INSTITUTION OF ENGINEERS SINGAPORE

CHARTERED ENGINEERING TECHNICIAN OF SINGAPORE

COMPETENCY STANDARD & ASSESSMENT STATEMENT

The Institution of Engineers, Singapore
Chartered Engineering Technologist and Technician Accreditation Board
70 Bukit Tinggi Road
Singapore 289758

Tel: (65)-6469 5000
Fax: (65)-6467 1108

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PART 1 - INTRODUCTION

1 REGISTRATION AS CHARTERED ENGINEERING TECHNICIAN OF SINGAPORE

1.1 The registration for Chartered Engineering Technician of Singapore by the Institution of Engineers Singapore (IES) is to recognise persons who have demonstrated that they are able to practise competently in their practice area.

1.2 The level of professional competency which IES's Chartered Engineering Technician is expected to meet, is listed as Competency Standard in Part 4 of this Assessment Statement. This set of Competency Standards has been developed with reference to the Technical Skills & Competencies (TSCs) in the Skills Framework[1].

1.3 The IES will keep a register of Chartered Engineering Technicians, which will list individuals who have been registered as Chartered Engineering Technicians. These Chartered Engineering Technicians will be able to use the post-nominal **"CETn"** to their names.

[1] The Skills Framework can be downloaded from SSG's website: https://www.skillsfuture.sg/skills-framework

PART 2 - REGISTRATION POLICY

2 CHARTERED ENGINEERING TECHNOLOGIST AND TECHNICIAN ACCREDITATION BOARD (CETTAB)

2.1 For the purpose of the registration of Chartered Engineering Technician of Singapore, the IES Council has constituted the Chartered Engineering Technologist and Technician Accreditation Board (CETTAB). The CETTAB will manage the assessment and registration process, and approve engineering Technicians to be registered as Chartered Engineering Technicians of Singapore.

2.2 The IES Council shall appoint Board Members of CETTAB who may be representatives from government, industry, relevant professional associations, or higher education institutions delivering engineering programs.

2.3 CETTAB will approve the registration of each successful engineering Technician by positive vote of more than half of the total number of Board Members in the CETTAB.

2.4 The contact person for CETTAB is:
Secretary
Chartered Engineering Technologist and Technician Accreditation Board
The Institution of Engineers, Singapore
70 Bukit Tinggi Road
Singapore 289758
Tel: (65) 64695000
Email: cettab@iesnet.org.sg

PART 3 - ELIGIBILITY REQUIREMENTS

3 REQUIREMENTS FOR REGISTRATION

3.1 An engineering Technician has to fulfil the following requirements in order to qualify for registration as Chartered Engineering Technician:

(i) is Member of IES; and
(ii) has met the required years of working experience (as stated in 4.2 or 4.3) as an engineering Technician that provides the knowledge and abilities to satisfy the Competency Standards;
(iii) has a letter of recommendation to be a Chartered Engineering Technician provided by his/her employer or user of service;
(iv) agrees to pursue continuing professional development at a satisfactory level prescribed by the CETTAB; and
(v) agrees to be bound by the IES's Rules for Professional Conduct.

4 PATHWAYS FOR REGISTRATION

4.1 Engineering Technicians seeking registration as Chartered Engineering Technician of Singapore through one of the following two pathways –

Pathway A
An engineering Technician who meets the following criteria can qualify for registration as a Chartered Engineering Technician –
i) passed the Technical & Skills Competencies assessment for a specific industry sector (listed in Annex C) conducted by the CETTAB accredited assessment centre(s) listed in Annex B; and
ii) obtained at least 5 years of relevant practical work experience as an engineering technician.

Pathway B
An engineering Technician who meets the following criteria can qualify for registration as a Chartered Engineering Technician –
i) completed an engineering National Institution of Technical Education Certificate (NITEC) course or any substantially equivalent academic programme recognised by the IES[2]; and
ii) passed the Technical & Skills Competencies assessment for a specific industry sector (listed in Annex C) conducted by the CETTAB accredited assessment centre(s) listed in Annex B; and
iii) obtained at least 3 years of relevant practical work experience as an engineering Technician.

