

The following competence standard sets the competence standard for engineering technicians seeking recognition in the class of Associate Member (AIPENZ) and/or registration as a Certified Engineering Technician (CertETn).

## **What is a Competence Standard?**

A competence standard is an indication of an expected level of performance. The competence assessments conducted by IPENZ require applicants to provide sufficient evidence to demonstrate they are able to consistently apply knowledge, understanding and skills to the standard expected of a competent engineering technician.

## **Format of Competence Standard for Engineering Technicians**

The Competence Standard for Engineering Technicians consists of the following:

*12 elements:* these represent broad areas of engineering performance. Taken holistically, these elements make up the minimum standard.

*performance indicators (bullet points):* these provide further detail as to the meaning of each element thereby enabling the applicant and assessors to have a clearer understanding of the performance required to demonstrate competence in each element. They are important indicators of competence but are not criteria that need to be met nor are they an exhaustive list.

*definition:* these provide a critical component of the standard and need to be considered carefully by applicants when they are preparing their portfolio of evidence to demonstrate they meet the competence standard.

## **Competence Assessment**

Those undertaking an initial competence assessment are expected to provide to their Assessment Panel evidence of their current competence which demonstrates that they are able to meet all the *elements* of the standard. The Panel, however, considers the totality of the evidence supplied and makes a *holistic* assessment as to whether each applicant meets the Competence Standard.

## **Competence-based Membership Classes**

IPENZ recognises that the type and complexity of engineering activities and problems fall along a continuum. At one end are engineering tradespeople who have a strong practical or 'craft' component to their activity. At the other end are engineers who have a strong theoretical component to their work and whose engineering activities require a high knowledge of underpinning engineering principles.

IPENZ has competence based membership classes and current competence registers that recognise three general engineering roles – professional engineer, engineering technologists and engineering technician. The following table sets out the matrix of membership classes and registers that are available.

Generic title	Exemplifying qualification	Membership class	National Register title	International Register title
Professional Engineer	4 year Bachelor of Engineering (BE)	Professional Member <b>MIPENZ</b>	Chartered Professional Engineers Register <b>CPEng</b>	International Professional Engineers Register <b>IntPE(NZ)</b>
Engineering Technologist	3 year Bachelor of Engineering Technology (BEngTech)	Technical Member <b>TIPENZ</b>	Engineering Technology Practitioners Register <b>ETPract</b>	International Engineering Technologists Register <b>IntET(NZ)</b>
Engineering Technician	2 year Diploma of Engineering (DipE)	Associate Member <b>AIPENZ</b>	Certified Engineering Technicians Register <b>CertETn</b>	
Engineering tradesperson	1 or 2 year certificate in an engineering trade			

IPENZ has developed a Competence Standard for each engineering role. These Standards recognise that there is commonality in the approach engineers take to analysing, solving, and managing engineering activity and there is a common standard of professionalism and ethical behaviour that underpins their work, however there is variance in the types of engineering activity they undertake.

The IPENZ Competence Standards were developed on the premise that:  
Engineering technicians are competent at analysing, solving, managing and taking responsibility for *well-defined* engineering problems and activities;

Engineering technologists are competent at analysing, solving, managing and taking responsibility for *broadly-defined* engineering problems and activities;

Professional engineers are competent at analysing, solving, managing and taking responsibility for *complex* engineering problems and activities

The definitions of these terms are critical to understanding the three IPENZ Competence Standards.

### Pathways to Formal Recognition of Competence

IPENZ acknowledges that engineers' career paths are varied hence entry into competence-based membership classes and/or registers is based on demonstrated evidence of competence, through a portfolio of evidence which is assessed by IPENZ Assessors – IPENZ Members from similar practice fields as the applicant and who have undergone training as an IPENZ Assessor.

Entry to membership classes and/or registers is not restricted to those with what are considered the 'normal' academic qualifications. Although the majority of engineers seeking AIPENZ membership or CertETn registration will have a New Zealand Certificate of

Engineering or National Diploma of Engineering recognised by IPENZ, or an equivalent qualification recognised through the Dublin Accord, there will always be some engineers who can demonstrate they have acquired the required knowledge of engineering principles through an alternative education pathway.

