

**Competence Profiles – Guidance for applicants and Assessors for  
Incorporated, Chartered & Fellow Engineering Status**

**PART 2 – INDUSTRY CLASSIFICATION (N) – WATER INDUSTRY**

**Introduction**

The regulatory capital value for English and Welsh water companies alone is £58billion (2010/2011). Because a large proportion of this value is bound up in engineered assets, there is considerable engineering activity within these companies. The industry is highly regulated with price increases determined by a large number of factors such as product quality, efficiency and cost of capital. Extremely large sums are spent annually on asset renewal and projects to enhance performance which are monitored by the regulator. Engineers working in the industry need to understand the opportunities and constraints arising from regulation.

Water engineering falls into a number of categories: water treatment (clean water) and sewage treatment (dirty water), networks, distribution, flood defences, irrigation and cooling systems. Within those categories, professional engineers will be involved either in the operation of existing treatment sites (operations/maintenance), the provision of new assets (capital projects) and research & development.

Whilst mechanical engineers in the water industry generally work with known technology and tried and tested equipment, the nature of the processes involved represents significant engineering challenges in respect of the application of technology and equipment. In addition, mechanical engineers are required to have a very broad base of ability and to develop skills in other engineering disciplines, particularly civil, electrical and chemical engineering. The ability to develop cross-discipline solutions is an important attribute for a professional engineer in this environment.

Much of the detailed engineering activity is carried out by specialist contractors, in conjunction with plant manufacturers. Activities such as project feasibility, analysis of options, conceptual design, detailed design, specification and procurement are carried out. Frequently, the role of the professional engineer will be to manage those activities and act as the project manager.

Capital projects can be driven by one or more of a number of factors such as, quality/process improvements, new development/connections, environmental and health and safety legislation and asset renewal. Projects can be £multi-million in value and have to be delivered within tightly constrained levels of funding and timescales. Achievement of those financial and completion targets represents a significant challenge to the professional engineer. In addition, reduction in whole-life costs requires significant technical input and innovation.

The delivery of capital projects can provide opportunities for the professional engineer to follow a project from its conception through to installation and commissioning, and to gain experience and learn lessons in the process. Similarly an engineer working in the water industry may have worked in one or a small number of

areas developing in-depth knowledge therein. Management experience and commercial awareness can be developed throughout the supply chain, via the management of contracts, consultants, suppliers, manufacturers, operational, maintenance and design teams.

On the Operational side there is a role for professional engineers in respect of operations and maintenance management, particularly in respect of strategies to improve reliability of plant, reduce running costs and optimise maintenance regimes. A further role can be in the development of technical solutions or modelling, leading to the inception of, or in support of, capital projects.

In summary, a professional mechanical engineer in the water industry needs to understand the regulatory framework within which the industry operates. He/she should demonstrate a broad base of technical knowledge and also an ability to develop cost-effective technical solutions, taking account of environmental and health and safety considerations. The ability to develop strategic solutions is also essential, as is the ability to operate with minimal supervision and to manage others.

In order to assess professional engineering responsibilities against such a varied and changing background, it is now necessary to judge an individual's competences, as distinct from investigating time spend in designated posts previously deemed to meet the Institution's requirements for Membership. The method of assessing the various elements of competence within sections A to E, in accordance with the benchmark profile for Membership (normally a minimum of three sections at level 3 plus two sections at level 2), is fully described in the Membership Department's Guidance Notes for Applicants and Assessors.

### **Requirements for Election or Transfer to Member**

Mechanical engineers who operate as line managers for other engineers should normally be expected to fulfil the Institution's requirements for the Class of Member. However, the majority of applications for membership are likely to be received from engineers at the next level down of responsibility. An engineer project-managing a complex project that involves the supervision of junior engineers, consultants or contractors' staff, or site-based staff, may be expected to fulfil the Institution's requirements for the Class of Member. The same may also be true of an engineer with responsibility for a number of smaller, less complex projects.

On the operational side, engineers responsible for strategic maintenance planning, the management of assets or the planning of high value or complex projects may also meet the Institution's requirements.

## **ASSESSMENT OF COMPETENCES**

### **INCORPORATED ENGINEERING STATUS**

Since applications are likely to be received from engineers not operating at a management level, it is most important to assess the applicant's personal responsibilities and competences, together with their direct input to projects and their degree of supervision. Simply working on a multi-million pound project is not sufficient, it is their rôle in the delivery of the project that is important. Clear and comprehensive organisation charts will be key to the appraisal process. Assessors may find it helpful to refer to the section entitled "Engineers in Project Management Roles" which appears later in Part 2 of this manual.