[2] A list of qualifications that has been deemed as substantially equivalent to NITEC can be found in IES's website on registration as Chartered Engineering Technician of Singapore.

5 INDUSTRY SECTOR OF ENGINEERING PRACTICE

5.1 CETTAB will identify and approve a list of recognised engineering practice from various industry sectors and an engineering technician shall be assessed under a recognised engineering practice in the list. (The list of industry sectors of engineering practices, as shown in Annex C, will be updated to include new industry sectors and tracks as necessary.) The registration of Chartered Engineering Technicians will be based on the engineering practice in his/her specific track of the industry sector.

PART 4 - COMPETENCY STANDARD

6 LEVELS OF COMPETENCY STANDARD

6.1 The Competency Standard[3] is the ability to perform at the level of Technical Skills & Competencies that represents broad practice areas of professional engineering performance. These levels of Technical Skills & Competencies are adapted from the Skills Framework.

6.2 The Competency Standard of Chartered Engineering Technician to be referred is pegged to level 1, 2 or 3 of Technical Skills & Competencies and is shown in Table 6.1 below.

Table 6.1

Level	Responsibility (Degree of supervision and accountability)	Autonomy (Degree of decision-making)	Complexity (Degree of difficulty of situations and tasks)	Knowledge and Abilities (Required to support work as described under Responsibility, Autonomy and Complexity)
1	Work under direct supervision. Accountable for tasks assigned.	Minimal discretion required. Expected to seek guidance.	Routine	• Recall factual and procedural knowledge • Apply basic skills to carry out defined tasks • Identify opportunities for minor adjustments to work tasks
2	Work with some supervision. Accountable for a broader set of tasks assigned.	Use limited discretion in resolving issues or enquiries. Work without frequently looking to others for guidance	Routine	• Understand and apply factual and procedural knowledge in a field of work • Apply basic cognitive and technical skills to carry out defined tasks and to solve routine problems using simple procedures and tools • Present ideas and improve work
3	Work under broad direction May hold some accountability for performance of others, in addition to self.	Use discretion in identifying and responding to issues, work with others and contribute to work performance	Less routine	• Apply relevant procedural and conceptual knowledge, and skills to perform differentiated work activities and manage changes • Able to collaborate with others to identify value-adding opportunities

6.3 Details of the knowledge and abilities for each of the Technical Skills & Competencies in each of the industry sectors are provided in the Appendices.

[3] Competency Standard is an indication of level of performance expected of a professional engineering Technologist and Technician.

6.4 Accredited assessment centres will carry out assessment for each of the Technical Skills & Competencies. The list of assessment centres is shown in Annex B.

PART 5 - ASSESSMENT

7 ASSESSMENT

7.1 CETTAB will appoint an Assessment & Quality Assurance Committee (AQAC) for each industry sector, to review and assess applications for registration as Chartered Engineering Technician.

7.2 The AQAC will appoint one or more independent assessors to be part of the assessment panel to evaluate the engineering Technician on his/her Technical & Skills Competencies of the specific industry sector.

7.3 The AQAC will make their recommendations to CETTAB on whether an engineering Technician should be registered through a review of the application form and documents therein.

8 AVOIDANCE OF CONFLICT OF INTEREST

8.1 In order to avoid possible conflict of interest, members of the AQAC and assessment panel are not expected to have or have had a close, active association with the engineering Technician or his/her work experience. Close/active association are, for example

a) being a relative of the engineering Technician by birth or marriage; and
b) being employed, either currently or within the past 3 years, as staff or consultant by the organisation in which the engineering Technician's work experience was obtained.

