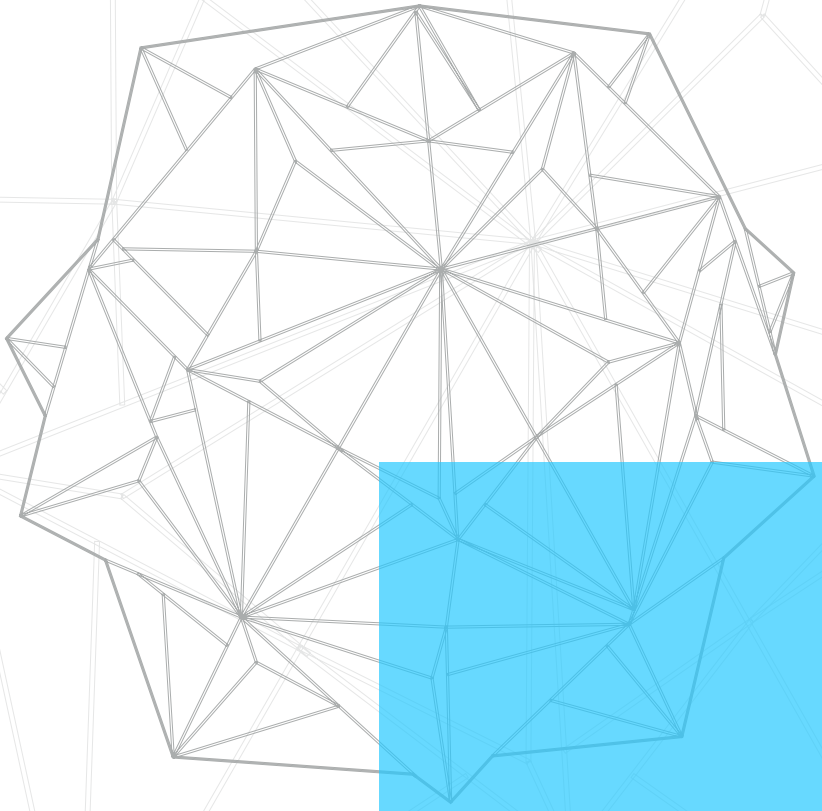
KIVI
Engineering Society

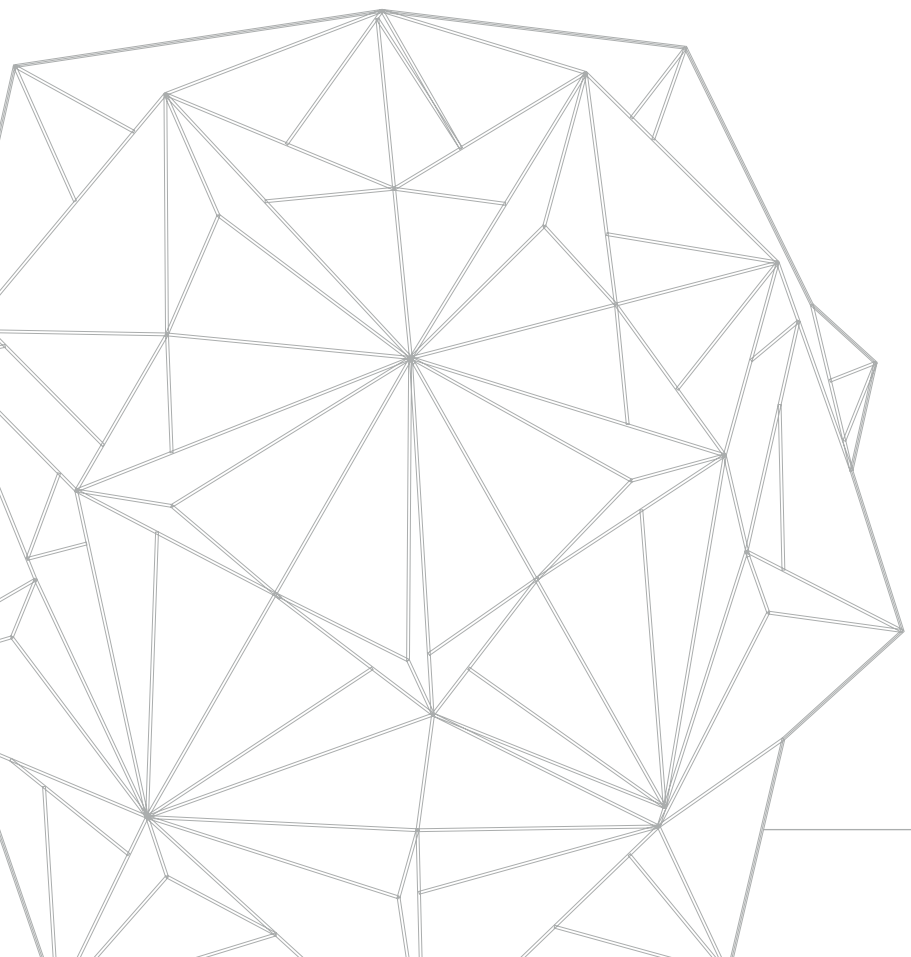
# NL-SPEC

## NL STANDARD FOR PROFESSIONAL ENGINEERING COMPETENCE



KNOWLEDGE
EXPERIENCE
COMMITMENT
EXCELLENCE

**2021**



# Content

# Preface

**Chartered Engineers set the standards that others follow.**

Since the earliest days humankind has sought to make life easier, safer and more productive through engineering. Today, engineering is all around us, satisfying everything from our basic needs to our more complex dreams and ambition. The engineers who make this possible, possess an incredible range of creative talent that is underpinned by their inquisitive minds and balanced by their intellect and judgement. It is with this and the latest technologies that we are able to sustain and improve the lives that we lead.

Society rightly places great faith in the engineering profession, counting on engineers and their imagination to help us meet the challenges of the 21st century, and trusting engineers to regulate themselves on its behalf. In order to do this, engineers must inspire each other, maintain on the cutting edge of technology and be driven by societal needs and demands. This trust can only be delivered through significant individual commitment that is publicly demonstrated by the attainment of the professional competence and behaviours that are described in this Standard.

The Chartership structure helps to ensure the development of the engineering profession and it's strong connection to society by regulating and maintaining this high standard. Chartered status means that an engineer's expertise and experience are recognized around the world, therefore they are acknowledged as the most accomplished and most professional of Engineers.

Professional Engineers with Chartered Status enjoy recognition by industry, government and the general public worldwide. Chartered Engineers are recognized internationally with the backing of international accords and agreements. In the Netherlands, the bestowment of Chartered Status is exclusive to the Royal Netherlands Society of Engineers (KIVI).

We are keen to ensure that our Chartership structure for Chartered Engineers and Incorporated Engineers is relevant to modern practice, in line with sustainable technological development focused on improving society, and has the backing and support of the industry. KIVI harnesses the voices of CEOs and CTO's across the industry to publicly stand up for the importance of being Chartered and to support the high standards that Chartership represents.

KIVI is committed to raising the profile of the engineering profession in the Netherlands, and the Chartership structure is at the forefront of our advocacy efforts.

**drs. ing. Miguel Delcour ECBS**
Registrar

# The Purpose of the NL-SPEC

The Chartership structure in the Netherlands complies with the rules and regulations of the International Engineering Alliance (IEA). Since 2017 KIVI is a member of the IEA. Therefore, professionally registered engineers in the Netherlands abide by the same standards and are part of the same global Chartership structure, which enjoys worldwide recognition. The Netherlands Standard for Professional Engineering Competence (NL-SPEC) has its origin in the UK Standard for Professional Engineering Competence (UK-SPEC), created by the UK Engineering Council.

Professional registration with the Royal Netherlands Society of Engineers (KIVI) is based on demonstration of competence and commitment. The NL-SPEC describes the competence and commitment requirements that have to be met for registration as a Chartered Engineer (CEng) or an Incorporated Engineer (IEng). It includes examples of activities that could demonstrate achievement of the requirements, to enable individuals and employers to find out whether they or their staff meet the registration requirements. Qualifications that exemplify the required knowledge and understanding are listed, however it should be noted that there are other ways of demonstrating achievement.

This document also explains the steps necessary to achieve professional registration, the requirement to maintain and enhance competence once Chartered status is achieved, and the obligations to act with integrity and in the public interest that are placed on Chartered status.

# Professional Titles

There are two professional titles available to individuals who meet the required standard of competence and commitment; Chartered Engineer and Incorporated Engineer.

Chartered and Incorporated are different forms of Chartership, each with their own merits and qualities, acknowledging different engineering backgrounds, project roles and responsibilities in the different workfields. Chartered and Incorporated engineers, enjoy recognition by industry, government and the general public worldwide. Chartered and Incorporated Engineers are recognised internationally with the backing of international accords and agreements.

## Chartered Engineers


Chartered Engineers (CEng) - also known as - Professional Engineers are characterised by their ability to develop appropriate solutions to engineering problems through innovation and creativity, using existing or new technologies. They might develop and apply new technologies, promote advanced designs and designing methods, introduce new and more efficient production techniques, market and construct concepts, or pioneer new engineering services and management methods. Chartered Engineers are variously engaged in technical and/or commercial leadership and possess effective interpersonal skills.

## Incorporated Engineers


Incorporated Engineers (IEng) - also known as - Engineering Technologists are characterised by their ability to maintain and manage applications of current and developing technology, and may undertake engineering design, development, manufacture, construction and operation. Incorporated Engineers are variously engaged in technical and/or commercial management and possess effective interpersonal skills.

## Fellow Chartered Engineer


A special distinction may be awarded in the form of Fellowship status. Fellow Chartered Engineer (FCEng) and Fellow Incorporated Engineer (FIEng) are prestigious honours granted to Lead Engineers who are Chartered and known and respected for their expertise. It is the highest level within the Chartership qualification. Fellows have not only proven themselves with their extensive experience and their excellent career, but have also contributed significantly to the work field as a whole. They increase the quality of the engineering sciences by taking a leading role in their professional field and by sharing their knowledge and experience with younger engineers. They are proven leaders and innovators within the engineering profession.

All of these titles can generally be referred to as 'Chartership'.

## Choosing which path is right for you

In the ever developing Engineering profession, there are increasingly diverse job roles across multiple workfields and disciplines. Therefore, you must decide which Chartership title is most suited to your career and your professional responsibilities.

The table below gives and overview of the difference between a Chartered Engineer and an Incorporated Engineer.

| Chartered Engineer | Incorporated Engineers |
|---|---|
| **Master's level or above.** | **Bachelor's level or above.** |
| Uses non-routine methods to solve complex problems. | Maintains and manages application of technology. |
| Develops new technologies and analytical techniques. | Applies current and developing technologies. |
| Has technical accountability for complex systems. | Exercises independent technical judgement. |
| Is accountable for project, financial and management decisions. | Actively participates in project and financial considerations. |
| Develops other technical staff. | Has some responsibility in developing other professional staff. |
| Effectively communicates technical matters. | Effectively communicates technical matters. |

# Introduction to the Chartership Structure

## Why Register?

Registration as a Chartered Engineer or an Incorporated Engineer sets individual professionals apart from engineers who are not registered. It establishes their proven knowledge, understanding and competence. In particular, registration demonstrates a commitment to professional standards, ethical behaviour and to developing and enhancing competence through continuing professional development (CPD).

