

## AUSTRALIAN ENGINEERING COMPETENCY STANDARDS STAGE 2 - THE EXPERIENCED ENGINEERING ASSOCIATE

The Stage 2 Competency Standards are the profession's expression of the knowledge and skill base, engineering application abilities, and professional skills, values and attitudes that must be demonstrated in order to practise independently or unsupervised as an engineering associate. It goes beyond the ability to perform specific tasks.

### **Purpose of the Stage 2 Competency Standards**

The Stage 2 competency standards are used as the basis of assessment for Chartered membership of Engineers Australia (CEngA) and registration on the National Engineering Register (NER).

Chartered membership is exclusive to Engineers Australia. It is a professional credential recognised by government, business and the general public worldwide. The achievement of CEngA brings with it a career-long obligation to maintain competence in a chosen area of operation.

### **What is expected of an experienced engineering associate?**

The community has certain expectations of experienced engineering associates, their competence, how they apply this competence and how they will conduct themselves.

Experienced engineering associates:

- need a good grounding in engineering science and the principles underlying their field of expertise, to ensure that their knowledge and skills are portable across different applications and situations within the broad field of practice
- undertake feasibility investigation, scoping, establishing criteria/performance measures, assessing and reporting technical and procedural options
- undertake a wide range of functions:
  - design and development
  - component, resources and materials sourcing and procurement
  - construction, prototyping, manufacture, testing, installation, commissioning, service provision and de-commissioning
  - tools, plant, equipment and facilities acquisition, management, maintenance, calibration and upgrades
  - operations management
  - procedures documentation
  - presentation and reporting
  - maintenance systems design and management
  - project and facility management
  - quality assurance, costing and budget management
  - document control and quality assurance
- are closely familiar with standards and codes of practice, and become expert in their interpretation and application to a wide variety of situations
- certify the quality of engineering work and the condition of equipment and systems in defined circumstances, laid down in recognised standards and codes of practice
- interact effectively with Professional Engineers and Engineering Technologists, tradespersons, clients and stakeholders, to ensure that technology outcomes and developments fully integrate with the overall system and context
- develop very extensive experience of practical installations and detailed aspects of plant and equipment that can contribute to safety, cost or effectiveness in operation
- develop high levels of expertise in aspects of design and development processes
  - use advanced software to perform detailed design of:
    - structures, mechanical components and systems
    - manufacturing or process plant
    - electrical and electronic equipment
    - information and communications systems
- construct experimental or prototype equipment
- develop detailed practical knowledge and experience, complementing the broader or more theoretical knowledge of others

- build on equipment, vendor or context-specific training to achieve expertise in particular contexts and in relation to particular equipment

Engineering associates may lead or manage teams appropriate to these activities. Some may establish their own businesses or may move into senior management roles in engineering and related enterprises, employing professional engineers, engineering technologists, and other specialists where appropriate.

### **Stage 2 competency standards**

The Stage 2 competency standards are generic in the sense that they apply to all disciplines of engineering in four units:

- personal commitment
- obligation to community
- value in the workplace
- technical proficiency

Each unit contains elements of competence and indicators of attainment. The elements of competence are the capabilities necessary to the unit of competence and the indicators of attainment serve as a guide to the engineering work likely to be considered as demonstrating attainment of that competence.

### **Demonstration of competence – Engineering Associate**

The demonstration of competence requires the presentation of written accounts of work that involves engineering contributions - contributions based on standardised approaches associated with established engineering operations.

When selecting work experience to offer as evidence of competence, provide examples of contributions to work that has some or all of the characteristics of either an engineering problem or engineering activity as described below:

#### **Engineering problems**

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

#### **Engineering activities**

- Involve a familiar, defined range of resources (and for this purpose resources includes people, money, equipment, materials, information and technologies)
- Require resolution of interactions between specific technical and engineering issues with little or no impact on wider issues
- Involve the use of existing materials, techniques or processes in modified or new ways
- Require a knowledge of practical procedures and techniques from widely-applied operations and processes

At any particular time, an engineering associate applying for Stage 2 assessment would expect some areas to be developing with others at a functional or proficient level as described below.

- **Developing:** an aspect of practice that you are learning, with help from more experienced practitioners and possibly supervision to help you practice at an acceptable standard.
- **Functional:** an aspect of practice in which you have a basic capability to practice independently at an acceptable standard without help or supervision.
- **Proficient:** an aspect of practice in which your capability to practice independently has been recognised through formal peer review, and in which you have the capacity to help others develop their capability.

A successful assessment at Stage 2 will formalise a transfer from functional to proficient.

