engineering activity on the society, and the environment.</i></p>	<p>The applicant explains and analyses impacts of engineering activity addressing issues by defined procedures.</p> <p><i>The engineering activity is considered in terms of the impact on the public health and safety. The engineering activity is considered in terms of the impact on the occupational health and safety. The engineering activity is considered in terms of the impact on the natural environment.</i></p>

8	<p>The curriculum contains elements that give an understanding of ethics and engineering professionalism</p> <p><i>Understand and commit to professional ethics, responsibilities and norms of engineering technical practice.</i></p>	<p>The applicant understands and commits to professional ethical principles in engineering.</p> <p><i>The ethical implications of the impact of engineering decisions are known and understood.</i></p> <p><i>Responsibility is accepted for consequences stemming from own actions or failure to act.</i></p> <p><i>Decision making is limited to area of current competence.</i></p>
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Table 2: Minimum duration of education, training and experience for various pathways towards registration:

Pathway	Qualification	Post Qualification Total Training and Experience in the Specific Discipline	Post Qualification Experience (part of total) with Responsibility as Indicated
Experience Route (Alternative Route)	No Tertiary Qualification	NQF 1 level: 20 years NQF 2 level: 15 years NQF 3 level: 10 years NQF 4 level: 5 years	2 years test and inspection or commissioning
Benchmark Route	Higher Certificate in Engineering or Equivalent (NQF 5) or Completed Apprenticeship in an Acceptable Trade (up to 4 years)	NQF 5 level: 3 years	2 years inspection, testing, commissioning, handover, certification, etc.
Engineering Management Type Route	BSc (Eng), BEng, BTech, N Dip, Advanced Certificate or Equivalent but not eligible for ECSA registration in any of the Professional Categories	NQF 6 level: 3 years NQF 7 level: 3 years NQF 8 level: 3 years	2 years planning, organising, leading, implementing and controlling engineering activities, including design control and approval, budget compilation and control, quality, environmental, safety and society management, legal matters, skills development, report and instruction writing, meeting management, ethics, etc.
Notes:	<ol style="list-style-type: none"> 1. Training and experience must incorporate legal requirements stipulated in laws, regulations and standards applicable (As detailed in the Sub Discipline-specific Training Requirements (SDSTR's) R-05-nnn-SC). 2. Training and experience must incorporate practical requirements detailed by equipment manufacturers, codes of practice, etc. applicable to the specific field (As detailed in the SDSTR's R-05-nnn-SC). 3. Academic programmes referred to above must be accredited, recognised or evaluated as equivalent, with individual assessment where required. 4. Equivalent refers to Equivalent Qualifications to the qualification(s) listed, e.g. past and future qualifications developed by education providers (QCTO, TVET) and accredited or recognised by ECSA.. 		

5. Case of Applicants who do not meet requirements

- 5.1 The general practice will be to inform the applicant that he/she has not met the educational requirements and list the criteria that were not satisfied. The applicant is then free to take remedial action and return for evaluation. In general, applications will not be refused outright; only in rare cases will a decision of no recognition possible be returned. Refusals therefore need not be referred to the Central Registration Committee for a final decision.

6. Composition of Interview and Oral Examination Panel

- 6.1 An interview in terms of section 4.3 or an oral examination in terms of section 4.15.4 must be conducted by at least two academics who are currently active in conducting accredited programmes in or related to the discipline of the applicant and one practitioner registered in a specified category.

7. Definitions

Alternative Route: See section 7.3 of R-01-SC and Table 2 above.

Benchmark Route: The usual process required to attain registration, consisting of the completion of an accredited, recognised or evaluated equivalent qualification and a well-structured and effectively executed programme of training and experience for the category of registration. See section 7.3 of R-01-SC and Table 2 above.

Engineering Discipline: a generally-recognised, major subdivision of engineering such as the traditional *disciplines* of Chemical, Civil, or Electrical Engineering, or a cross-disciplinary field of comparable breadth including combinations of engineering fields, for example Mechatronics, and the application of engineering in other fields, for example Bio-Medical Engineering.

Sub-discipline: a generally-recognised practice area or major subdivision within an engineering discipline, for example: Mechanical Engineering: Lifting Machinery Inspectors

Specified Category (SC): Means a category created for registered persons, other than professional or candidate engineers, certificated engineers, engineering technologists and engineering technicians, who has specific training pertaining to a specialised field that has to be regulated. It is a category of registration created for persons who must be licensed through the Engineering Profession Act or a combination of the Engineering Profession Act and external legislation as having specific competencies related to an identified need to protect the safety, health and interest or the environment, in relation to engineering activity.

Substantial Equivalence: applied to educational programmes means that two programmes, while not meeting a single set of criteria in detail, provide their respective graduates with knowledge and abilities to enable the graduates to undertake the same work and professional development.

Annexure 1: Information for applicants for evaluation of qualifications, individual evaluation or proceeding by methods (iii) or (iv)

A person proceeding via the qualification evaluation route method (iii) or (iv) must provide at least the following evidence of educational achievement:

- Certified copies of all qualifications Full
- academic transcripts
- If the type of programme does not appear on the list of programmes whose graduates are eligible for consideration under case (iii), the following material must be supplied:
 - A curriculum analysis using the worksheet provided with as much details as possible
 - Syllabi of the subjects studied
 - Portfolio(s) of evidence of work and other outputs presented for assessment
 - Other evidence of prior learning presented for assessment, including completed Forms AR, ER, IPD and TER/TEO of the Application for Registration.

Abbreviations

CPD:	Continuing Professional Development
CA:	Competency Assessment
C&U:	Commitment and Undertaking
CSC:	Candidate Specified Category
ECSA:	Engineering Council of South Africa
EA:	Experience Appraisal
IPD:	Initial Professional Development
nnn:	Existing or future Specified Category's
RSC:	Registered Specified Category
SDSTR::	Sub Discipline-specific Training Requirements
SC:	Specified Category

Revision History

Version	Date	Revised/Approved by	Nature of Revision
Concept A	1 Apr 2015	Erasmus (JIC)	Original draft based on E-17-P
Concept B	5 June 2015	CRC Working Group	Providing for a higher level type of Specified Category called Engineering Management. Incorporating editing by Dr Stidworthy and Mr Van Niekerk.
Concept C	5 June 2015	Working Group (WG)	Logical improvements recommended by the WG implemented. Table 2 revised to align with R-01-CS Schedule 7. Concept of sub-discipline added.
Concept D	9 July 2015	Working Group (WG)	Draft for submission to the CRC, and SC Committees
Concept E	7 September 2015	Working Group (WG) Final for report to CRC. Approved by JIC for submission to TC	Amended and approved by WG for submission to the CRC and JIC.
Concept F	8 February 2016	For submission to TC	Aligned with revised E-17-P
Rev 1	24 March 2016	Approved by Council	No amendments
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