#### **Competence Statement A**

Successful applicants will be able to demonstrate their use of a combination of general engineering knowledge and understanding. In particular, they should have an understanding of pumping plant design and application and be aware of the potential for new technologies within the water industry.

Examples of activities that may give Incorporated Engineers the opportunity to achieve and demonstrate competence in their areas include:

- Understanding of pumping plant and design of pumping installations.
- Understanding of process plant and design.
- Broaden knowledge of new technologies and their application in the water industry.

#### **Competence Statement B**

Assessors should seek evidence of contribution to the production of technical specifications or technical reports. These may either relate to process streams requiring the linking together of different items of plant, or to detailed specifications/reports for discrete items of plant. In addition, applicants should demonstrate ability to carryout designs to solve problems during or following commissioning.

Examples where competence can be demonstrated include:

- Contribute to tender documentation, feasibility reports or technical specifications.
- Development of design drawings, value engineering of designs.
- Studies of operational problems and implementation of solutions.
- Contribute to post project evaluation.

#### **Competence Statement C**

Applicants are not necessarily expected to have any line management responsibility in order to meet the required level of competence in this section. Applicants are expected to have elements of project management experience. Evidence of planning and monitoring should be sought. Examples of situations or activities that may give incorporated engineers the opportunity to achieve and demonstrate competence in these areas include:

- Project management/contribute to low value or complex projects.
- Contribute to the review and formulation of maintenance strategies.
- Active contribution to the development of improved processes and value engineered solutions.
- Manage/contribute to project planning activities, including quality, cost and time.

#### **Competence Statement D**

Communication and interpersonal skills should be assessed by consideration of both the Professional Review Report and interview performance. Assessors should look out for a report which has a logical structure, clearly aimed at presenting a portfolio of evidence against each of the five competence statements, while providing a qualitative description of activities and achievements.

Assessment of verbal communication skills should analyse the ability to give clear, concise and relevant answers that address the question without undue digression and provide sufficient, but not superfluous detail.

Additional evidence of competence in this area may be sought by investigating:

- Preparation of studies and reports
- Whether the applicant routinely makes presentations to management at various levels within their own company and or across the supply chain, subjects could include project plans, business plans, etc.
- Whether the applicant contributes to tender and contract liaison and negotiations - systems, procedures, method statements, safety, etc.
- Chairing, minuting, participating in meetings

#### **Competence Statement E**

The observance of safe working procedures, the implementation of the CDM regulations, H&SWA, and the management of risk are fundamental requirements for incorporated engineers within the water industry. Similarly, the regulatory framework, the European Directives regarding Utility Procurement and the contractual framework within which projects are managed require awareness and observation. Evidence of professional integrity and commitment should include a Self-Development Action Plan, in any convenient format, outlining how the applicant intends to maintain and enhance competence through personal development. The Plan should include short, medium and long-term goals and explain how these are likely to be achieved.

Examples of CPD activities recognised by the Institution as acceptable include:

- extra qualifications such as an MBA, Diploma in Engineering Management
- any relevant technical or business courses
- conducting or attending workshops

- attending, presenting or participating in seminars and conferences
- presenting or attending lectures
- reading technical articles and journals
- distance or open learning
- Institution meetings or events
- Involvement with the IMechE

### **CHARTERED ENGINEERING STATUS**

Since applications are likely to be received from engineers not operating at a management level, it is most important to assess the applicant's personal responsibilities and competences, together with their direct input to projects and their degree of supervision. Simply working on a multi-million pound project is not sufficient, it is their role in the delivery of the project that is important. Clear and comprehensive organisation charts will be key to the appraisal process. Assessors may find it helpful to refer to the section entitled "Engineers in Project Management Roles" which appears later in Part 2 of this manual.

#### **Competence Statement A**

Successful applicants will be able to demonstrate their use of a combination of general and specialist engineering knowledge and understanding. In particular, they should have a good grasp of pumping plant design and application and be aware of the potential for new technologies within the water industry.

