

The following competence standard sets the entry standard for engineering technologists seeking recognition as a competent engineering technologist in the class of Technical Member (TIPENZ) and/or registration as an Engineering Technology Practitioner (ETPract).

## **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 technologist.

## **Format of Competence Standard for Engineering Technologist Practitioners**

The “Competence Standard for Engineering Technologists” 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 for entry into the class of Technical Member (TIPENZ) and/or ETPract registration 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. As an example, although the majority of

engineers seeking TIPENZ membership or ETPract registration have a Bachelor of Engineering Technology accredited by IPENZ and/or recognised through the Sydney Accord, there will always be some engineers who can demonstrate they have acquired the required competencies who have gained their 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.*

**Broadly defined engineering activities** or projects have some or all of the following characteristics:

- (a) Involve a variety of resources (and for this purpose resources includes people, money, equipment, materials, information and technologies)
- (b) Require resolution of occasional interactions between limited technical, engineering and other issues, of which few are conflicting
- (c) Involve the use of new materials, techniques, or processes in innovative ways
- (d) Have consequences that are most important locally, but may extend more widely
- (e) Require a knowledge of normal operating procedures and processes

**Broadly defined engineering problems** have some or all of the following characteristics:

- (a) Involve a variety of factors which may impose conflicting constraints,
- (b) Can be solved by application of well-proven analysis techniques,
- (c) Requires knowledge of principles and applied procedures or methodologies
- (d) Belong to families of familiar problems which are solved in well-accepted ways,
- (e) May be partially outside those encompassed by standards or codes of practice,
- (f) Involve several groups of stakeholders with differing and occasionally conflicting needs
- (g) Have consequences which are important locally but may extend more widely,
- (h) Are parts of, or systems within complex engineering problems

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 technology practitioner.

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 knowledge underpinning good practice as an engineering technology practitioner**

- Has a Sydney Accord degree or recognised equivalent qualification or has demonstrated equivalent knowledge
- Identifies, comprehends and applies engineering knowledge to broadly-defined engineering problems
- Seeks advice, where necessary, to supplement own knowledge and experience

**2 Comprehend and apply knowledge underpinning good practice as an engineering technology practitioner that is specific to the jurisdiction in which he/she practices**

- Demonstrates an awareness of legal requirements and regulatory issues associated with broadly-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 ETPract registration, the jurisdiction in which competence is demonstrated must be New Zealand

**3 Identify, clarify and analyse broadly-defined engineering problems in accordance with good engineering practice**

- Identifies the scope of the problem
- Investigates and analyses relevant information using quantitative and qualitative techniques
- Tests analysis for correctness of results
- Conducts any necessary testing and reaches justified conclusions

**4 Design or develop solutions to broadly-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 broadly-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 broadly-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 risks and apply risk management techniques to broadly-defined engineering problems**
  - Identifies risks
  - Applies risk management policies, procedures and protocols
- 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 broadly-defined engineering functions 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 broadly-well defined engineering activities**
  - Uses oral and written communication that meet the needs and expectations of 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 engineering practice
- Demonstrates collaborative involvement with other professionals

**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