PART 6 - OBLIGATIONS OF AND RULES GOVERNING CHARTERED ENGINEERING TECHNICIANS

9 BOUND BY RULES OF PROFESSIONAL CONDUCT

9.1 Chartered Engineering Technicians of Singapore are assessed for skills & competencies in their domain of engineering practice in a specific industry sector. Chartered Engineering Technicians shall therefore not claim competency by virtue of their registration as Chartered Engineering Technician in other areas of engineering practice that lie outside their area of expertise

9.2 Chartered Engineering Technicians are bound by the IES's Rules for Professional Conduct.

9.3 Chartered Engineering Technicians are required to maintain their continuing professional development at a satisfactory level, which should not be less than the level as prescribed by the CETTAB in Annex D. CETTAB may carry out random audit (of between 2% and 5% of records for the past year) of participation in CPD programme.

10 DISCIPLINARY ACTION

10.1 A complaint against any Chartered Engineering Technician relating to contravention of the rules of professional conduct shall be lodged with the Secretary of the CETTAB.

10.2 If CETTAB has determined the complaint to be bona fide, CETTAB will set up an Investigation Committee to investigate into the complaint and make recommendations to the CETTAB.

10.3 Any action to be taken by the CETTAB against the Chartered Engineering Technician, including removal from the register, shall not be taken unless the Chartered Engineering Technician has been given an opportunity of being heard.

11 DISPUTE RESOLUTION

11.1 An engineering Technician may appeal against the refusal to be placed on the register.

11.2 A Chartered Engineering Technician may appeal against the decision of the CETTAB to remove him/her from the register.

11.3 An appeal must be made in writing to the Honorary Secretary, Council of IES within 30 days after receiving notification of refusal or removal. The appeal should be accompanied by a clear statement of the grounds for appeal.

11.4 The Council of IES will appoint an Appeal Committee comprising not less than 3 members to consider the appeal and to submit its findings and recommendations within 60 days.

11.5 The Council of IES will consider the findings of the Appeal Committee and arrive at a final decision within 90 days after the formation of the Appeal Committee.

11.6 If the appeal is denied, the IES Council will provide the appellant with reasons for the decision.

11.7 If a review of the registration is necessary, the IES Council, in consultation with CETTAB, will appoint another Assessment Panel to carry out the review.

11.8 If appeal for reinstatement on the register is successful, CETTAB will reinstate the Chartered Engineering Technician on the register.

11.9 The IES Council may impose a fee for lodgement of an appeal. The fee will be refunded to appellant's membership account if the outcome is in appellant's favour, but there will be no refund if the original decision is upheld.

PART 7 - APPLICATION GUIDANCE

12 APPLICATION FORM

12.1 The Application Form is available for download from the IES web site.

13 WHO IS ELIGIBLE TO APPLY

13.1 Application for registration as Chartered Engineering Technician is open only to members of IES.

13.2 CETTAB may refuse to register an engineering Technician who in its opinion is not of good character or reputation.

14 RENEWAL OF REGISTRATION

14.1 Every Chartered Engineering Technician who wishes to renew his/her registration has to fulfil the following requirements:

a) Obtain a minimum of 20 PDUs every 2 years over the renewal qualifying period
b) Update particulars on the IES Chartered Technician database
c) Pay the IES Chartered Technician renewal fee
d) Make the necessary declarations in the renewal application form.

14.2 Refer to Annex D for more details.

PART 8 - BIBLIOGRAPHY

1. International Engineering Technologist Agreement Version 1.4
2. Agreement for International Engineering Technicians Version 1.4
3. International Engineering Alliance – “Graduate Attributes and Professional Competencies”, June 2013
4. IPENZ – Chartered Professional Engineer Competence Standard
5. The Institution of Mechanical Engineers, UK – Chartered & Incorporated Engineers Application Guidance
6. The Professional Engineers Board, Singapore – Continuing Professional Development for Professional Engineers
7. Skills Framework - https://www.skillsfuture.sg/skills-framework

ANNEX A – TECHNICAL SKILLS & COMPETENCIES FOR EACH OF THE INDUSTRY SECTORS

A.1 Skills Framework

A1.1 In the Skills Framework, there is a unique set of Technical Skills & Competencies (TSCs) for each of the industry sectors and tracks. In each set of TSCs, there are TSC map and reference documents as shown in the Appendices

A1.2 To be Chartered Engineering Technician, he/she has to pass the assessment for the set of TSCs stipulated in the Appendices for the particular industry sector and track. The assessment on the set of TSCs is conducted by the assessment centres as listed in Annex B.