Employers of registered engineering professionals have the assurance of knowing that their employees have had their competence independently assessed, their credentials verified, and their commitment to Continuing Professional Development (CPD) established. They will have gained the recognition of their peers as meeting the Netherlands standards for knowledge and experience. Maintaining registration requires continued membership of the Royal Netherlands Society of Engineers (KIVI), which ensures that registrants are exposed to new developments in their profession, and provides opportunities to benefit from these. Increasingly, evidence of employing registered engineering professionals is necessary to be eligible for certain contracts, particularly international contracts.

Professional registration provides employers, government and society both in the Netherlands and internationally, with the confidence that professionally registered engineers possess and maintain the knowledge, skills and commitment required to meet the engineering and technological needs of today, whilst also catering for the needs of future generations.

## Key elements: Competence and commitment

Two key principles of Chartership are competence and commitment. These are sustained and developed through reflective learning, peer review, mentoring and CPD. The Chartership structure creates a platform on both an individual and company level, that accomodates knowledge exchange and connectivity, career strategy and planning, and aligned contribution to company strategy.

## What is competence?

Competence is the ability to do something successfully or efficiently. Achieving the competence level for Chartership requires the right level of knowledge, understanding, skill, and a professional attitude. Competence is developed by a combination of formal and informal learning, training and work experience, generally known as Initial Professional Development (IPD). However, these elements are not necessarily separate or sequential and they may not always be formally structured.

There are five core areas of competence and commitment for all who acquire Chartered status, broadly covering:

A. Knowledge and understanding of engineering

B. Design, develop and create innovative products, systems, processes or services

C. Leadership, responsibility and management

D. Communication and interpersonal skills

E. Professional commitment

The following chapters in this document explain the threshold competence and commitment standards for professional registration as a Chartered Engineer or Incorporated Engineer, and include some examples of the kind of evidence that would help to demonstrate these. The list of examples is not intended to be exhaustive, there may be other examples and local equivalents. The standard also facilitates and streamlines Initial Professional Development (IPD), which helps to develop engineers skills more efficiently towards Chartership. This is supported through our Online Professional Development Tool (OPD Tool). Mentoring may also be a part of this stage.

## What is commitment?

Chartered Engineers and Incorporated Engineers not only demonstrate a commitment to their own professional development but they also demonstrate a personal and professional commitment to society, the engineering profession and the environment. They are required to show that they have adopted a set of values and behaviours that will maintain and enhance the reputation of the profession.

Specific evidence is required in the areas of:

- Undertaking engineering activities in a way that contributes to sustainable development and a circular economy.
- Carrying out CPD necessary to maintain and enhance competence.
- Managing and applying safe systems of work.
- Complying with behavioural code of KIVI.
- Actively participating within the profession.

Candidates applying for professional registration must be committed to maintain and enhance their competence. They will be required to show evidence that they have taken steps to ensure this, and that they intend to continue to do this in line with the CPD policy. This is an important part of recognition as a Chartered Engineer or an Incorporated Engineer, and it is important that anyone seeking Chartership recognises that this will entail obligations and an ongoing commitment.

## CPD: Continuing Professional Development

Continuing Professional Development (CPD) is the process of planning, tracking and documenting the skills, knowledge and experience that you gain both formally and informally as you work. CPD is used in the Chartership structure to maintain and enhance the five core professional competences. All Chartered Engineers have an obligation to undertake CPD, and to support the learning of others. This obligation underpins the value of the professional titles of Chartered Engineer and Incorporated Engineer, which ensures a high level of both competence and commitment. This in turn enables society as a whole to have confidence in the engineering profession. CPD undertaken in the stage before attaining Chartered Status may also be referred to as Initial Professional Development (IPD).

CPD has several purposes, which will vary in relation to the candidates circumstances, their needs and their career progression. Often candidates will do CPD to assure continuing competence and innovation at their current job. At other times, CPD may be done to enable a different role within or outside their organisation which may entail gaining technical knowledge in a new field, or may have more management content or not be a purely engineering role. Equally, CPD may help them follow a more long term career development plan, or to enhance their professionalism and creativity in a wider context than a specific job role. The focus of the candidate's learning may therefore be on different areas of competence at different times.

CPD may also take a variety of forms. On the one hand, it is informal learning through the challenges and opportunities of working life and interaction with others (e.g. colleagues, customers, suppliers) including professionals from other disciplines. However on the other hand, this is to be supplemented by structured activities such as courses, lectures, distance learning programmes, private study, attending workshops and seminars, preparation of papers and presentations, acquiring patents, mentoring, involvement in activities, or relevant volunteer work (this list is not intended to be exhaustive).

Individual candidates are best placed to determine their needs and how to meet them. Often, employers or experienced colleagues will play a significant part in this, but individuals should be responsible and proactive in seeking professional development opportunities.

Whatever its purpose or nature, learning through CPD should be reflective and should relate to specific objectives even if these are only to maintain their professional engineering competence. Having a regularly reviewed development plan will facilitate learning, although there will always be a place for unplanned activities. Candidates should record both their CPD activities and what they have learned or achieved through them, and relate this to any planned objectives. This reflection will help them to determine their future needs and plan accordingly, as part of a cyclical process. It will also encourage an outcome-based approach which is appropriate to professional learning.

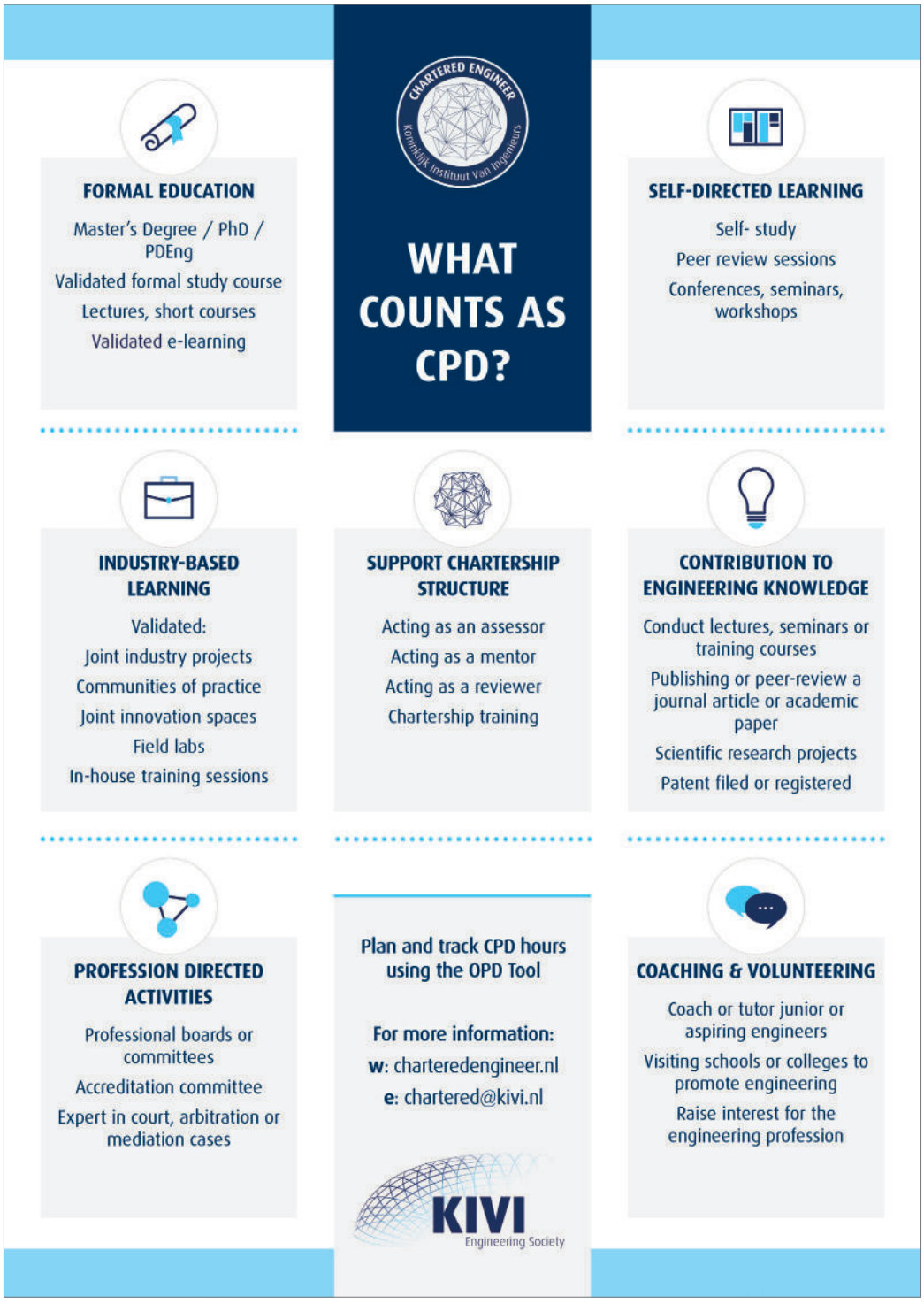
KIVI supports CPD of candidates and engineers who have already attained Chartership by providing an Online Professional Development Tool where CPD can easily be planned, recorded, analysed and maintained.

## CPD Policy

Chartered Engineers and Incorporated Engineers are required to maintain and enhance their competence through CPD. In particular they should:

1. Take ownership of their learning and development needs, and develop plans to indicate how they might meet these, in discussion with their employer, as appropriate.
2. Undertake a variety of development activities with respect to all five competency areas.
3. Record a minimum of 100 CPD hours over a two year period.
4. Reflect upon what they have learned or achieved through their CPD activities and record these reflections.
5. Evaluate their CPD activities against any objectives which they have set and record this evaluation.
6. Review their learning and development plans regularly following reflection and assessment of future needs.
7. Support the learning and development of others through activities such as mentoring and sharing professional expertise and knowledge.

# What Counts as CPD?



# Sectors and Disciplines

Engineers graduate in a particular discipline, but in their professional life the field in which they work becomes an important parameter as well. Therefore, in the Chartered Engineer structure both the original discipline and the work field, or 'sector', will be taken into account. These sectors cover several disciplines and industries. The sector defines the context and therefore the specific required knowledge of the professional engineer. Engineers from different disciplines in the same sector may share expertise and develop knowledge, leading to innovation and creativity. At the same time engineers from the same disciplines working in different sectors can also inspire each other and equally spark innovative crossover concepts and techniques. The Chartership structure for professional registration stimulates these interactions, both within the Netherlands and internationally.

