Competence Criteria for Chartered Engineer Registration

The work of a Chartered Engineer (CEng) is characterised by their ability to develop appropriate solutions to engineering problems, using new or existing technologies, through innovation, creativity and change. They might develop and apply new technologies, promote advanced designs and design methods, introduce new and more efficient production techniques, marketing and construction concepts, pioneer new engineering services and management methods. Chartered Engineers are engaged in technical and commercial leadership and possess effective interpersonal skills. They demonstrate a personal and professional commitment to society, to their profession, and to the environment.

The competence criteria set out the required skills and knowledge. They are based upon the Competence Statements issued by the Engineering Council (EC^{UK}) as part of UK-SPEC.

You will be expected to refer to all 16 competence criteria in your Engineering Practice Report, demonstrating that you are fully competent in at least 60% - 70% and that you have a knowledge and understanding of the remainder. Please note that the 60-70% applies to each subsection A-E.

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

No	Objective	Range	Evidence Examples
A1	Maintain and extend a sound theoretical approach in enabling the introduction and exploitation of new and advancing technology and other relevant developments. This could include an ability to:	Identify the limits of one's personal knowledge and skills. Strive to extend one's technological capability. Broaden and deepen one's knowledge base through research and experimentation.	Identify, through project involvement and a questioning mind, new areas for development and research. Read technical journals via paper/electronic media. Engage in wider reading of general engineering, research and building design publications. Use / evaluate innovative solutions / new technology in specific projects with particular reference to sustainability and reducing carbon emissions.

No	Objective	Range	Evidence Examples
A2	Engage in the creative and innovative development of engineering technology and continuous improvement systems. This could include an ability to:	Establish users' needs. Assess marketing needs and contribute to marketing strategies. Identify constraints and exploit opportunities for the development and transfer of technology within one's chosen field. Promote new applications when appropriate. Secure the necessary intellectual property rights. Develop and evaluate continuous improvement systems.	Participate in / contribute to multi-disciplinary project teams with other professionals including clients. Evaluate proposals and plan specific tasks using contemporary schemes and solutions. Read publications of other relevant professional institutions. Critically compare your own and others' work Implement innovative technologies paying regard to sustainability and reducing carbon emissions. Evaluate completed projects to establish whether objectives were achieved and consolidate lessons learned. Take account of the commercial value of your and others' innovative work and ideas.

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

No	Objective	Range	Evidence Examples
B1	Identify potential projects and opportunities. This could include an ability to:	Explore the territory within one's responsibility for new opportunities. Review the potential for enhancing engineering products, processes, systems and services. Use one's knowledge of the employer's position to assess the viability of opportunities.	Investigate the business of your employers and understand the company objectives and business plan. Participate in activities, discussions, peer group reviews to enhance knowledge and understanding. Participate in proposals and presentations and contribute to technology transfers, investigative thinking and critical evolution.
B2	Conduct appropriate research, and undertake design and development of engineering solutions. This could include an ability to:	Identify and agree appropriate research methodologies. Assemble the necessary resources. Carry out the necessary tests. Collect, analyse and evaluate the relevant data. Draft, present and agree design recommendations. Undertake engineering design.	Take part as team/individual in early client contact e.g. meetings/presentations, initial proposals and analysis. Select, use and evaluate software packages. Integrate manual and computerised design techniques to achieve practical and innovative solutions. Establish and agree basis of design including e.g. cost plan, deliverables and programme for implementation. Engage with others to obtain specialist input including product design, testing, models, mock-ups and research. Prepare reports to include e.g. option studies, whole-life performance costings, drawing designs and other documentation to solve problems and meet objectives.

No	Objective	Range	Evidence Examples
B3	Implement 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. Identify the required cost, quality, safety, reliability, appearance, fitness for purpose and environmental impact of the outcome. Determine the criteria for evaluating the design solutions. Evaluate the outcome against the original specification. Feed back the results so as to improve future design solutions.	Work (through discussions/secondment/placement) with manufacturers and installers and understand/evaluate their contribution to the design process. Read manufacturers' literature and test data to establish understanding of product development, manufacture and application, and identify any limitations that might apply. Initiate a post occupancy review as an assessment tool. Consult with peers to seek their views of your interpretations. Establish benchmarks with similar projects as an evaluation strategy. Update budgets, make comparisons and evaluate differences. Conduct Value Engineering exercises. Evaluate results against original targets and assumptions .