Examples of activities that may give mechanical engineers the opportunity to achieve and demonstrate professional competence in their areas include:

- Selection of pumping plant, design or optimisation of pumping installations.
- Selection of process plant and design and optimisation of related processes.
- Development of new technologies and their application.
- Selection of materials to solve specific process problems.

#### **Competence Statement B**

Assessors should seek evidence of responsibility for the production of technical specifications or technical reports. These may either relate to process streams requiring the linking together of different items of plant, or to detailed specifications/reports for discrete items of plant. In addition, applicants should demonstrate an ability to review designs carried out by others and to solve problems during or following commissioning.

Examples where competence can be demonstrated include:

- Production of tender documentation, feasibility reports or technical specifications.
- Approval of design drawings, value engineering of designs.
- Studies of operational problems and implementation of solutions.

### **Competence Statement C**

Applicants are not necessarily expected to have line management responsibility or experience in order to meet the required level of competence in this section. What is important is that they demonstrate their responsibilities in respect of project management and their management of contractors, consultants, suppliers, manufacturers and colleagues. Evidence of a high degree of autonomy in respect of planning and monitoring should be sought.

Examples of situations or activities that may give engineers the opportunity to achieve and demonstrate competence in these areas include:

- Project management of high value or complex projects.
- Review and formulation of maintenance strategies.
- Active contribution to the development of improved processes and value engineered solutions.

### **Competence Statement D**

Communication and interpersonal skills should be assessed by consideration of both the Professional Review Report and interview performance. Assessors should look out for a report which has a logical structure, clearly aimed at presenting a portfolio of evidence against each of the five competence statements, while providing a qualitative description of activities and achievements.

Assessment of verbal communication skills should analyse the ability to give clear, concise and relevant answers that address the question without undue digression and provide sufficient, but not superfluous detail.

Additional evidence of competence in this area may be sought by investigating:

- Preparation of studies and reports
- Whether the applicant routinely makes presentations to management at various levels, within their own company and or across the supply chain; subjects could include project plans, business plans, etc.
- Whether the applicant is involved in tender and contract liaison and negotiations - systems, procedures, method statements, safety, etc.
- Chairing, minuting, participating in meetings

### **Competence Statement E**

The observance of safe working procedures, the implementation of the CDM regulations, H&SWA and the management of risk are fundamental requirements for professional engineers within the water industry. Similarly, the regulatory framework, the European Directives regarding Utility Procurement and the contractual framework within which projects are managed require understanding and observation.

Evidence of professional integrity and commitment should include a Self-Development Action Plan, in any convenient format, outlining how the applicant intends to maintain and enhance competence through personal development. The Plan should include short, medium and long-term goals and explain how these are likely to be achieved. Assessors should be aware that

UK-SPEC interprets Continuing Professional Development (CPD) as commencing at the point where Chartered status is attained; therefore applicants are not required to provide a record of courses attended, etc., when applying for corporate membership.

Examples of CPD activities recognised by the Institution as acceptable include:

- extra qualifications such as an MBA, Diploma in Engineering Management
- any relevant technical or business courses
- conducting or attending workshops
- attending, presenting or participating in seminars and conferences
- presenting or attending lectures
- writing technical papers
- reading technical articles and journals
- distance or open learning
- secondments and job rotation
- updating in own and other fields of work
- Institution meetings or events
- active IMechE committee work
- learning a foreign language
- involvement in government activities
- community and charity work

### **Requirements for election or transfer to Fellow**

The Institution of Mechanical Engineers has recently altered the requirements for Corporate Members who wish to upgrade their Membership to Fellowship. The focus is now on the qualities required for Fellowship rather than on the UK-SPEC competences which have already been demonstrated to gain Membership and Professional Registration.

The requirements are split into three types: Essential, Desirable and Optional, details of which can be found on the IMechE website using the following link:

<http://www.imeche.org/training-and-professional-development/career-development/fellowship/upgrade-to-fellow>

For candidates applying for **direct election to the class of Fellow**, a Professional Review Report similar to that required for the class of Member would be required, in addition to an interview. In particular, this report must contain additional supporting evidence detailing the Qualities for Fellowship, which include:

- The position of senior responsibility held by the applicant
- The applicant's contribution to the professional development of young engineers
- How the applicant intends to keep up to date regarding developing technologies, from both technical and commercial standpoints
- Development Action Plan detailing a future programme of CPD

Applicants should refer to the guidance notes for the full set of assessment requirements before submitting their paperwork.