## AUSTRALIAN ENGINEERING COMPETENCY STANDARDS STAGE 2 –ENGINEERING ASSOCIATE

### Elements of Competence – PERSONAL COMMITMENT

This unit of competence requires you to demonstrate:

- how you deal with ethical issues when they arise
- how you keep up to date
- how you adopt a personal sense of responsibility for your work

| ELEMENT OF COMPETENCE<br>ENGINEERING ASSOCIATE | What this competence means in practice   | Indicators of Attainment<br>Refer to only as many Indicators of Attainment as you need to demonstrate the Element of Competence  |
|--|--|--|
| 1. Deal with ethical issues                    | <p><i>means you demonstrate an understanding of the ethical issues associated with your work or practice area, and how these are managed collectively by your organisation, project or team; and</i></p> <p><i>means you demonstrate an ability to identify ethical issues when they arise, and to act appropriately</i></p> | <ul style="list-style-type: none"> <li>• understand ethical dilemmas in your practice area</li> <li>• recognise an unethical situation; take appropriate action</li> <li>• engage in ethical reflective practice</li> <li>• seek appropriate advice and consult Engineers Australia Code of Ethics</li> </ul>  |
| 2. Practise competently                        | <p><i>means you recognise the competencies and resources appropriate to engineering activities</i></p>   | <ul style="list-style-type: none"> <li>• maintain a concise description of your areas of competence</li> <li>• carry out engineering work only within the boundaries of your known areas of competence</li> <li>• identify and consult with appropriate persons</li> <li>• maintain records of Continuing Professional Development activities</li> </ul>   |
| 3. Responsibility for engineering activities   | <p><i>means you adopt a personal sense of responsibility for your work</i></p>   | <ul style="list-style-type: none"> <li>• use self-evaluation or feedback from others (peer review) to help you consider the potential outcomes of your decisions</li> <li>• understand the relevant standards and codes for your practice area</li> <li>• authorise engineering outputs in a manner consistent with relevant standards and codes</li> <li>• understand statutory and commercial frameworks within your own area of responsibility</li> </ul> |

## Elements of Competence – OBLIGATION TO COMMUNITY

‘Community’ will change depending on the nature of the work you are doing. Sometimes it will be the client; sometimes the general public; sometimes your students; sometimes the regulatory authorities and sometimes it will be your employer. This unit of competence requires you to demonstrate:

- how you delivered a safe and efficient solutions
- how you defined the community and considered the community benefit at various stages of *engineering activities* (within the context of your work)
- how you identified and managed the risks associated with the *engineering activities*
- how you incorporated legal and regulatory requirements into your solutions

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|--|--|--|
| 4. Develop safe and sustainable solutions              | <p><i>means</i> that you apply current workplace health and safety requirements; and</p> <p><i>means</i> that you recognise short and long-term implications of the <i>engineering activities</i></p>  | <ul style="list-style-type: none"> <li>• contribute to the safety of workers and others in design, manufacture, construction, commissioning, use, decommissioning, demolition, removal or disposal of plant, substances or structures</li> <li>• promote a culture of workplace safety</li> <li>• apply energy efficiency regulations and codes of practice to reduce operating costs</li> <li>• contribute to reducing adverse effects on community and environment from <i>engineering activities</i></li> </ul> |
| 5. Engage with the relevant community and stakeholders | <p><i>Means</i> that you recognise the communities and stakeholders who could be affected by <i>engineering activities</i>; and</p> <p><i>means</i> that you recognise the needs and expectations of the relevant community and stakeholders; and</p> <p><i>means</i> that you understand and consider relevant public interest issues</p> | <ul style="list-style-type: none"> <li>• contribute to safety, environmental and community health and other public interest issues relevant to <i>engineering activities</i></li> <li>• explain how <i>engineering activities</i> may affect the community and the environment</li> <li>• recognise the reliance of others on engineering capability when engaging with the community</li> </ul>   |

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| <b>6. Identify, assess and manage risks</b>                  | <i>means</i> that you understand and operate within a hazard and risk framework appropriate to <i>engineering activities</i>   | <ul style="list-style-type: none"> <li>• classify product, project, process, environmental or system risks that could be caused by material, economic, social or environmental factors</li> <li>• record an audit trail of technical and operational changes during product development, project implementation or process operations</li> <li>• identify technical, safety and commercial risks</li> <li>• apply strategies and processes to identify, evaluate and manage organisational risk</li> </ul>                            |
| <b>7. Meet legal and regulatory requirements</b>             | <i>means</i> that you should be able to identify the laws, regulations, codes and other instruments which you are legally bound to apply, and apply these in your work | <ul style="list-style-type: none"> <li>• identify and comply with the codes, standards of compliance or legal instruments relevant to a particular product, project or system</li> <li>• conduct safety audit reports (under relevant legislation)</li> <li>• evaluate and implement improved safety systems (under relevant legislation)</li> <li>• provide regulatory approvals within delegated authority for <i>engineering activities</i></li> <li>• implement safety procedures under the Work Health and Safety Act</li> </ul> |

## Elements of Competence – VALUE IN THE WORKPLACE

This unit of competency requires you to demonstrate:

- how you communicate in the workplace
- how you work within an organisation
- how you initiate, plan, lead or manage *engineering activities*
- how you exercise sound judgement in *engineering activities*