The Chartership structure is divided into four main sectors. The choice for these sectors is based on domains relevant to industry. Each sector will form a platform for professionals engaged in all engineering activities, such as development, design, planning, testing, innovating, inventing, research, production, maintenance and management. The four sectors currently handled within the KIVI Chartership structure are:

**Infrastructure and building**

**Marine and offshore**

**High tech systems**

**Biotech**

The main disciplines in present day engineering in the Netherlands, are determined as follows:

- Aerospace engineering
- Agro engineering
- Applied Mathematics
- Applied Physics
- Artificial Intelligence engineering
- Automotive engineering
- Biotechnical engineering
- Building and Urbanism engineering
- Chemical and Process engineering
- Civil engineering
- Electrical and Electronics engineering
- Environmental engineering
- Geotechnical engineering
- Hydraulic engineering
- Industrial design engineering
- Industrial engineering and Manufacturing
- Information and Software engineering
- Marine engineering
- Materials science and engineering
- Mechanical engineering
- Medical engineering
- Power and Energy engineering
- Safety and Security engineering
- Structural engineering
- Systems engineering
- Transport engineering

## Table of Disciplines

The table below demonstrates the main disciplines in the Chartered Engineer structure distributed over the four work sectors; based on in which sector they play the most prominent role in present day engineering in the Netherlands.

| Infrastructure and Building | Marine and Offshore | High Tech Systems | Biotech |
|---|---|---|---|
| | | Aerospace | |
| | | | Agrocultural |
| Applied mathematics | Applied mathematics | Applied mathematics | Applied mathematics |
| Applied physics | Applied physics | Applied physics | Applied physics |
| Artificial Intelligence | | Artificial Intelligence | |
| | | Automotive | |
| | | | Biotechnical |
| Building and Urbanism | | | |
| | | Chemical and Process | Chemical and Process |
| Civil | Civil | | |
| Electrical and Electronics | | Electrical and Electronics | |
| Environmental | | Environmental | Environmental |
| Geotechnical | Geotechnical | | |
| | Hydraulic | | |
| | | Industrial design | Industrial design |
| Industrial and Manufacturing | Industrial and Manufacturing | Industrial and Manufacturing | Industrial and Manufacturing |
| Information and software | Information and software | Information and software | Information and software |
| | Marine | | |
| | | Materials science | Materials science |
| Mechanical | Mechanical | Mechanical | Mechanical |
| | | Medical | Medical |
| | | Power and Energy | Power and Energy |
| Safety and Security | Safety and Security | Safety and Security | Safety and Security |
| Structural | Structural | | |
| Systems | Systems | Systems | Systems |
| Transport | Transport | Transport | |

# Professional and Ethical Behaviour

## Statement of Ethical Principles of KIVI

Technology and science are strongly connected to our society. In their role as creators and managers of the technology, engineers carry a special responsibility for people, society and environment. As a guide, KIVI has composed a behavioural code for engineers to help them during their professional worktime. With this code, KIVI hopes to provide support and guidance for engineers who are working in the Netherlands.

## Code of Ethics:

As members of the Royal Netherlands Society of Engineers (KIVI), we are deeply aware of the influence that technology has on the quality of the society and the responsibility that it brings to the execution of our profession. Therefore, we will strive to a higher grade of professional and responsible behaviour while conducting our profession. On this note we will state the following:

1. We shall take in account how our technical decisions influence the health and safety of people and their surroundings. We will not hide any factors that influence the safety of society and the environment.
2. We shall alert stakeholders where real or perceived conflicts of interest may occur.
3. We shall contribute to clear communication in reference to technical products and technologies with regard to the application and possible negative effects.
4. We shall reject bribery and all forms of corrupt behaviour.
5. We shall base our conclusions, recommendation and deals on the most current and available information.
6. We shall maintain and enhance our technical competence. We are familiar with our own limitations and we shall make others aware of these limitations of our services.
7. We shall mention the resources that have contributed to our publications, reports, and all other components of our engineers work. We are open to feedback and recommendations of others.
8. We shall respect the cultural values and inhabitants of the countries we work in.
9. We shall promote a professional environment where everyone feels safe, and where diversity and inclusion in all its forms are embraced and where our differences are valued and respected.
10. We shall strive for a healthy development and practice of the engineering work in all its components through loyal and open co-operation.

A detailed version of the code of ethics can be found at:

www.kivi.nl/codeofethics

# The Application Process

## Formal Education requirements

The formal education requirements to qualify as a Chartered Engineer are an approved Master's degree in Engineering, Technology or Science, or a PDEng, or a PhD in Engineering, Technology, or Science. The formal education requirements to qualify as an Incorporated Engineer are an approved Bachelor's degree in Engineering, Technology or Science.

## Professional requirements

Professional registration is open to all engineers who have an acknowledged formal education degree and can demonstrate competence and commitment to perform professional work to the necessary standard. Anyone wishing to be registered must obtain membership of the Royal Netherlands Society of Engineers (KIVI).

Candidates need to have at least five years of work experience to qualify for Chartership. There is no prescribed maximum time period for the initial development of competence and commitment. Candidates must demonstrate all sub-competencies. Demonstration includes evidence of working in the required role in specific projects (project references) and demonstration of the competence to apply methodologies relevant to the specific engineering area.

How much time a candidate needs before they are ready to apply, depends on many factors, such as prior qualifications or experience, job roles and personal circumstances. To assist potential registrants, mentors, advisers and professional review assessors in deciding the most appropriate category of registration, a matrix comparing requirements for the two titles is provided in the Annex.

## Assessment

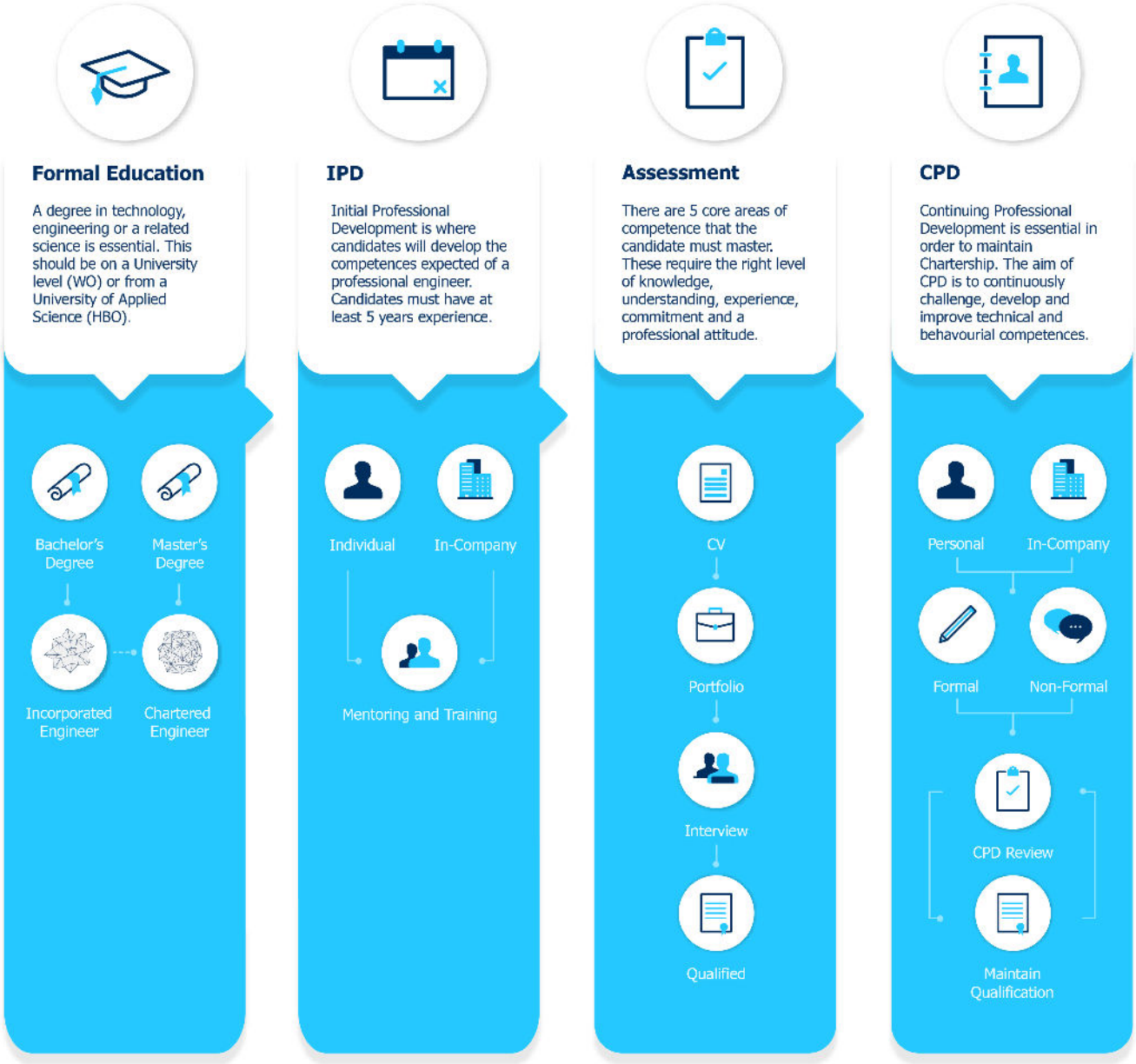
Candidates must firstly submit a comprehensive English CV for initial review. Once the candidate's extended CV is approved, the candidate must complete a portfolio covering all five core-competences and sub-competences. Relevant evidence must be submitted alongside this. The next stage is a Professional Review Interview (PRI) in which the candidate gives a 10 minute presentation. They will then be questioned on both their presentation, portfolio and workfield. The total duration of the PRI is 90 minutes.

If the candidate is successful, they will be added to the KIVI register and will have to maintain their Chartership status through CPD. The next page includes an overview of the requirements and application process of applying for Chartership.

## Career development and progression

Registration as CEng or IEng demonstrates valued recognition of an individual's engineering education, competence and commitment. Evidence of competence and commitment is the key requirement for Chartership, and normally there will be a need for additional education and training before an individual can be registered for a different title.