ANNEX B – ACCREDITED TECHNICAL & SKILLS COMPETENCIES ASSESSMENT CENTRES

B.1 CETTAB will accredit assessment programmes for the various tracks under the different sectors progressively.

Please visit www.cettab.com.sg for updated list of assessment programmes available.

ANNEX C - LIST OF INDUSTRY SECTORS AND TRACKS

Sector	Track
Aerospace	**Nil**
Built Environment	**Nil**
Land Transport	**Automotive**
Land Transport	**Rail**
Precision Engineering	**Nil**
Water & Environment	**Nil**

ANNEX D - CONTINUING PROFESSIONAL DEVELOPMENT (CPD) FRAMEWORK

D1 **CPD Policy**

D1.1 In the prevailing fast changing environment, there is a need for Chartered Engineering Technicians in Singapore to pursue lifelong learning to maintain and update their professional competence on a continuing basis.

D1.2 As a Chartered Engineering Technician may be operating under circumstances which are unique to him/her, the focus of the CPD activities is best left to each Chartered Engineering Technician to decide. The principle is that the relevant CPD activities must be those related to the scope of practice of each Chartered Engineering Technician. There is therefore no prescribed rule~~s~~ as to the nature and type of activities to be undertaken but each Chartered Engineering Technician will be given the flexibility to select from amongst a broad range of activities. The range of activities in this CPD programme is not intended to be exhaustive but to act as a general guide. The activities that would be relevant are those that will enable one to

a) maintain, improve, or expand his/her technical skills and knowledge;
b) keep abreast of changing procedures and standards;
c) understand and apply advances in technology;
d) better serve the engineering profession, community and environment;
e) develop communication and management skills; and
f) broaden into related fields, such as those covering management, financial or legal aspects.

D2 **Definitions**

D2.1 The terms used in this document have the following meanings

a) "contact hour" refers to an attendance or involvement lasting one hour;
b) "professional development units" or "PDU" refers to the unit of measure for effort in continuing professional development program;
c) "renewal qualifying period" refers to a 24-month period immediately preceding the application for renewal of registration;

D3 **Activities**

D3.1 The types of relevant CPD activities are as follows:

a) Accredited formal study courses, lectures, short courses, conferences, workshops, seminars and in-house training (e.g. Relevant diploma, NITEC, Higher NITEC and WSQ skills-based courses on engineering and/or project management);

b) Participation in Professional Boards, Committees and Societies (e.g. Member of Boards of local Professional institutions or relevant government agencies);
c) Contribution to relevant engineering or management knowledge (e.g. Conduct accredited lectures, seminars, conferences or training courses for the first time);
d) Self-study of relevant topics (e.g. Reading of relevant technical, professional, financial, legal or business literature;
e) Informal In-house training and discussion;
f) Non-accredited engineering activities.

D4 Carrying over of excess PDUs

D4.1 If a Chartered Engineering Technician exceeds the biennial requirement in one renewal qualifying period, a maximum of 10 PDUs from excess PDUs may be carried forward into the next renewal qualifying period.

D5 Insufficient PDU for renewal of registration

D5.1 A Chartered Engineering Technician who has not obtained sufficient PDUs in the renewal qualifying period to meet the requirement for renewal of his registration may apply to have his registration renewed by providing reasons for the failure to meet the requirement. The CETTAB may renew his/her registration and may impose a condition that the shortfall in PDUs in that renewal qualifying period has to be obtained during the following renewal qualifying period. The PDUs to be obtained in the next renewal qualifying period to meet the shortfall would not be used for the renewal of the registration for the next renewal period.