### **Definitions**

The **practice area** of an engineer is defined by both the area in which the engineer holds engineering knowledge and the nature of the activities performed. *Both of these may change over the course of his or her working life. The competence of the applicant will be assessed in his/her current areas of engineering practice.*

**Well-defined engineering activities** means engineering activities or projects that have some or all of the following characteristics:

- (a) Involve a limited range of resources (and for this purpose resources includes people, money, equipment, materials, information and technologies)
- (b) Require resolution of interactions between limited technical and engineering issues with little or no impact of wider issues
- (c) Involve the use of existing materials techniques, or processes in new ways
- (d) Have consequences that are locally important and not far-reaching
- (e) Require a knowledge of practical procedures and practices for widely-applied operations and processes

**Well-defined engineering problems** means engineering problems having some or all of the following characteristics:

- (a) Involve several issues, but with few of these exerting conflicting constraints,
- (b) Can be solved in standardised ways,
- (c) Can be resolved using limited theoretical knowledge but normally requires extensive practical knowledge,
- (d) Are frequently encountered and thus familiar to most practitioners in the practice area,
- (e) Are encompassed by standards and/or documented codes of practice,
- (f) Involve a limited range of stakeholders with differing needs
- (g) Have consequences which are locally important and not far-reaching
- (h) Are discrete components of engineering systems

To meet the minimum standard a person must demonstrate that he/she is able to practice competently in his/her practice area to the standard expected of a reasonable engineering technician.

The extent to which the person is able to perform each of the following numbered elements in his/her practice area must be taken into account in assessing whether or not he/she meets the overall standard.

- 1 Comprehend and apply detailed knowledge underpinning good practice as an engineering technician**
  - Has a Dublin Accord Diploma or recognised equivalent qualification or has demonstrated equivalent knowledge
  - Identifies, comprehends and applies engineering knowledge to well-defined engineering problems
  - Seeks advice, where necessary, to supplement own knowledge and experience
  
- 2 Comprehend and apply detailed knowledge underpinning good practice as an engineering technician that is specific to the jurisdiction in which he/she practices**
  - Demonstrates an awareness of legal requirements and regulatory issues associated with well-defined engineering activities within the jurisdictions in which he/she practices
  - Demonstrates an awareness of and applies appropriately the special engineering requirements operating within the jurisdictions in which he/she practices
  
- NB: For CertETn registration, the jurisdiction in which competence is demonstrated must be New Zealand.
  
- 3 Identify, state and analyse well-defined engineering problems in accordance with good practice for engineering**
  - Identifies the scope of the problem
  - Investigates and analyses relevant information using routinely-applied techniques
  - Tests analysis for correctness of results
  - Conducts any necessary testing and reaches justified conclusions
  
- 4 Design or develop solutions to well-defined *engineering problems* by applying accepted procedures and methodologies**
  - Identifies needs, requirements, constraints and performance criteria
  - Develops concepts and recommendations that are tested against accepted procedures and methodologies
  - Consults with stakeholders
  - Evaluates options and selects solution that best matched needs, requirements and criteria
  - Plans and implements effective, efficient and practical systems or solutions
  - Evaluates outcomes

- 5 Be responsible for making decisions on part or all of one or more well-defined engineering activities**
  - Takes accountability for his/her outputs and for those for whom he/she is responsible
  - Accepts responsibility for his/her engineering activities
  
- 6 Manage part or all of one or more well-defined engineering activities in accordance with good engineering management practice**
  - Plans, schedules and organises projects to deliver specified outcomes
  - Applies appropriate quality assurance techniques
  - Manages resources, including personnel, finance and physical resources
  - Manages conflicting demands and expectations
  
- 7 Identify risk and apply risk management techniques to well-defined engineering problems**
  - Is familiar with limits of applicability, applies appropriate checks and takes corrective actions
  - Applies appropriate risk management techniques
  
- 8 Conduct engineering activities to an ethical standard at least equivalent to the relevant code of ethical conduct**
  - Demonstrates understanding of IPENZ codes of ethics or other recognised code of ethics
  - Behaves ethically even in difficult circumstances
  - Demonstrates an awareness of limits of capability
  - Acts with integrity and honesty
  
- 9 Recognise the reasonably foreseeable social, cultural and environmental effects of well-defined engineering activities generally**
  - Considers and, where needed, takes into account health and safety compliance issues and impact(s) on those affected by engineering activities
  - Considers and takes into account possible social, cultural and environmental impacts and consults where appropriate
  - Considers Treaty of Waitangi implications and consults accordingly
  - Recognises foreseeable effects and where practicable seeks to reduce adverse effects
  
- 10 Communicate clearly with others in the course of his/her well defined engineering activities**
  - Uses oral and written communication that meet the needs and expectations of his/her audience
  - Communicates using a range of media suitable to the audience and context
  - Treats people with respect
  - Develops empathy and uses active listening skills when communicating with others
  - Operates effectively as a team member

**11 Maintain the currency of engineering knowledge and skills**

- Demonstrates a commitment to extending and developing knowledge and skills
- Participates in education, training, mentoring or other programmes contributing to his/her professional development
- Adapts and updates knowledge base in the course of professional practice
- Demonstrates collaborative involvement with others in the engineering profession

**12 Exercise sound engineering judgement**

- Demonstrates the ability to identify alternative options
- Demonstrates the ability to choose between options and justify decisions
- Peers recognise his/her ability to exercise sound engineering judgement
- Recognises limits of competence