# An Overview:
# The Chartership Process



# Overview: The CEng Standard

## COMPETENCE A

Knowledge and understanding of engineering

**A1:** Extend your theoretical knowledge of new and advancing technology.

**A2:** Contribute to the development of the theory of engineering technology.

## COMPETENCE B

Design, develop and create innovative products, systems, processes or services

**B1:** Identify potential projects and opportunities.

**B2:** Conduct appropriate research, and undertake design and development of new and creative engineering solutions.

**B3:** Manage implementation of design solutions, and evaluate their effectiveness.

**B4:** Exercise sound judgement when stakes are conflicting or knowledge is incomplete.

## COMPETENCE C

Leadership, responsibility & management

**C1:** Plan for effective project implementation.

**C2:** Budget, organise, direct and control tasks, people and resources.

**C3:** Lead teams and develop staff to meet changing technical and managerial needs.

**C4:** Bring about continuous improvement through quality management.

**C5:** Be a leader within your work field and society.

## COMPETENCE D

Communication & interpersonal skills

**D1:** Identify all stakeholders and communicate with others at all levels.

**D2:** Present and discuss proposals.

**D3:** Demonstrate personal and social skills, including the ability to work in teams.

## COMPETENCE E

Professional commitment

**E1:** Demonstrate ethical behaviour and comply with relevant legal and regulatory requirements.

**E2:** Design, manage and apply safe systems of work.

**E3:** Undertake engineering activities in a way that contributes to sustainable development and a circular economy.

**E4:** Demonstrate your development strategy and how you plan to carry out and record CPD in order to maintain and enhance all competences A-E.

# The CEng Standard

**Chartered Engineers develop solutions to engineering problems using new or existing technologies, through innovation, creativity and/or they may have technical accountability for complex systems with significant levels of risk.**

**Chartered Engineers** are able to demonstrate:

- The theoretical knowledge to solve problems in new technologies and develop new analytical techniques.
- Successful application of the knowledge to deliver innovative products and services and/or take technical responsibility for complex engineering systems.
- Accountability for research and/or project, finance and personnel management and managing trade-offs between technical and socio-economic factors.
- Skill sets necessary to develop other technical staff or engineering students.
- Effective interpersonal skills in communicating technical matters.

## Table of Competence areas

The following pages contain the competence and commitment standard for a Chartered Engineer, this includes examples for each sub-competence. An example of the table layout can be found below:

| **The Competence and Commitment standard for a Chartered Engineer.** | **Examples** |
| --- | --- |
| Chartered Engineers must be competent throughout their working life, by virtue of their education, training and experience. | The examples given in this column are intended to help you identify activities you might quote to demonstrate the required competence and commitment for CEng registration.<br><br>These are not exhaustive. |

## A Use a combination of general and specialist engineering knowledge and understanding to optimise the theory of existing and emerging technology.

### A1 Extend your theoretical knowledge of new and advancing technology.

This could include an ability to:

- Extend own technological capability through formal and non-formal learning.
- Broaden and deepen own knowledge base through research and experimentation.
- Acquiring knowledge specific to the jurisdiction in which you practice.

Engage in formal post-graduate academic study.

Engage in non-formal learning at quality based seminars, masterclasses and other forms of training.

Learn and develop new engineering theories and techniques in the workplace.

Broaden your knowledge of engineering codes, standards and specifications.

### A2 Contribute to the development of the theory of engineering technology.

This could include an ability to:

- Contribute to theory through cross-disciplinary work.
- Documenting and sharing your knowledge so that other engineers can benefit from it.
- Develop a new theory backed by evidence to improve current practice.
- Develop knowledge specific to the jurisdiction in which you practice.

Further develop the implementation of unproven technologies and document this in a way that others can learn from it.

Give lectures, present on discipline related seminars or conferences. Give a masterclass, write or peer-review articles or academic papers.

File or obtain a patent.

## B Apply appropriate theoretical and practical methods to the analysis and solution of engineering challenges.

### B1 Identify potential projects and opportunities.

This could include an ability to:

- Consider and find use for new and emerging technologies.
- Use own knowledge of the employer's position to identify or assess the viability of opportunities.
- Explore the ground for projects on new or enhanced engineering products, systems, processes or services.

Involvement in the marketing of and tendering for new engineering products, processes or systems.

Persuade client to initiate a new project or to broaden the initial scope.

Use strategic thinking and insight on developments in your field to identify potential future needs of your company.

### B2 Conduct appropriate research, and undertake design and development of new and creative engineering solutions.

This could include an ability to:

- Identify and agree appropriate research methodologies.
- Collect, analyse and evaluate the relevant data prior to implementation.
- Develop the necessary tests.
- Undertake engineering design.
- Prepare, present and agree design recommendations, with appropriate analysis of risk, and taking account of cost, quality, safety, reliability, appearance, fitness for purpose, security, intellectual property (IP) constraints and opportunities, and environmental impact.

Carry out formal theoretical research or applied research on the job.

Evaluate numerical and analytical tools.

Lead/manage value engineering and whole life costing.

Lead design teams.

Draft specifications; develop and test options.

Produce concept designs.

Design or develop solutions, identifying the nature of the problem and uniqueness of the solution.

## B3 Manage implementation of design solutions, and evaluate their effectiveness.

This could include an ability to:

- Ensure that the application of the design results in the appropriate practical outcome.
- Implement design solutions, taking account of critical constraints, including due concern for safety and sustainability.
- Determine the criteria for evaluating the design solutions.
- Evaluate the outcome against the original specification.
- Actively learn from feedback on results to improve future design solutions and build best practice.

Follow the design process through into product or service realisation and its evaluation.

Prepare and present reports on the evaluation of the effectiveness of the designs, including risk, safety and life cycle considerations.

Analyse and interpret performance.

Determine critical success factors.

Manage product improvement.

Develop concept designs into detailed designs.

## B4 Exercise sound judgement when stakes are conflicting or knowledge is incomplete.

This could include an ability to:

- Recognise complexity and assess alternatives in light of competing requirements and incomplete knowledge.

Identify various options and make sound judgement on the engineering approach when data is limited, incomplete or inconclusive.

Ability to realise the essence of an unforeseen complex problem and making sound judgement on an engineering solution, even though not all parameters are known.

# C Demonstrate technical and managerial leadership.

## C1 Plan for effective project implementation.

This could include an ability to:

- Systematically review the factors affecting the project implementation including safety and sustainability considerations.
- Define a holistic and systematic approach to risk identification, assessment and management.
- Lead on preparing and agreeing implementation plans and method statements.
- Ensure that the necessary resources are secured and brief the project team.

Lead or manage project planning activities.

Carry out project risk assessments.

Collaborate with key stakeholders, and negotiate agreement to the plans.

Plan programmes and delivery of tasks; identify resources and costs.

Produce and implement procurement plans.

Negotiate the necessary contractual arrangements with other stakeholders (client, subcontractors, suppliers, etc).

## C2 Budget, organise, direct and control tasks, people and resources.

This could include an ability to:

- Set up appropriate management systems.
- Organise and lead work teams, coordinating project activities.
- Define quality standards, programme and budget within legal and statutory requirements.
- Ensure that variations from quality standards, programme and budgets are identified, and that corrective action is taken.
- Gather and evaluate feedback, and recommend improvements.

Take responsibility for and control project operations.

Manage the balance between quality, cost and time.

Manage risk register and contingency systems.

Manage project funding, payments and recovery.

Allocate and manage resources.

Satisfy legal and statutory obligations.

Lead or manage tasks within identified financial, commercial and regulatory constraints.

**C3** **Lead teams and develop staff to meet changing technical and managerial needs.**

This could include an ability to:

- Agree objectives and work plans with teams and individuals.
- Identify team and individual needs, and plan for their development.
- Reinforce team commitment to professional standards.
- Lead and support team and individual development.
- Assess team and individual performance, and provide feedback.

Carry out/contribute to staff appraisals.

Plan/contribute to the training and development of staff.

Gather evidence from colleagues of the management, assessment and feedback that you have provided.

Carry out/contribute to disciplinary procedures.

**C4** **Bring about continuous improvement through quality management.**

This could include an ability to:

- Develop and maintain operations to meet quality standards.
- Promote quality throughout the organisation and its customer and supplier networks.
- Direct project evaluation and propose recommendations for improvement.

Plan and implement best practice methods of continuous improvement, eg ISO 9000, EFQM, balanced scorecard.

Carry out quality audits.

Monitor, maintain and improve delivery.

Identify, implement and evaluate changes to meet quality objectives.

**C5** **Be a leader within your work field and society.**

This could include:

- Lead within your expertise or specialism.
- Set a standard that everyone uses.
- Act as a role model.
- Lead in your management role, act as a role model.

Carry out the role as a leader within your work field and area of expertise, as a manager and expert or on other areas of engineering.

Take the role as a leader to the outside world and act as a role model.

Lead by example.

# D Demonstrate effective interpersonal skills.

## D1 Identify all stakeholders and communicate with others at all levels.

This could include an ability to:

- Interact and communicate with collegues and professional network, as well as with possible stakeholders, on a variety of professional matters.
- Lead, chair, contribute to and record meetings and discussions.
- Prepare communications, documents and reports on complex matters.
- Engage with a non-technical audience, explain technical matters to them, and the ability to listen to and act upon their concerns and ideas.

Ability to engage with others from all organisational levels.

Engage or interact with professional networks.

Exchange information and provide advice to technical and non-technical colleagues.

Discuss with stakeholders and societal parties.

## D2 Present and discuss proposals.

This could include an ability to:

- Prepare and deliver presentations on strategic matters.
- Lead and sustain debates with audiences. Feed the results back to improve the proposals.
- Raise the awareness of risk, sustainability and professional ethics.

Give presentations and engage in debates.

Present records of discussions and their outcomes.

Present and discuss roadmaps.

**D3** **Demonstrate personal and social skills, including the ability to work in teams.**

This could include an ability to:

- Know and manage own emotions, strengths and weaknesses.
- Be aware of the needs and concerns of others, especially where related to diversity and equality.
- Be confident and flexible in dealing with new and changing interpersonal situations.
- Identify, agree and lead work towards collective goals.
- Create, maintain and enhance productive working relationships, and resolve conflicts.

Take responsibility for productive working relationships.

Evidence from colleagues of your personal and social skills.

Apply diversity and anti-discrimination norms and legislation.

Be sensitive and aware of cultural differences.

## E Demonstrate a personal commitment to professional standards, recognising obligations to the profession, the environment and society.

### E1 Demonstrate ethical behaviour and comply with relevant legal and regulatory requirements.

This includes an ability to:

- Have high professional standards in such a way that ethical actions and solutions are always leading, even in cases that are not (completely) covered by law or codes of conduct.
- Demonstrate understanding of societal concerns and how this is reflected in engineering solutions.
- Lead work within all relevant legislation and regulatory frameworks, including social and employment legislation.

Name examples of how you apply the code of ethics and what it means for your work.

Demonstrate initiative in and commitment to the affairs of your profession.

Work with a variety of conditions of contract.

Demonstrate your preference for ethical actions and solutions.

### E2 Manage and apply safe systems of work.

This could include an ability to:

- Ensure that systems satisfy health, safety and welfare requirements.
- Identify and take responsibility for own obligations for health, safety and welfare issues.
- Develop and implement appropriate hazard identification and risk management systems and culture.
- Manage, evaluate and improve these systems.
- Apply a sound knowledge of health and safety legislation.