D6 Reinstatement after a lapse of 3 years

D6.1 A Chartered Engineering Technician whose registration had lapsed for 3 years or more will be removed from the register.

D7 Exemptions

D7.1 A Chartered Engineering Technician may be exempted, subject to review and approval of the CETTAB, from CPD requirements if he/she experiences physical disabilities, prolonged illness or other extenuating circumstances.

D8 Records

D8.1 When applying for renewal of registration, a Chartered Engineering Technician is to submit the Biennial Renewal Form (which can be downloaded from the IES web site) which contains a form to record the PDUs obtained during the renewal qualifying period. Chartered Engineering Technicians do not have to submit documentary evidence together with the Biennial Renewal Form. However, Chartered Engineering Technicians are advised to retain their CPD documentary evidence for a period of at least 4 years.

D9 **Audit Process**

D9.1 CETTAB will conduct random audit on compliance with CPD. Those selected will be asked to produce documentary evidence of their CPD participation during the particular period. The documentary evidence may take any one of the following forms:

a) Summary of diary records or a log showing the activities claimed;
b) Course enrolment record;
c) Receipts;
d) Certificate of attendance;
e) Attendance list from course organiser;
f) Employer's report or certification.

APPENDIX I – LAND TRANSPORT (AUTOMOTIVE) TECHNICAL SKILLS & COMPETENCIES

Technical Skills & Competencies Assessment

	Knowledge	Abilities
Pre-requisite	NITEC or Equivalent and >3 years relevant working experience	Pass MCQ assessment
Duration	1 hours	2 hours
Format	30 MCQs	4 practical tasks in the TSCs
Coverage	4 out of 6 TSCs	4 out of 6 TSCs

Technical Skills and Competencies Map

Chartered Technician (Land Transport - Automotive)		
Sector	Land Transport	
Track	Automotive (Bus)	
	Technical Skills & Competencies	
Skills & Competencies	Bus Air-Conditioning Systems Maintenance	Level 3
	Bus Brake Systems Maintenance	Level 3
	Bus Drivetrain Systems Maintenance	Level 3
	Bus Electrical and Electronic Systems Maintenance	Level 3
	Bus Engine System Maintenance	Level 3
	Bus Steering and Suspension Systems	Level 3

Technical Skills and Competencies Reference Document

Technical Skills and Competencies (TSC) Reference Document	
TSC	**Bus Air-Conditioning Systems Maintenance**
TSC Proficiency	**Level 3**
Knowledge	• Operating principles of bus air-conditioning systems • Types of troubleshooting and rectification techniques for bus air-conditioning systems maintenance • Types of fault identification methods for bus air-conditioning systems • Signs of defective or degenerated components within bus air-conditioning systems • Safety guidelines on usage of tools and equipment to troubleshoot bus air-conditioning systems
Abilities	• Implement troubleshooting procedures to investigate causes of faults in bus air-conditioning systems • Recommend corrective actions to defects identified on bus air-conditioning systems • Implement procedures on safe usage of tools and equipment during maintenance work • Analyse maintenance activities documented for bus air-conditioning systems to identify maintenance workflow improvements

Technical Skills and Competencies (TSC) Reference Document	
TSC	**Bus Brake Systems Maintenance**
TSC Proficiency	**Level 3**
Knowledge	• Operating principles of bus brake systems and its components • Types of troubleshooting and rectification techniques for bus brake systems maintenance • Types of fault identification methods for bus brake systems • Signs of defective or degenerated components and parts within bus brake systems • Safety guidelines on usage of tools and equipment to troubleshoot bus brake systems
Abilities	• Implement troubleshooting procedures to investigate causes of faults in bus brake systems • Recommend corrective actions to defects identified on bus brake systems • Implement procedures on safe usage of tools and equipment during maintenance work • Analyse maintenance activities documented for bus brake systems to identify maintenance workflow improvements