C. Provide technical and commercial leadership.

No	Objective	Range	Evidence Examples
C1	Plan for effective project implementation. This could include an ability to:	Identify the factors affecting the project implementation. Lead on preparing and agreeing implementation plans and method statements. Ensure that the necessary resources are secured and brief the project team. Negotiate the necessary contractual arrangements with other stakeholders (client, subcontractors, suppliers, etc.).	Play a key role in a major project involving other professionals and disciplines. Engage in site meetings, conduct of negotiations, meeting deadlines. Undertake risk analysis and be aware of the CDM Regulations and other statutory regulations. Develop an implementation programme, identifying significant dates. Estimate any resource required. Answer client queries, respond to changes/requests, advise on cost/benefits ratios, propose alternative solutions. Embrace current and proposed legislation including working towards zero carbon emissions and the use of sustainable materials. Prepare tender and/or bid documentation.

No	Objective	Range	Evidence Examples
C2	Plan, budget, organise, direct and control tasks, people and resources. This could include an ability to:	Set up appropriate management systems Agree quality standards, programme and budget. Organise and lead work teams, coordinating project activities. 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 part in tender analysis. Use/compile criteria/checklists to ensure fair judgement between different tenderers. Observe and report inconsistencies/misleading presentation of information in tenders received. Advise and report, with recommendations, on competing tenders. Obtain and use standard forms. Read and refer to relevant legislation, cases , information resources e.g., periodicals, Times Law Report and participate in contract law training courses/seminars. Contribute to preparing documentation for claims or disputes. Prepare spreadsheets of costings, resource required and monitor these against agreed programmes. Evaluate any proposed changes and make recommendations/issue instructions accordingly.
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. Lead and support team and individual development. Assess team and individual performance, and provide feedback.	Have responsible experience of supervising others. Draft job/ person specifications, job adverts. Contribute to selecting team members, coach, train and develop team spirit, resolve disputes. Participate in/ develop appraisal systems. Exhibit leadership skills, e.g. in managing a crisis. Have responsibility in Quality Circles or similar. Read books and articles on quality theory, TQM and current case studies. Analyse the distinctive features of QA in the building services engineering environment. Undertake a cost/benefit analysis of the QA scheme operated by your organisation. Participate in damage limitation/ reparation when QA becomes compromised. Participate in Investors in People Scheme or similar.

No	Objective	Range	Evidence Examples
C4	Bring about continuous improvement through quality management. This could include an ability to:	Promote quality throughout the organisation and its customer and supplier networks. Develop and maintain operations to meet quality standards. Direct project evaluation and propose recommendations for improvement.	Establish and participate in company quality schemes. Consult with and make presentations to peer group on e.g. projects undertaken, project development, solutions reached. Organise or participate in quality groups. Evaluate your own work and be critical as to its content and outcome. Set key performance indicators (KPI) Encourage manufacturers, contractors and other professionals to evaluate their progress/inputs/outputs at strategic stages. Engage in a process of continuous evaluation against preset targets, e.g. for use of resources, cash flow, drawing/documentation production, installation progress.