Undertake formal health and safety training.

Work with health and safety legislation and best practice.

Carry out safety audits.

Identify and minimise hazards.

Assess and control risks.

Evaluate the costs and benefits of safe working.

Deliver strategic health and safety briefings and inductions.

Incorporate safety into your designs.

| | | |
|---|---|---|
| **E3** | **Undertake engineering activities in a way that contributes to sustainable development and a circular economy.**<br><br>This could include an ability to:<br><br>• Operate and act responsibly, taking account of the need to progress environmental, social and economic outcomes simultaneously.<br><br>• Use imagination, creativity and innovation to provide products and services which maintain and enhance the quality of the environment and community, and meet financial objectives.<br><br>• Understand and secure stakeholder involvement in sustainable development.<br><br>• Use resources efficiently and effectively. | Adopt sustainable practices. Achieve favourable social, economic and environmental outcomes.<br><br>Carry out environmental impact assessments.<br><br>Carry out environmental risk assessments.<br><br>Plan and implement best practice environmental management systems, eg ISO 14000.<br><br>Manage best practice risk management systems eg ISO 31000.<br><br>Work within environmental norms and legislation. |
| **E4** | **Demonstrate your development strategy and how you plan to carry out and record CPD in order to maintain and enhance all competences A-E.**<br><br>This includes an ability to:<br><br>• Identify your aims and goals for professional development and translate them into actionable results.<br><br>• Have insight on developments in your field and translate that to your future development needs.<br><br>• Continuously challenge, develop and improve your own technical and behavioural competences.<br><br>• Practice reflective learning, mentoring and peer review. | Formal education<br><br>Self-directed learning<br><br>Contribution to engineering knowledge<br><br>Support of Chartership Structure<br><br>Profession directed activities<br><br>Industry-based learning<br><br>Coaching and volunteering<br><br>Use of the OPD Tool |

# Overview: The IEng Standard

## COMPETENCE A

Knowledge and understanding of engineering

**A1:** Extend your theoretical knowledge of the application of engineering technology.

**A2:** Contribute to the continuous improvement of applied engineering technology.

## COMPETENCE B

Design, develop and create innovative products, systems, processes or services

**B1:** Identify, review and select techniques, procedures and methods to undertake engineering tasks.

**B2:** Contribute to the design and development of engineering solutions.

**B3:** Implement design solutions and contribute to their evaluation.

**B4:** Exercise sound judgement in the course of implementing solutions.

## COMPETENCE C

Leadership, responsibility & management

**C1:** Plan for effective project implementation.

**C2:** Manage tasks, people and resources to plan and budget.

**C3:** Manage teams and develop staff to meet changing technical and managerial needs.

**C4:** Manage continuous quality improvement.

**C5:** Contribute to the engineering world and society as a role model.

## COMPETENCE D

Communication & interpersonal skills

**D1:** Identify all stakeholders and communicate with others at all levels.

**D2:** Present and discuss proposals.

**D3:** Demonstrate personal and social skills, including the ability to work in teams.

## COMPETENCE E

Professional commitment

**E1:** Demonstrate ethical behaviour and comply with relevant legal and regulatory requirements.

**E2:** Manage and apply safe systems of work.

**E3:** Undertake engineering activities in a way that contributes to sustainable development and a circular economy.

**E4:** Demonstrate your development strategy and how you plan to carry out and record CPD in order to maintain and enhance all competences A-E.

# The IEng Standard

**Incorporated Engineers maintain and manage applications of current and developing technology, and may undertake engineering design, development, manufacture, construction and operation.**

**Incorporated Engineers** are able to demonstrate:

- The theoretical knowledge to solve problems in developed technologies using well proven analytical techniques
- Successful application of their knowledge to deliver engineering projects or services using established technologies and methods
- Responsibility for project and financial planning and management together with some responsibility for leading and developing other professional staff
- Effective interpersonal skills in communicating technical matters
- Commitment to professional engineering values.

## Table of Competence areas

The following pages contain the competence and commitment standard for an Incorporated Engineer, this includes examples for each sub-competence. An example of the table layout can be found below:

| | |
|---|---|
| **The Competence and Commitment standard for the Incorporated Engineer.**<br><br>Incorporated Engineers must be competent throughout their working life, by virtue of their education, training and experience. | The examples given in the column below are intended to help you identify activities you might quote to demonstrate the required competence and commitment for IEng registration.<br><br>These are not exhaustive. |

## A Use a combination of general and specialist engineering knowledge and understanding to optimise the application of existing and emerging technology.

### A1 Extend your theoretical knowledge of the application of engineering technology.

This could include an ability to:

- Identify the limits of own personal knowledge and skills.
- Strive to extend own technological capability.
- Broaden and deepen own knowledge base through new applications and techniques.

Engage in formal learning.

Learn new engineering theories and techniques in the workplace, at seminars, etc.

Broaden your knowledge of engineering codes, standards and specifications.

### A2 Contribute to the continuous improvement of applied engineering technology.

This could include an ability to:

- Documenting and sharing your knowledge so that other engineers can benefit from it.
- Use market intelligence and knowledge of technological developments to promote and improve the effectiveness of engineering products, systems or services.
- Contribute to the evaluation and development of systems.

Manage or contribute to market research, and product and process research and development, and document this in a way that others can learn from it.

Apply root cause analysis and publish it within the organisation and/or to the public.

Conduct statistically sound appraisal of data and publish it within the organisation and/or to the public.

## B Apply appropriate theoretical and practical methods to design, develop, manufacture, construct, commission, operate, maintain, decommission and re-cycle engineering processes, systems, services and products.

### B1 Identify, review and select techniques, procedures and methods to undertake engineering tasks.

This could include an ability to:

- Establish users requirements for improvement.
- Select a review methodology.
- Fully exploit and implement current technology.
- Review the potential for enhancing engineering practices, products, processes, systems and services, using evidence from best practice.
- Establish an action plan to implement the results of the review.

Contribute to the marketing of and tendering for new engineering products, processes and systems.

Contribute to the specification and procurement of new engineering products, processes and systems.

Develop decommissioning processes. Set targets, and draft programmes and action plans.

### B2 Contribute to the design and development of engineering solutions.

This could include an ability to:

- Contribute to the identification and specification of design and development requirements for engineering products, processes, systems and services.
- Identify operational risks and evaluate possible engineering solutions, taking account of cost, quality, safety, reliability, appearance, fitness for purpose, security, intellectual property (IP) constraints and opportunities, and environmental impact.
- Collect and analyse results.
- Carry out necessary tests.

Contribute to theoretical and applied research.

Manage/contribute to value engineering and whole life costing.

Work in design teams.

Draft specifications.

Find and evaluate information from a variety of sources, including online.

Develop and test options.

Identify resources and costs of options.

Produce detailed designs.

Be aware of IP constraints and opportunities.

**B3** **Implement design solutions and contribute to their evaluation.**

This could include an ability to:

- Secure the resources required for implementation.
- Implement design solutions, taking account of critical constraints, including due concern for safety and sustainability.
- Identify problems during implementation and take corrective action.
- Contribute to recommendations for improvement and actively learn from feedback on results.

Follow the design process through into product manufacture.

Operate and maintain processes, systems etc.

Contribute to reports on the evaluation of the effectiveness of the designs, including risk, safety and life cycle considerations.

Contribute to product improvement.

Interpret and analyse performance.

Contribute to determining critical success factors.

**B4** **Exercise sound judgement in the course of implementing solutions.**

This could include an ability to:

- Recognise complexity and assess alternatives in light of competing requirements and incomplete knowledge.

Identify various options and make sound judgement on the engineering approach when data is limited, incomplete or inconclusive.

Ability to realise the essence of an unforeseen complex problem and making sound judgement on an engineering solution, even though not all parameters are known.

## C Demonstrate technical and commercial management.

### C1 Plan for effective project implementation.

This could include an ability to:

- Identify factors affecting the project implementation.
- Carry out holistic and systematic risk identification, assessment and management.
- Prepare and agree implementation plans and method statements.
- Secure the necessary resources and confirm roles in project team.

Manage or contribute to project planning activities.

Contribute to project risk assessments.

Collaborate with key stakeholders.

Plan programmes and delivery of tasks; identify resources and costs.

Apply the necessary contractual arrangements with other stakeholders (client, subcontractors, suppliers, etc).

Produce and implement procurement plans.

### C2 Manage tasks, people and resources to plan and budget.

This could include an ability to:

- Operate appropriate management systems.
- Manage work teams, coordinating project activities.
- Work to the agreed quality standards, programme and budget, within legal and statutory requirements.
- Identify variations from quality standards, programme and budgets, and take corrective action.
- Evaluate performance and recommend improvements.

Manage/contribute to project operations.

Manage the balance between quality, cost and time.

Manage contingency processes.

Contribute to the management of project funding, payments and recovery.

Satisfy legal and statutory obligations.

Manage tasks within identified financial, commercial and regulatory constraints.

**C3** **Manage teams and develop staff to meet changing technical and managerial needs.**

- This could include an ability to:
- Agree objectives and work plans with teams and individuals.
- Identify team and individual needs, and plan for their development.
- Reinforce team commitment to professional standards.
- Manage and support team and individual development.
- Assess team and individual performance, and provide feedback.

Carry out/contribute to staff appraisals.

Plan/contribute to the training and development of staff.

Gather evidence from colleagues of the management, assessment and feedback that you have provided.

Carry out/contribute to disciplinary procedures.

**C4** **Manage continuous quality improvement.**

This could include an ability to:

- Ensure the application of quality management principles by team members and colleagues.
- Manage operations to maintain quality standards.
- Evaluate projects and make recommendations for improvement.

Promote quality.

Manage / contribute to best practice methods of continuous improvement, eg ISO 9000, EFQM, balanced scorecard.

Carry out/contribute to quality audits.

Monitor, maintain and improve delivery.

Identify, implement and evaluate changes to meet quality objectives.

**C5** **Contribute to the engineering world and society as a role model.**

This could include:

- Be a role model within your expert or specialist role.
- Be a role model within your management role.

Contribute to and carry out the role as a role model within your work field and area of expertise, as a manager and expert or on other areas of engineering and the society.

# D Demonstrate effective interpersonal skills.

## D1 Identify all stakeholders and communicate with others at all levels.

This could include an ability to:

- Interact and communicate with collegues and professional network, as well as with possible stakeholders, on a variety of professional matters.
- Contribute to, chair and record meetings and discussions.
- Prepare communications, documents and reports on technical matters.
- Engage with a non-technical audience, explain technical matters to them, and the ability to listen to and act upon their concerns and ideas.

Engage or interact with professional networks.

Ability to engage with others from all organisational levels.

Exchange information and provide advice to technical and non-technical colleagues.

Discuss with stakeholders and societal parties.