Technical Skills and Competencies (TSC) Reference Document	
TSC	**Bus Drivetrain Systems Maintenance**
TSC Proficiency	**Level 3**
Knowledge	• Operating principles of bus drivetrain systems • Types of troubleshooting and rectification techniques for bus drivetrain systems maintenance • Types of fault identification methods for bus drivetrain systems • Signs of defective or degenerated components and parts within bus drivetrain systems • Safety guidelines on usage of tools and equipment to troubleshoot bus drivetrain systems
Abilities	• Implement troubleshooting procedures to investigate causes of faults in bus drivetrain systems • Recommend corrective actions to defects identified on bus drivetrain systems • Implement procedures on safe usage of tools and equipment during maintenance work • Analyse maintenance activities documented for bus brake systems to identify maintenance workflow improvements

Technical Skills and Competencies (TSC) Reference Document	
TSC	**Bus Electrical and Electronic Systems Maintenance**
TSC Proficiency	**Level 3**
Knowledge	• Operating principles of bus electrical and electronic systems • Types of troubleshooting and rectification techniques for bus electrical and electronic systems maintenance • Types of fault identification methods for bus electrical and electronic systems • Signs of defective or degenerated components and parts within bus electrical and electronic systems • Safety guidelines on usage of tools and equipment to troubleshoot bus electrical and electronic systems
Abilities	• Implement troubleshooting procedures to investigate causes of faults in bus electrical and electronic systems • Recommend corrective actions to defects identified on bus electrical and electronic systems • Implement procedures on safe usage of tools and equipment during maintenance work • Analyse maintenance activities documented for bus electrical and electronic systems to identify maintenance workflow improvements

Technical Skills and Competencies (TSC) Reference Document	
TSC	**Bus Engine System Maintenance**
TSC Proficiency	**Level 3**
Knowledge	• Operating principles of bus engine system • Types of troubleshooting and rectification techniques for bus engine system maintenance • Types of fault identification methods for bus engine system • Signs of defective or degenerated components and parts within bus engine system • Safety guidelines on usage of tools and equipment to troubleshoot bus engine system
Abilities	• Implement troubleshooting procedures to investigate causes of faults in bus engine system • Recommend corrective actions to defects identified on bus engine system • Implement procedures on safe usage of tools and equipment during maintenance work • Analyse maintenance activities documented for bus engine system to identify maintenance workflow improvements

Technical Skills and Competencies (TSC) Reference Document	
TSC	**Bus Steering and Suspension Systems Maintenance**
TSC Proficiency	**Level 3**
Knowledge	• Operating principles of bus steering and suspension systems • Types of troubleshooting and rectification techniques for bus steering and suspension systems maintenance • Types of fault identification methods for bus steering systems • Signs of defective or degenerated components within bus steering and suspension systems • Safety guidelines on usage of tools and equipment to troubleshoot bus steering and suspension systems
Abilities	• Implement troubleshooting procedures to investigate causes of faults in bus steering and suspension systems • Recommend corrective actions to defects identified on bus steering and suspension systems • Implement procedures on safe usage of tools and equipment during maintenance work • Analyse maintenance activities documented for bus steering and suspension systems to identify maintenance workflow improvements

APPENDIX II – AEROSPACE ENGINEERING TECHNICAL SKILLS & COMPETENCIES

To be updated

APPENDIX III – BUILD ENVIRONMENT TECHNICAL SKILLS & COMPETENCIES

To be updated

APPENDIX IV – ENVIRONMENT SERVICES TECHNICAL SKILLS & COMPETENCIES

To be updated

APPENDIX V – PRECISION ENGINEERING TECHNICAL SKILLS & COMPETENCIES

To be updated