D. Demonstrate effective interpersonal skills.

No	Objective	Range	Evidence Examples
D1	Communicate with others at all levels. This could include an ability to:	Contribute to, chair and record meetings and discussions. Prepare letters, documents and reports. Exchange information and provide advice to technical and non-technical colleagues.	Identify opportunities/constraints inherent in different site settings. Prepare agendas and minutes for site meetings, identify/ develop/ establish formal/ informal communication channels between site personnel. Negotiate on variations and instructions. Prepare / handle handover/closing documentation. Participate in meetings, produce records and documentation. Explain process, technical rationales and constraints as necessary to clients and colleagues. e.g. Factory Acceptance Tests, witness testing on site, role of regulatory authorities

No	Objective	Range	Evidence Examples
D2	Present and discuss proposals. This could include an ability to:	Prepare and deliver appropriate presentations. Lead and sustain debates with audiences. Feed the results back to improve the proposals.	Take part in meetings with prospective clients. Analyse client specifications. Obtain involvement of different departments in preparing final package. Prepare bids. Evaluate final tender, appreciate particular tendering practices/ cultural differences of particular types of client, e.g. local authority clients, private/public sector clients, overseas clients, PFI, Partnering. Develop practical skills in presentations (relevant software, flip charts, over-heads) to small and large groups having researched and prepared material. Attend seminars, critically evaluate their usefulness, ask questions and debate answers.
D3	Demonstrate personal and social skills. This could include an ability to:	Know and manage one's own emotions, strengths and weaknesses. Be aware of the needs and concerns of others. Be confident and flexible in dealing with new and changing interpersonal situations. Identify, agree and work towards collective goals. Resolve conflicts and create, maintain and enhance productive working relationships.	Select and use appropriate communications styles for the range of professional situations, e.g. skim/ scan/ study, write for notes, memos, formal letter, academic, reports, minutes. Exhibit listening skills. Make oral presentation to small / large formal / informal groups. Exhibit interpersonal skills e.g. assertiveness, negotiation, flexibility, dealing with conflict. Select appropriate communication modes / approaches for different situations e.g. sell, explain, reprimand. Communicate in a foreign language. Effectively manage your own time.

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

No	Objective	Range	Evidence Examples
E1	Comply with relevant codes of conduct. This could include an ability to:	Comply with the rules of professional conduct of one's own professional body. Work constructively within all relevant legislation, including social and employment legislation.	Examine digest and abide by the relevant Codes of Conduct. Exercise all reasonable professional skill and care Give due regard as appropriate to the Engineering Council (ECUK) Guidelines. Maintain a working knowledge of current and impending legislation, standards and Codes of Practice that will influence, guide and regulate your work. Maintain professional competence by research, reading and participating in the activities of the Institute.

No	Objective	Range	Evidence Examples
E2	Manage and apply safe systems of work. This could include an ability to:	Identify and take responsibility for one's own obligations for health, safety and welfare issues. Ensure that systems satisfy HS&W requirements. Develop and implement appropriate hazard identification and risk management systems. Manage, evaluate and improve these systems.	Be aware of your employers' health and safety policy and practice as they relate to your personal circumstances and to your responsibility for others. Provide information as required for the Health and Safety plan for projects and to comply with the Construction (Design & Management) Regulations (CDM). Be familiar with safe systems of work, method statements for the execution of work and permits to work systems.
E3	Undertake engineering activities in a way that contributes to sustainable development. This could include an ability to:	Operate and act responsibly, taking account of the need to progress environmental, social and economic outcomes simultaneously. 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. Understand and encourage stakeholder involvement.	Actively promote the profile and implementation of engineering solutions and designs that embrace the principles of sustainability in materials and energy sources. Actively engage in the process of reducing carbon emissions by reducing energy requirements using prudent design techniques and innovation. Observe good practice with regard to aspects of sustainability in the conduct of your own work. Help clients to embrace sound environmental principles by providing them with whole life performance information
E4	Carry out continuing professional development necessary to maintain and enhance competence in one's area of practice. This could include an ability to:	undertake reviews of one's development needs prepare action plans to meet personal and organisational objectives Carry out planned (and unplanned) CPD activities Maintain evidence of competence development Evaluate CPD outcomes against the action plans Assist others with their own CPD.	Be involved with Professional Institution activities. Read professional journals, attend employer, and other development seminars. Plan own immediate medium and long term CPD. Help others plan their CPD. Establish links with local training/education providers. Advise others on building services engineering careers. Mentor, assist and guide the professional development of others Access information sources for learning opportunities. Exercise skills transfer between professional and personal life.