## D2 Present and discuss proposals.

This could include an ability to:

- Prepare and deliver appropriate presentations.
- Manage debates with audiences.
- Feed the results back to improve the proposals.
- Contribute to the awareness of risk, sustainability and professional ethics.

Give presentations, present records of discussions and their outcomes.

**D3** **Demonstrate personal and social skills, including the ability to work in teams.**

This could include an ability to:

- Know and manage own emotions, strengths and weaknesses.
- Be aware of the needs and concerns of others, especially where related to diversity and equality.
- Be confident and flexible in dealing with new and changing interpersonal situations.
- Identify, agree and work towards collective goals.
- Create, maintain and enhance productive working relationships, and resolve conflicts.

Take responsibility for productive working relationships.

Evidence from colleagues of your personal and social skills.

Apply diversity and anti-discrimination norms and legislation.

Be sensitive and aware of cultural differences.

## E Demonstrate a personal commitment to professional standards, recognising obligations to the profession the environment and society.

### E1 Demonstrate ethical behaviour and comply with relevant legal and regulatory requirements.

This includes an ability to:

- Have high professional standards in such a way that ethical actions and solutions are always leading, even in cases that are not (completely) covered by law or codes of conduct.
- Demonstrate understanding of societal concerns and how this is reflected in engineering solutions.
- Manage work within all relevant legislation and regulatory frameworks, including social and employment legislation.

Name examples of how you apply the code of ethics and what it means for your work.

Contribute to the affairs of your profession.

Work with a variety of conditions of contract.

Demonstrate your preference for ethical actions and solutions.

### E2 Manage and apply safe systems of work.

This could include an ability to:

- Manage systems that satisfy health, safety and welfare requirements.
- Identify and take responsibility for own obligations for health, safety and welfare issues.
- Develop and implement appropriate hazard identification and risk management systems and culture.
- Manage, evaluate and improve these systems.
- Apply a sound knowledge of health and safety legislation.

Undertake formal health and safety training.

Work with health and safety legislation and best practice.

Carry out safety audits.

Identify and minimise hazards.

Assess and control risks.

Deliver health and safety briefings and inductions.

Incorporate safety into your designs.

**E3** **Undertake engineering activities in a way that contributes to sustainable development and a circular economy.**

This could include an ability to:

- Operate and act responsibly, taking account of the need to progress environmental, social and economic outcomes simultaneously.
- Provide products and services which maintain and enhance the quality of the environment and community, and meet financial objectives.
- Understand and encourage stakeholder involvement in sustainable development.
- Use resources efficiently and effectively.

Carry out/contribute to environmental impact assessments.

Carry out/contribute to environmental risk assessments.

Manage best practice environmental management systems, eg ISO 14000.

Manage best practice risk management systems eg ISO 31000.

Work within environmental norms and legislation.

Adopt sustainable practices.

Contribute to favourable social, economic and environmental outcomes.

**E4** **Demonstrate your development strategy and how you plan to carry out and record CPD in order to maintain and enhance all competences A-E.**

This includes an ability to:

- Identify your aims and goals for professional development and translate them into actionable results.
- Have insight on developments in your field and translate that to your future development needs.
- Continuously challenge, develop and improve technical and behavioural competences.
- Practice reflective learning, mentoring and peer review.

Formal education

Self-directed learning

Contribution to engineering knowledge

Support of Chartership Structure

Profession directed activities

Industry-based learning

Coaching and volunteering

Use of the OPD Tool

# Glossary

| | |
|---|---|
| **Chartered Engineer (CEng)** | One of the professional titles available to individuals who meet the required standard of competence and commitment. |
| **Competence** | The ability to carry out a task to an effective standard. Its achievement requires the right level of knowledge, understanding and skill, as well as a professional attitude. It is part of the requirement (along with commitment) that must be demonstrated in order for an individual to be admitted to KIVI register at the relevant level. |
| **Continuing Professional Development (CPD)** | The systematic acquisition of knowledge and skills, and the development of personal qualities, to maintain and enhance professional competence. All CEng and IEng have an obligation to undertake CPD, and to support the learning of others. |
| **Engineering Council UK** | The UK regulatory body for the engineering profession that sets and maintains internationally recognised standards of professional competence and ethics for the UK, and holds the UK register of professional engineers and technicians.<br><br>www.engc.org.uk |
| **Fellowship Status** | Fellowship Status is a special distinction status within Chartership and provides recognition of the excellency and expertise of a senior engineer. |
| **Incorporated Engineer (IEng)** | One of the professional titles available to individuals who meet the required standard of competence and commitment. |
| **Initial Professional Development (IPD)** | The development period needed to become on level to apply for Chartered or Incorporated Engineers. This is the preparation period before undergoing the professional review. |

| | |
|---|---|
| **KIVI** | Koninklijk Instituut van Ingenieurs, The Royal Netherlands Society of Engineers, for Engineers of University and University of Applied Sciences level. Holds the Dutch Register for Chartered Engineers and Incorporated Engineers. www.kivi.nl |
| **NL-SPEC:**<br>**The NL Standard for Professional Engineering Competence** | The NL standard which sets out the competence and commitment requirements for registration as a Chartered Engineer or Incorporated Engineer. |
| **Online Professional Development Tool (OPD Tool)** | The online tool where all stages of Chartership can be processed and tracked, including the application portfolio and CPD hours. |
| **Professional Development** | The process by which an individual gains professional competence. It may take place through formal and informal learning, and workplace training and experience. |
| **Professional Registration** | The process whereby an individual is admitted to the KIVI's Register as a Chartered Engineer or an Incorporated Engineer. Admission is based on the individual demonstrating, via a peer review process, that he/she has met the profession's standards of commitment and competence. Award of the CEng or IEng title permits the use of the relevant post-nominal. |
| **Professional Review** | A peer assessment process to decide whether an individual has met the requirements for registration. It is a holistic assessment of the applicant's competence and commitment against the relevant sections of NL-SPEC. For candidates seeking CEng or IEng registration, this will include a professional review interview. |
| **UK-SPEC:**<br>**The UK Standard for Professional Engineering Competence** | The UK standard which sets out the competence and commitment requirements for registration with the Engineering Council as a Chartered Engineer, Incorporated Engineer or Engineering Technician. www.engc.org.uk/ukspec |

# Annex: Comparison of CEng and IEng

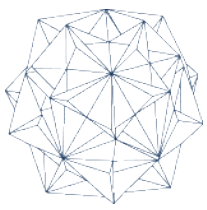
## Chartered Engineer

**Chartered Engineers develop solutions to engineering problems using new or existing technologies, through innovation, creativity and/or they may have technical accountability for complex systems with significant levels of risk.**

**They are Master's level or above.**

**Chartered Engineers** are able to demonstrate:

- The theoretical knowledge to solve problems in new technologies and develop new analytical techniques.
- Successful application of the knowledge to deliver innovative products and services and/or take technical responsibility for complex engineering systems.
- Accountability for research and/or project, finance and personnel management and managing trade-offs between technical and socio-economic factors.
- Skill sets necessary to develop other technical staff or engineering students.
- Effective interpersonal skills in communicating technical matters.



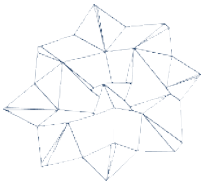
## Incorporated Engineer

**Incorporated Engineers maintain and manage applications of current and developing technology, and may undertake engineering design, development, manufacture, construction and operation.**

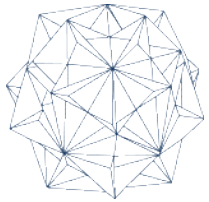
**They are Bachelor's level or above.**

**Incorporated Engineers** are able to demonstrate:

- The theoretical knowledge to solve problems in developed technologies using well proven analytical techniques.
- Successful application of their knowledge to deliver engineering projects or services using established technologies and methods.
- Responsibility for project and financial planning and management together with some responsibility for leading and developing other professional staff.
- Effective interpersonal skills in communicating technical matters.
- Commitment to professional engineering values.

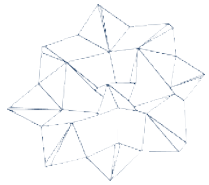


# A Knowledge and understanding of Engineering



## Chartered Engineer

| | Description | Examples |
|---|---|---|
| A | **Use a combination of general and specialist engineering knowledge and understanding to optimise the theory of existing and emerging technology.** | |
| A1 | **Extend your theoretical knowledge of new and advancing technology.**<br><br>This could include an ability to:<br>• Extend own technological capability through formal and non-formal learning.<br>• Broaden and deepen own knowledge base through research and experimentation.<br>• Acquiring the knowledge specific to the jurisdiction in which you practice. | Engage in formal post-graduate academic study.<br><br>Engage in non-formal learning at quality based seminars, masterclasses and other forms of training.<br><br>Learn and develop new engineering theories and techniques in the workplace.<br><br>Broaden your knowledge of engineering codes, standards and specifications. |

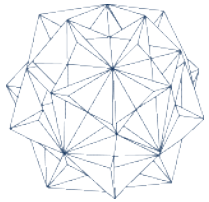


## Incorporated Engineer

| | Description | Examples |
|---|---|---|
| | **Use a combination of general and specialist engineering knowledge and understanding to apply existing and emerging technology.** | |
| | **Extend your theoretical knowledge of the application of engineering technology.**<br><br>This could include an ability to:<br>• Identify the limits of own personal knowledge and skills.<br>• Strive to extend own technological capability.<br>• Broaden and deepen own knowledge base through new applications and techniques. | Engage in formal learning.<br><br>Learn new engineering theories and techniques in the workplace, at seminars, etc.<br><br>Broaden your knowledge of engineering codes, standards and specifications |

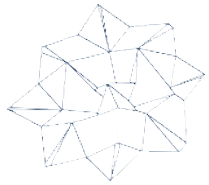
| | | | | |
|---|---|---|---|---|
| **A2** | **Contribute to the development of the theory of engineering technology.**<br><br>This could include an ability to:<br><br>• Contribute to theory through cross-disciplinary work.<br><br>• Documenting and sharing your knowledge so that other engineers can benefit from it.<br><br>• Develop a new theory backed by evidence to improve current practice.<br><br>• Develop knowledge specific to the jurisdiction in which you practice. | Further develop the implementation of unproven technologies and document this in a way that others can learn from it.<br><br>Give lectures, present on discipline related seminars or conferences. Give a masterclass, write or peer-review articles or academic papers.<br><br>File or obtain a patent. | **Contribute to the continuous improvement of applied engineering technology.**<br><br>This could include an ability to:<br><br>• Documenting and sharing your knowledge so that other engineers can benefit from it.<br><br>• Use market intelligence and knowledge of technological developments to promote and improve the effectiveness of engineering products, systems or services.<br><br>• Contribute to the evaluation and development of systems. | Manage or contribute to market research, and product and process research and development, and document this in a way that others can learn from it.<br><br>Apply root cause analysis and publish it within the organisation and/or to the public.<br><br>Conduct statistically sound appraisal of data and publish it within the organisation and/or to the public. |