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|--|--|--|
| 8. Communication                               | <i>means</i> that you communicate efficiently, honestly and effectively  | <ul style="list-style-type: none"> <li>• respect confidentiality obligations</li> <li>• collaborate effectively within engineering teams in the workplace</li> <li>• interpret engineering requirements from drawings, specifications or codes to technical and non-technical personnel</li> <li>• provide feedback, suggestions and technical advice on relevant practical issues</li> </ul>  |
| 9. Performance                                 | <i>means</i> that you work within an operational system to achieve corporate objectives while recognising personal obligations to others | <ul style="list-style-type: none"> <li>• understand clearly and document the working relationships between all parties to an <i>engineering activity</i></li> <li>• document and provide advice on predicted performance, reliability and delivery (with respect to budget and timeliness) of intended products, projects and systems</li> <li>• maintain an attitude of operational efficiency to add value for the stakeholders of a product, project or system</li> <li>• apply operational performance standards to create the greatest benefits and value for all parties to an <i>engineering activity</i></li> <li>• follow agreed protocols for terms of engagement, job acceptance, client relationships and billing</li> </ul> |

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| 10. Taking action                              | <i>means that you manage part or all of one or more engineering activities</i> | <ul style="list-style-type: none"> <li>• manage, monitor and report progress against agreed plans, method statements and programs to achieve project objectives</li> <li>• follow quality processes and procedures to achieve project outcomes with minimum supervision</li> <li>• identify and manage own obligations for continuous improvement in work health and safety</li> <li>• manage relationship between budget and costs, keep records of instructions and variations</li> <li>• plan, organise and supervise the operation of tools, production systems and information systems</li> </ul> |
| 11. Judgement                                  | <i>means that you exercise sound judgement in engineering activities</i>       | <ul style="list-style-type: none"> <li>• choose appropriate technologies to deal with well-defined problems</li> <li>• advise client or employer of limit of personal knowledge</li> <li>• seek appropriate advice and decide whether to proceed or suspend work when faced with unexpected obstacles, performance deficiencies, impending or actual failures</li> </ul>   |

## Elements of Competence – TECHNICAL PROFICIENCY

This unit of competency require you to demonstrate:

- how you use knowledge of standardised practices
- how you use local knowledge
- how you analyse problems
- how you use technological equipment skilfully
- how you evaluate the outcomes and impacts of *engineering activities*

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|--|--|---|
| 12. Knowledge of standardised practices        | <i>means</i> that you understand and apply knowledge relevant to standard practices in operational area                        | <ul style="list-style-type: none"> <li>• Maintain a working knowledge of technical aids in area of operation</li> <li>• interpret standards and codes of practice in area of operation</li> <li>• use knowledge and understanding to interpret engineering instructions, drawings, sketches or computer images</li> <li>• apply technical and practical skills to the use of state-of-the-art tools, materials, production systems and information systems</li> </ul> |
| 13. Local knowledge                            | <i>means</i> that you demonstrate the application of knowledge of local practices, materials, products and environmental plans | <ul style="list-style-type: none"> <li>• apply specified technical standards in area of operation</li> <li>• comply with local environmental aspects of standards and codes of practice</li> <li>• apply knowledge of first principles to link codes, standards and specifications</li> <li>• apply established properties of local materials, components and systems in area of operation</li> </ul>   |
| 14. Problem analysis                           | <i>means</i> that you identify, state and analyse <i>engineering problems</i>  | <ul style="list-style-type: none"> <li>• accurately determine the main issues for each problem and reliably identify opportunities to improve outcomes</li> <li>• work with customer or employer to reach an agreed understanding of the expected capability or functionality of the required product, project or system</li> <li>• undertake performance management measurements, condition assessment or trend analysis leading to system improvement</li> </ul>    |



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|--|--|---|
| 15. Predictable operation                                    | <i>means</i> that you use technological equipment skilfully, creatively and reliably | <ul style="list-style-type: none"> <li>• develop the necessary capacity to skilfully interact with state-of-the-art tools, materials, production systems and information systems</li> <li>• use new and emerging technological equipment, engineering applications and systems to create value for customer</li> <li>• provide feedback, suggestions and advice to others on the practical application and potential for improvement of equipment, applications and systems</li> <li>• skilfully operate and maintain materials, production systems and information systems to reliably produce, modify or repair products, processed materials or information</li> <li>• predict time, human effort and material resources needed to skilfully interact with tools, materials, production systems and information systems used in area of operation</li> </ul> |
| 16. Evaluation   | <i>means</i> that you evaluate the outcomes of <i>engineering activities</i>         | <ul style="list-style-type: none"> <li>• measure product, project or system cost, quality, safety, reliability, maintenance, fitness for purpose</li> <li>• review and evaluate the effectiveness of <i>engineering activities</i></li> <li>• evaluate product, project or systems outcomes against well-defined criteria</li> <li>• evaluate the constructability or maintainability of products, projects or systems against well-defined construction or maintenance guides</li> <li>• locate and use technical information correctly to ensure that proposed <i>engineering activities</i> are based on sound evidence</li> </ul>   |