# B Design, develop and create innovative products, systems, processes or services



## Chartered Engineer

| | Description | Examples |
|---|---|---|
| B | **Apply appropriate theoretical and practical methods to the analysis and solution of engineering problems.** | |
| B1 | **Identify potential projects and opportunities.**<br><br>This could include an ability to:<br>• Consider and find use for new and emerging technologies.<br>• Use own knowledge of the employer's position to identify or assess the viability of opportunities.<br>• Explore the ground for projects on new or enhanced engineering products, systems, processes or services. | Involvement in the marketing of and tendering for new engineering products, processes or systems.<br><br>Persuade client to initiate a new project or to broaden the initial scope.<br><br>Use strategic thinking and insight on developments in your field to identify potential future needs of your company. |



## Incorporated Engineer

| | Description | Examples |
|---|---|---|
| | **Apply appropriate theoretical and practical methods to design, develop, manufacture, construct, commission, operate, maintain, decommission and re-cycle engineering processes, systems, services and products.** | |
| | **Identify, review and select techniques, procedures and methods to undertake engineering tasks.**<br><br>This could include an ability to:<br>• Establish users requirements for improvement.<br>• Select a review methodology.<br>• Fully exploit and implement current technology.<br>• Review the potential for enhancing engineering practices, products, processes, systems and services, using evidence from best practice.<br>• Establish an action plan to implement the results of the review. | Contribute to the marketing of and tendering for new engineering products, processes and systems.<br><br>Contribute to the specification and procurement of new engineering products, processes and systems.<br><br>Develop decommissioning processes.<br><br>Set targets, and draft programmes and action plans. |

## B2

**Conduct appropriate research, and undertake design and development of new and creative engineering solutions.**

This could include an ability to:

- Identify and agree appropriate research methodologies.
- Collect, analyse and evaluate the relevant data prior to implementation.
- Develop the necessary tests.
- Undertake engineering design.
- Prepare, present and agree design recommendations, with appropriate analysis of risk, and taking account of cost, quality, safety, reliability, appearance, fitness for purpose, security, intellectual property (IP) constraints and opportunities, and environmental impact.

Carry out formal theoretical research or applied research on the job.

Evaluate numerical and analytical tools.

Lead/manage value engineering and whole life costing.

Lead design teams.

Draft specifications; develop and test options.

Produce concept designs.

Design or develop solutions, identifying the nature of the problem and uniqueness of the solution.

**Contribute to the design and development of engineering solutions.**

This could include an ability to:

- Contribute to the identification and specification of design and development requirements for engineering products, processes, systems and services.
- Identify operational risks and evaluate possible engineering solutions, taking account of cost, quality, safety, reliability, appearance, fitness for purpose, security, intellectual property (IP) constraints and opportunities, and environmental impact.
- Collect and analyse results. Carry out necessary tests.

Contribute to theoretical and applied research.

Manage/contribute to value engineering and whole life costing.

Work in design teams.

Draft specifications.

Find and evaluate information from a variety of sources, including online.

Develop and test options.

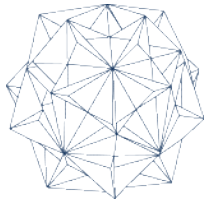
Identify resources and costs of options.

Produce detailed designs.

Be aware of IP constraints and opportunities.

| | | | | |
|---|---|---|---|---|
| **B3** | **Manage implementation of design solutions, and evaluate their effectiveness.**<br><br>This could include an ability to:<br>• Ensure that the application of the design results in the appropriate practical outcome.<br>• Implement design solutions, taking account of critical constraints, including due concern for safety and sustainability.<br>• Determine the criteria for evaluating the design solutions.<br>• Evaluate the outcome against the original specification.<br>• Actively learn from feedback on results to improve future design solutions and build best practice. | Follow the design process through into product or service realisation and its evaluation.<br><br>Prepare and present reports on the evaluation of the effectiveness of the designs, including risk, safety and life cycle considerations.<br><br>Analyse and interpret performance.<br><br>Determine critical success factors.<br><br>Manage product improvement.<br><br>Develop concept designs into detailed designs. | **Implement design solutions and contribute to their evaluation.**<br><br>This could include an ability to:<br>• Secure the resources required for implementation.<br>• Implement design solutions, taking account of critical constraints, including due concern for safety and sustainability.<br>• Identify problems during implementation and take corrective action.<br>• Contribute to recommendations for improvement and actively learn from feedback on results | Follow the design process through into product manufacture.<br><br>Operate and maintain processes, systems etc.<br><br>Contribute to reports on the evaluation of the effectiveness of the designs, including risk, safety and life cycle considerations.<br><br>Contribute to product improvement.<br><br>Interpret and analyse performance.<br><br>Contribute to determining critical success factors. |
| **B4** | **Exercise sound judgement when stakes are conflicting or knowledge is incomplete.**<br><br>This could include an ability to:<br>• Recognise complexity and assess alternatives in light of competing requirements and incomplete knowledge. | Identify various options and make sound judgement on the engineering approach when data is limited, incomplete or inconclusive.<br><br>Ability to realise the essence of an unforeseen complex problem and making sound judgement on an engineering solution, even though not all parameters are known. | **Exercise sound judgement in the course of implementing solutions.**<br><br>This could include an ability to:<br>• Recognise complexity and assess alternatives in light of competing requirements and incomplete knowledge. | Identify various options and make sound judgement on the engineering approach when data is limited, incomplete or inconclusive.<br><br>Ability to realise the essence of an unforeseen complex problem and making sound judgement on an engineering solution, even though not all parameters are known. |

# C Leadership, responsibility and management



## Chartered Engineer

| | Description | Examples |
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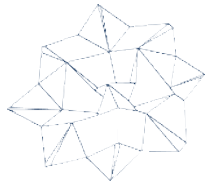
| C | **Demonstrate technical and managerial leadership.** | |
| C1 | **Plan for effective project implementation.**<br><br>This could include an ability to:<br>• Systematically review the factors affecting the project implementation including safety and sustainability considerations.<br>• Define a holistic and systematic approach to risk identification, assessment and management.<br>• Lead on preparing and agreeing implementation plans and method statements.<br>• Ensure that the necessary resources are secured and brief the project team. | Lead or manage project planning activities.<br><br>Carry out project risk assessments.<br><br>Collaborate with key stakeholders, and negotiate agreement to the plans.<br><br>Plan programmes and delivery of tasks; identify resources and costs.<br><br>Produce and implement procurement plans.<br><br>Negotiate the necessary contractual arrangements with other stakeholders (client, subcontractors, suppliers, etc). |



## Incorporated Engineer

| | Description | Examples |
|---|---|---|
| | **Demonstrate technical and commercial management.** | |
| | **Plan for effective project implementation.**<br><br>This could include an ability to:<br>• Identify factors affecting the project implementation.<br>• Carry out holistic and systematic risk identification, assessment and management.<br>• Prepare and agree implementation plans and method statements.<br>• Secure the necessary resources and confirm roles in project team. | Manage or contribute to project planning activities.<br><br>Contribute to project risk assessments.<br><br>Collaborate with key stakeholders.<br><br>Plan programmes and delivery of tasks; identify resources and costs.<br><br>Apply the necessary contractual arrangements with other stakeholders (client, subcontractors, suppliers, etc).<br><br>Produce and implement procurement plans. |

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| **C2** | **Budget, organise, direct and control tasks, people and resources.**<br><br>This could include an ability to:<br>• Set up appropriate management systems.<br>• Organise and lead work teams, coordinating project activities.<br>• Define quality standards, programme and budget within legal and statutory requirements.<br>• Ensure that variations from quality standards, programme and budgets are identified, and that corrective action is taken.<br>• Gather and evaluate feedback, and recommend improvements. | Take responsibility for and control project operations.<br><br>Manage the balance between quality, cost and time.<br><br>Manage risk register and contingency systems.<br><br>Manage project funding, payments and recovery.<br><br>Allocate and manage resources.<br><br>Satisfy legal and statutory obligations.<br><br>Lead or manage tasks within identified financial, commercial and regulatory constraints. | **Manage tasks, people and resources to plan and budget.**<br><br>This could include an ability to:<br>• Operate appropriate management systems.<br>• Manage work teams, coordinating project activities.<br>• Work to the agreed quality standards, programme and budget, within legal and statutory requirements.<br>• Identify variations from quality standards, programme and budgets, and take corrective action.<br>• Evaluate performance and recommend improvements. | Manage/contribute to project operations.<br><br>Manage the balance between quality, cost and time.<br><br>Manage contingency processes.<br><br>Contribute to the management of project funding, payments and recovery.<br><br>Satisfy legal and statutory obligations.<br><br>Manage tasks within identified financial, commercial and regulatory constraints. |
| **C3** | **Lead teams and develop staff to meet changing technical and managerial needs.**<br><br>This could include an ability to:<br>• Agree objectives and work plans with teams and individuals.<br>• Identify team and individual needs, and plan for their development.<br>• Reinforce team commitment to professional standards.<br>• Lead and support team and individual development.<br>• Assess team and individual performance, and provide feedback. | Carry out/contribute to staff appraisals.<br><br>Plan/contribute to the training and development of staff.<br><br>Gather evidence from colleagues of the management, assessment and feedback that you have provided.<br><br>Carry out/contribute to disciplinary procedures. | **Manage teams and develop staff to meet changing technical and managerial needs.**<br><br>This could include an ability to:<br>• Agree objectives and work plans with teams and individuals.<br>• Identify team and individual needs, and plan for their development.<br>• Reinforce team commitment to professional standards.<br>• Manage and support team and individual development.<br>• Assess team and individual performance, and provide feedback. | Carry out/contribute to staff appraisals.<br><br>Plan/contribute to the training and development of staff.<br><br>Gather evidence from colleagues of the management, assessment and feedback that you have provided.<br><br>Carry out/contribute to disciplinary procedures. |

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| **C4** | **Bring about continuous improvement through quality management.**<br><br>This could include an ability to:<br>• Develop and maintain operations to meet quality standards.<br>• Promote quality throughout the organisation and its customer and supplier networks.<br>• Direct project evaluation and propose recommendations for improvement. | Plan and implement best practice methods of continuous improvement, eg ISO 9000, EFQM, balanced scorecard.<br><br>Carry out quality audits.<br><br>Monitor, maintain and improve delivery.<br><br>Identify, implement and evaluate changes to meet quality objectives. | **Manage continuous quality improvement.**<br><br>This could include an ability to:<br>• Ensure the application of quality management principles by team members and colleagues.<br>• Manage operations to maintain quality standards.<br>• Evaluate projects and make recommendations for improvement. | Promote quality. Manage / contribute to best practice methods of continuous improvement, eg ISO 9000, EFQM, balanced scorecard.<br><br>Carry out/contribute to quality audits.<br><br>Monitor, maintain and improve delivery.<br><br>Identify, implement and evaluate changes to meet quality objectives. |
| **C5** | **Be a leader within your work field and society.**<br><br>This could include:<br>• Lead within your expertise or specialism.<br>• Set a standard that everyone uses.<br>• Act as a role model.<br>• Lead in your management role, act as a role model. | Carry out the role as a leader within your work field and area of expertise, as a manager and expert or on other areas of engineering.<br><br>Take the role as a leader to the outside world and act as a role model.<br><br>Lead by example. | **Contribute to the engineering world and society as a role model.**<br><br>This could include:<br>• Be a role model within your expert or specialist role.<br>• Be a role model within your management role. | Contribute to and carry out the role as a role model within your work field and area of expertise, as a manager and expert or on other areas of engineering and the society. |

# D Communication and interpersonal skills

## Chartered Engineer

| | Description | Examples |
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| D | **Demonstrate effective interpersonal skills.** | |
| D1 | **Identify all stakeholders and communicate with others at all levels.**<br><br>This could include an ability to:<br>• Interact and communicate with collegues and professional network, as well as with possible stakeholders, on a variety of professional matters.<br>• Lead, chair, contribute to and record meetings and discussions.<br>• Prepare communications, documents and reports on complex matters.<br>• Engage with a non-technical audience, explain technical matters to them, and the ability to listen to and act upon their concerns and ideas. | Ability to engage with others from all organisational levels.<br><br>Engage or interact with professional networks.<br><br>Exchange information and provide advice to technical and non-technical colleagues.<br><br>Discuss with stakeholders and societal parties. |

## Incorporated Engineer

| | Description | Examples |
|---|---|---|
| D | **Demonstrate effective interpersonal skills.** | |
| D1 | **Identify all stakeholders and communicate with others at all levels.**<br><br>This could include an ability to:<br>• Interact and communicate with collegues and professional network, as well as with possible stakeholders, on a variety of professional matters.<br>• Contribute to, chair and record meetings and discussions.<br>• Prepare communications, documents and reports on technical matters.<br>• Engage with a non-technical audience, explain technical matters to them, and the ability to listen to and act upon their concerns and ideas. | Engage or interact with professional networks.<br><br>Ability to engage with others from all organisational levels.<br><br>Exchange information and provide advice to technical and non-technical colleagues.<br><br>Discuss with stakeholders and societal parties. |

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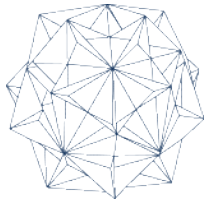
| **D2** | **Present and discuss proposals.**<br><br>This could include an ability to:<br><br>• Prepare and deliver presentations on strategic matters.<br><br>• Lead and sustain debates with audiences. Feed the results back to improve the proposals.<br><br>• Raise the awareness of risk, sustainability and professional ethics. | Give presentations and engage in debates.<br><br>Present records of discussions and their outcomes.<br><br>Present and discuss roadmaps. | **Present and discuss proposals.**<br><br>This could include an ability to:<br><br>• Prepare and deliver appropriate presentations.<br><br>• Manage debates with audiences.<br><br>• Feed the results back to improve the proposals.<br><br>• Contribute to the awareness of risk, sustainability and professional ethics. | Give presentations, present records of discussions and their outcomes. |
| **D3** | **Demonstrate personal and social skills, including the ability to work in teams.**<br><br>This could include an ability to:<br><br>• Know and manage own emotions, strengths and weaknesses.<br><br>• Be aware of the needs and concerns of others, especially where related to diversity and equality.<br><br>• Be confident and flexible in dealing with new and changing interpersonal situations.<br><br>• Identify, agree and lead work towards collective goals.<br><br>• Create, maintain and enhance productive working relationships, and resolve conflicts. | Take responsibility for productive working relationships.<br><br>Evidence from colleagues of your personal and social skills.<br><br>Take responsibility for productive working relationships.<br><br>Apply diversity and anti-discrimination norms and legislation.<br><br>Be sensitive and aware of cultural differences. | **Demonstrate personal and social skills, including the ability to work in teams.**<br><br>This could include an ability to:<br><br>• Know and manage own emotions, strengths and weaknesses.<br><br>• Be aware of the needs and concerns of others, especially where related to diversity and equality.<br><br>• Be confident and flexible in dealing with new and changing interpersonal situations.<br><br>• Identify, agree and work towards collective goals.<br><br>• Create, maintain and enhance productive working relationships, and resolve conflicts. | Contribute to productive working relationships.<br><br>Evidence from colleagues of your personal and social skills.<br><br>Apply diversity and anti-discrimination norms and legislation.<br><br>Be sensitive and aware of cultural differences. |

# E Professional commitment



## Chartered Engineer

| | Description | Examples |
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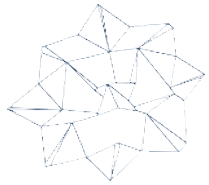
| E | **Demonstrate a personal commitment to professional standards, recognising obligations to the profession, the environment and society.** | |
| E1 | **Demonstrate ethical behaviour and comply with relevant legal and regulatory requirements.**<br><br>This includes an ability to:<br>• Have high professional standards in such a way that ethical actions and solutions are always leading, even in cases that are not (completely) covered by law or codes of conduct.<br>• Demonstrate understanding of societal concerns and how this is reflected in engineering solutions.<br>• Lead work within all relevant legislation and regulatory frameworks, including social and employment legislation. | Name examples of how you apply the code of ethics and what it means for your work.<br><br>Demonstrate initiative in and commitment to the affairs of your profession.<br><br>Work with a variety of conditions of contract.<br><br>Demonstrate your preference for ethical actions and solutions. |



## Incorporated Engineer

| | Description | Examples |
|---|---|---|
| E | **Demonstrate a personal commitment to professional standards, recognising obligations to the profession, the environment and society.** | |
| E1 | **Demonstrate ethical behaviour and comply with relevant legal and regulatory requirements.**<br><br>This includes an ability to:<br>• Have high professional standards in such a way that ethical actions and solutions are always leading, even in cases that are not (completely) covered by law or codes of conduct.<br>• Demonstrate understanding of societal concerns and how this is reflected in engineering solutions.<br>• Manage work within all relevant legislation and regulatory frameworks, including social and employment legislation. | Name examples of how you apply the code of ethics and what it means for your work.<br><br>Contribute to the affairs of your profession.<br><br>Work with a variety of conditions of contract.<br><br>Demonstrate your preference for ethical actions and solutions. |

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| **E2** | **Design, manage and apply safe systems of work.**<br><br>This could include an ability to:<br>• Ensure that systems satisfy health, safety and welfare requirements.<br>• Identify and take responsibility for own obligations for health, safety and welfare issues.<br>• Develop and implement appropriate hazard identification and risk management systems and culture.<br>• Manage, evaluate and improve these systems.<br>• Apply a sound knowledge of health and safety legislation. | Undertake formal health and safety training.<br><br>Work with health and safety legislation and best practice.<br><br>Carry out safety audits.<br><br>Identify and minimise hazards. Assess and control risks.<br><br>Evaluate the costs and benefits of safe working.<br><br>Deliver strategic health and safety briefings and inductions.<br><br>Incorporate safety into your designs. | **Manage and apply safe systems of work.**<br><br>This could include an ability to:<br>• Manage systems that satisfy health, safety and welfare requirements.<br>• Identify and take responsibility for own obligations for health, safety and welfare issues.<br>• Develop and implement appropriate hazard identification and risk management systems and culture.<br>• Manage, evaluate and improve these systems.<br>• Apply a sound knowledge of health and safety legislation. | Undertake formal health and safety training.<br><br>Work with health and safety legislation and best practice.<br><br>Carry out safety audits.<br><br>Identify and minimise hazards.<br><br>Assess and control risks.<br><br>Deliver health and safety briefings and inductions.<br><br>Incorporate safety into your designs. |
| **E3** | **Undertake engineering activities in a way that contributes to sustainable development and a circular economy.**<br><br>This could include an ability to:<br>• Operate and act responsibly, taking account of the need to progress environmental, social and economic outcomes simultaneously.<br>• Use imagination, creativity and innovation to provide products and services which maintain and enhance the quality of the environment and community, and meet financial objectives.<br>• Understand and secure stakeholder involvement in sustainable development.<br>• Use resources efficiently and effectively. | Carry out environmental impact assessments.<br><br>Carry out environmental risk assessments.<br><br>Plan and implement best practice environmental management systems, eg ISO 14000.<br><br>Manage best practice risk management systems eg ISO 31000.<br><br>Work within environmental norms and legislation.<br><br>Adopt sustainable practices.<br><br>Achieve favourable social, economic and environmental outcomes. | **Undertake engineering activities in a way that contributes to sustainable development and a circular economy.**<br><br>This could include an ability to:<br>• Operate and act responsibly, taking account of the need to progress environmental, social and economic outcomes simultaneously.<br>• Provide products and services which maintain and enhance the quality of the environment and community, and meet financial objectives.<br>• Understand and encourage stakeholder involvement in sustainable development.<br>• Use resources efficiently and effectively. | Carry out/contribute to environmental impact assessments.<br><br>Carry out/contribute to environmental risk assessments.<br><br>Manage best practice environmental management systems, eg ISO 14000.<br><br>Manage best practice risk management systems eg ISO 31000.<br><br>Work within environmental norms and legislation.<br><br>Adopt sustainable practices.<br><br>Contribute to favourable social, economic and environmental outcomes. |

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| E4 | **Demonstrate your development strategy and how you plan to carry out and record CPD in order to maintain and enhance all competences A-E.**<br><br>This includes an ability to:<br>• Identify your aims and goals for professional development and translate them into actionable results.<br>• Have insight on developments in your field and translate that to your future development needs.<br>• Continuously challenge, develop and improve technical and behavioural competences.<br>• Practice reflective learning, mentoring and peer review. | Formal education<br><br>Self-directed learning<br><br>Contribution to engineering knowledge<br><br>Support of Chartership Structure<br><br>Profession directed activities<br><br>Industry-based learning<br><br>Coaching and volunteering<br><br>Use of the OPD Tool | **Demonstrate your development strategy and how you plan to carry out and record CPD in order to maintain and enhance all competences A-E.**<br><br>This includes an ability to:<br>• Identify your aims and goals for professional development and translate them into actionable results.<br>• Have insight on developments in your field and translate that to your future development needs.<br>• Continuously challenge, develop and improve technical and behavioural competences.<br>• Practice reflective learning, mentoring and peer review. | Formal education<br><br>Self-directed learning<br><br>Contribution to engineering knowledge<br><br>Support of Chartership Structure<br><br>Profession directed activities<br><br>Industry-based learning<br><br>Coaching and volunteering<br><br>Use of the OPD Tool |


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